Cradle to Grave Waste Analysis Study

Payara Project

June 2021

Esso Exploration and Production Guyana Limited

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Acronyms and Abbreviations

Name	Description
°C	degrees Celsius
ADR	International Carriage of Dangerous Goods by Road
AFR	alternative fuels and raw materials
ANTT	National Land Transport Agency (Agências Nacionais de Transporte Terrestre)
AWSL	Approved Waste Site List
BAT	best available technology
bbl	barrels
CBA	cost / benefits analysis
CCU	cargo carrying unit
CFR	Code of Federal Regulation
Dev Well	Development Wells
DOECAP	U.S. Department of Energy Consolidated Audit Program
DOT	U.S. Department of Transportation
E&A	exploration and appraisal
E&P	exploration and production
EBD	East Bank Demerara
Ecotox	Ecotox Environmental Services Ltd.
EEPGL	Esso Exploration and Production Guyana Limited
EHS	environmental, health, and safety
EIA	Environmental Impact Assessment
EII	Eternity Investment Inc.
EPA	Guyana Environmental Protection Agency
EU	European Union
EWMSG	Environmental Waste Management Services Guyana Inc.
FPSO	floating, production, storage and offloading vessel
FSV	fast supply vessel
GSEC	Ground Structures Engineering Consultants Ltd.
GWI	Guyana Water Incorporated
GYSBI	Guyana Shore Base Inc.
HBL	Haags Bosch Landfill
HEPA	high-efficiency particulate absorbing/arrestance
HTDU	Hot Oil Thermal Desorption Unit
IBAMA	Instituto Brasileiro do Meio Ambiente e dos Recursos
IBC	international bulk chemical
IFC	International Finance Corporation
IMDG	International Maritime Dangerous Goods
IMO	International Maritime Organization
IOGP	International Association of Oil & Gas Producers
ISO	International Organization for Standardization
IWMF	integrated waste management facility
kg	kilogram
km	kilometer
LMP	liquid mud plant
LP1	Liza Phase 1
LP2	Liza Phase 2
m^2	square meters
m^3	cubic meters
MARPOL 73/78	International Convention for the Prevention of Pollution by Ships, 1973, as modified by the Protocol of 1978
MEPC	Marine Environment Protection Committee

Name	Description
MIST	Microemulsion Injection and Separations Technology
MPV	multipurpose vessel
MSD	marine sanitation device
MSV	marine support vessel
MT	metric tons
MTR	waste transport manifest
NAF	non-aqueous fluid
NORM	Naturally Occurring Radioactive Material
OIW	oil in water
OIWA	oil in water analyzers
OWMS	Oilfield Waste Management Services
OWS	oily water separator
PSV	platform supply vessel
POTW	publicly owned treatment works
ppm	parts per million
RAMPS	RAMPS Logistics
RCRA	Resource Conservation and Recovery Act
SDS	safety data sheet
SES	Sustainable Environmental Services
SSH&E	Safety, Security, Health & Environment
Study	Cradle to Grave Waste Analysis Study
SURF	subsea umbilicals, risers, and flowlines
TCLP	Toxicity Characteristic Leaching Procedure
TCW	treatment, completion, and workover
TOG	total oil and grease
TOR	Terms of Reference
TPH	total petroleum hydrocarbons
TRG	Tiger Rentals Guyana
TSDF	treatment, storage, or disposal facility
U.S.	United States
UK	United Kingdom
UN	United Nations
USEPA	United States Environmental Protection Agency
VIR	vertical infrared desorption
WBG	World Bank Group
WFAA	Waste Facility Audit Association
WMP	Waste Management Plan
WMT	Waste Management Tool
WPS	Waste Profile Sheet
WRAP	Waste Receiver Assessment Program

1. EXECUTIVE SUMMARY

This Cradle to Grave Waste Analysis Study (Study) was conducted to provide a holistic, beginning-to-end overview of waste generation and management resulting from Esso Exploration and Production Guyana Limited's (EEPGL) projects in Guyana. The Study covers waste streams generated offshore during exploration, development and production operations, including points of generation, composition and concentrations, transportation, treatment method processes, disposal locations, anticipated disposal frequencies, and application of relevant international standards and best practices. This Study addresses each of the seven objectives set forth in Section 2.1 of the January 2021 Terms of Reference (TOR), as well as specific Study topics identified in the remaining sections of the TOR (EEPGL 2021). The methodologies used in the Study are set forth as appropriate in each section of the Study or are reflected as a part of a table or graph.

The **highlights** of the Study are as follows:

- Opening the Haags Bosch Landfill (HBL) Cell 2 will provide adequate short term disposal capacity, but a longer-term strategy needs to be evaluated and implemented. Consideration of an engineered landfill for industrial waste needs to be evaluated.
- Waste volumes will increase as a result of additional floating, production, storage and offloading (FPSO) vessels, drill ships for exploration and appraisal (E&A) and development wells (Dev Wells), liquid mud plants (LMP) and marine support vessels (MSV) tank cleaning services transitioning from Trinidad to Guyana.
- Third-party waste treatment capacity meets estimated project demands and capacity will be evaluated annually. Waste oil recycling options are needed in Guyana to address the growing volumes generated from consumer vehicles, industrial generators, marine vessels, and oil and gas industry.
- A cost/benefits analysis (CBA) for specific recycling infrastructure related to potential high volume recyclables such as wood, plastic, and cardboard/paper needs to be conducted.
- Practicable technology is currently utilized at Tiger Rentals Guyana (TRG), and additional technology improvements will be utilized at Sustainable Environmental Services (SES), which will operate an integrated waste treatment facility starting this year. SES will operate some Best Available Technology (BAT) with their treatment processes.

The **recommendations** of the Study include the following:

- Continue implementing international waste management standards and best practices in working with the Guyana Environmental Protection Agency (EPA) on updating the regulatory framework in Guyana.
- Based on Government priorities, align on issues and conduct focused CBAs and prioritize capacity building such as developing an environmental analytical laboratory in Guyana.
- Conduct workshops with relevant, multiple stakeholders to enhance collaboration with the EPA.
- The development of the Comprehensive Waste Management Plan (WMP) will account for lessons learned from data efficiency reviews, capturing waste volume estimate revisions, and suggesting potential improvement opportunities.

2. INTRODUCTION

EEPGL, which is the operator of the Stabroek, Canje, and Kaieteur Blocks offshore Guyana, is engaged in numerous ongoing exploration and development operations offshore, and began production of the Liza Phase 1 (LP1) Project in December 2019 with the deployment of the first FPSO vessel in Guyana. EEPGL has obtained additional Production Licenses and Environmental Permits to develop and operate the Liza Phase 2 (LP2) Project and the Payara Project, which will result in a second and third FPSO. EEPGL's various exploration and development projects result in generation of certain wastes that must be managed by EEPGL and its contractors, consistent with required WMPs and applicable regulations and industry best practices (EEPGL 2017, 2018, 2020e, 2020f, 2020g, 2020h).

3. STUDY OBJECTIVE AND SCOPE

This Study is developed pursuant to the requirements of the Payara EPA Environmental Permit #20181204-PPOIX dated 24 September 2020 (EPA 2020). Conditions in the EPA Environmental Permit are summarized herein.

> *5.20 During the lifetime of the Project, the Permit Holder shall be responsible for stewarding and auditing the activities of all downstream subcontractors handling Project waste streams, and shall contractually require them to conduct all treatment and disposal of such waste streams in keeping with the EPA approved Waste Management Plan included within the Project EIA.*
>
> *5.21 Within thirty (30) days of issuance of the Permit, the Permit Holder shall submit to the EPA for approval the Terms of Reference for the conduct of a "cradle to grave" waste analysis study, which must include factors related to i) environment, ii) management, iii) auditing, iv) schedule and v) cost/benefits. The "cradle to grave" waste analysis study must be submitted to the EPA for approval within sixty (60) days of the EPA's approval of the Terms of Reference.*
>
> *5.22 The approved "cradle to grave" waste analysis study must form part of the revised Waste Management Plan which shall be submitted within one (1) month of submission of the "cradle to grave" waste analysis approved study.*
>
> *5.23 The Revised Waste Management Plan referenced in condition 5.22 shall be implemented during the lifetime of the project.*

Given these permit conditions, the primary objective of this Study is to provide a "cradle to grave" analysis of waste management practices for the project.

Consistent with the TOR and EPA's 28 May 2021 comments on the March 2021 draft Study, this final Study:

- Characterizes EEPGL waste streams and provide waste profiles including concentration and composition based on best information available;
- Supplies a third-party waste management facility's Waste Acceptance Criteria (Appendix E), Waste Sampling Plan (Appendix F);
- References a third-party waste management facility's 2020 Annual Environmental Report that includes landfill volumes;
- Provides Safety Data Sheets (Appendix I) and analytical results for waste streams (Appendix J);

- Provides waste treatment flow diagrams covering each waste stream and standardized waste manifest form(s);
- Evaluates EEPGL waste streams, estimated volumes, waste treatment methodologies and waste disposal methods;
- Provides anticipated EEPGL waste volumes from 2021–2045 to be generated and managed;
- Provides applicable international best practices and standards for the treatment, transport and disposal of waste, and auditing waste treatment providers and disposal facilities;
- Conducts BAT evaluation for all waste processing and treatment equipment and provides alternatives where necessary to ensure the most appropriate industry-proven technologies are used to process and treat each waste stream; and
- Analyzes capacity and need for third-party laboratory(ies), recycling opportunities, capacity building workshops, new landfill, vessel tank cleaning capability and drilling/mud plant waste minimization strategy and alternative technologies; and recommends the EPA and EEPGL identify and prioritize where detailed CBAs are needed to support capacity building decisions.

EEPGL has previously submitted cradle to grave waste analysis information between June and November 2020 (EEPGL 2020b, 2020c, 2020d, 2020e). Submittals have consisted of presentations, waste and treatment equipment process flow diagrams, a Waste Management Tool (WMT), a sample Manifest form and Waste Profile Sheets (WPSs), treatment and discharge best practices, and comprehensive tables that include waste streams, volume, and treatment, all of which also serve as mechanisms of waste management capacity building. This Study includes and supplements the information previously submitted consistent with the objectives in Section 2.1 of the TOR.

See Appendix A for the TOR Requirements Crosswalk Table, which is a reference index that provides the section number(s) in this Study where each element of the TOR is addressed.

3.1 Waste Management—International Conventions, Regulations, Standards, Guidelines, and Best Practices

The waste management activities described in this document for the various offshore and onshore operations are conducted in accordance with both Guyanese regulations and various applicable international conventions, regulations, standards, and guidelines/best practices, including ExxonMobil's best practices. Some of these conventions, regulations, standards, and guidelines are referenced in this report.

The various waste management operations include:

1. General Maritime Waste Management Operations;
2. Maritime Transport of Waste Operations;
3. Offshore Oil and Gas Exploration and Production (E&P) Waste Management Operations;
4. Onshore Waste Management Operations; and
5. Land Transport of Waste Operations.

The following discussion identifies and briefly describes the international conventions/regulations/standards/guidelines/best practices that are applicable to these waste management operations.

3.1.1 General Maritime Waste Management Operations

The primary international convention governing general maritime waste management operations (and applicable to all vessels involved with offshore operations) is the International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978 (MARPOL 73/78) (IMO 2019). MARPOL, which is an international marine environmental convention that includes regulations aimed at preventing and minimizing pollution from ships, has technical annexes:

- Annex I—Regulations for the Prevention of Pollution by Oil—this annex specifies tanker design features, treatment of bilge, ballast, and tank cleaning waters, and documentation of oily wastewater discharges.
- Annex II—Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk—this annex details discharge criteria for noxious liquids, discharge only to reception facilities, and the international bulk chemical code (IBC Code).
- Annex III—Prevention of Pollution by Harmful Substances Carried in Packaged Form—this annex contains requirements for standards on packing, marking, labeling, documentation, stowage, quantity subtraction, division and notifications for preventing pollution by harmful substances. The Annex is in line with the procedures detailed in the International Maritime Dangerous Goods (IMDG) Code, which has been expanded to include marine pollutants (IMO 2018).
- Annex IV—Prevention of Pollution by Sewage from Ships—this annex includes requirements to control pollution by sewer discharge, and also includes International Sewage Pollution Certification requirements for marine sanitation devices (MSD).
- Annex V—Prevention of Pollution by Garbage from Ships—this annex describes the various types of garbage (including food) and other marine debris that can be disposed at sea.
- Annex VI—Prevention of Air Pollution from Ships—this annex introduces requirements to regulate air pollution emitted from ships and from shipboard incineration.

In addition to MARPOL, the International Maritime Organization (IMO) Marine Environment Protection Committee (MEPC) also periodically issues resolutions that supplement the MARPOL convention. Examples of pertinent resolutions include Standard Specification for Shipboard Incinerators (resolution MEPC.244(66)) that covers the design, manufacture, performance, operation and testing of incinerators to incinerate garbage and other shipboard waste (IMO 2014); Revised Guidelines for Systems for Handling Oily Wastes in Machinery Spaces of Ships (MEPC.1/Circ.511) (IMO 2006); and Guidelines for the Development of Garbage Management Plans (resolution MEPC.220(63)) (IMO 2012).

Additional IMO/MARPOL information can be found at the following link: https://www.imo.org/en.

3.1.2 Maritime Transport of Waste Operations

Maritime transport of wastes (hazardous/dangerous) worldwide is generally governed by the IMO IMDG Code (2018 edition, including the most recent Amendment 39-18—valid through 31 May 2022).[1]

The IMDG Code addresses classifications of dangerous goods, packing and tank provisions, consignment procedures, construction and testing of packaging, IBCs, portable tanks, etc., and transport operations. The code also includes the dangerous goods listing. Additional details about the IMDG Code can be found at https://www.imo.org/en/publications/Pages/IMDG%20Code.aspx

[1] The IMDG Code, 2020 Edition (including Amendment 40-20) comes into force on 1 June 2022 and may be applied voluntarily as from 1 January 2021.

This standard applies directly to the classification and packaging of dangerous goods on ships, the documentation required to track maritime transport of dangerous goods, as well as actual dangerous goods transport operations, including loading and unloading.

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel Convention 1989) was adopted on 22 March 1989. At present, the only means for transboundary movement of wastes from Guyana is via maritime transport. The Basel Convention annexes provide definitions for hazardous wastes, as well as identify operations that are understood to be disposal or recovery. The convention also identifies conditions on the import and export of hazardous wastes, including requirements for notice, consent, and tracking for movement of wastes across international boundaries. EEPGL uses the Basel Convention annexes to characterize waste streams for its WPSs. Currently, the convention is not relevant as EEPGL does not import or export hazardous wastes. See the following web link for additional information about the Basel Convention: http://www.basel.int/.

3.1.3 Offshore Oil and Gas Exploration and Production Waste Management Operations

There are no international regulations that specifically address offshore E&P waste management operations—these activities are regulated by the relevant government entities with jurisdictions over territorial waters. For example, the United States EPA (USEPA) has promulgated Oil and Gas Extraction Effluent Guidelines and Standards (40 Code of Federal Regulation [CFR] Part 435), and these requirements are incorporated into National Pollutant Discharge Elimination System discharge permits issued for offshore oil and gas projects within 200 miles of shore.

However, there are various guidelines for environmental, health, and safety (EHS) that have been developed by entities with international interests and influence, including the following:

- World Bank Group (WBG) and International Finance Corporation (IFC) EHS Guidelines for Offshore Oil and Gas Development (2015)—This guidance document includes information relevant to exploratory and production drilling, development and production activities, offshore pipeline operations, offshore transportation, tanker loading and unloading, ancillary and support operations, and decommissioning. It also addresses potential onshore impacts that may result from offshore oil and gas activities (WBG and IFC 2015). See: http://documents1.worldbank.org/curated/en/378221479466912449/pdf/110348-FINAL-Jun-2015-Offshore-Oil-and-Gas-EHS-Guideline-PUBLIC.pdf.
- International Association of Oil & Gas Producers (IOGP) and International Petroleum Industry Environmental Conservation Association—Environmental Management in the Upstream Oil and Gas Industry (IOGP and IPIECA 2020)—this guidance document, which was prepared with input and feedback from the United Nations Environment Programme, details all environmental management aspects related to upstream oil and gas development, including best practice methods for identifying and mitigating environmental impacts related to offshore and onshore discharges and wastes generated from E&P activities. See: https://www.ipieca.org/resources/good-practice/environmental-management-in-the-upstream-oil-and-gas-industry/.
- IOGP—Managing Naturally Occurring Radioactive Material (NORM) in the oil and gas industry (2016)—this report provides guidance and general information on the management of process streams or equipment contaminated with NORM, including transport of NORM, management of NORM and permanent disposal options (IOGP and IPIECA 2016). See: https://www.iogp.org/bookstore/product/412/.

3.1.4 Onshore Waste Management Operations

Onshore waste management operations are highly variable worldwide and range from simple to complex in their technical design and implementation. There are no international regulations applicable to onshore waste management operations nor are there any international treatment standards, as these waste management operations are regulated by the relevant government entities with jurisdictions. For example, dozens of industrialized nations throughout North America, Europe, and Asia have promulgated treatment standards applicable to waste management operations, such as the United States (U.S.) Resource Conservation and Recovery Act (RCRA) regulations (https://www.epa.gov/rcra), which include treatment standards and limits for a wide variety of waste treatment processes and discharges (USEPA Undated); and the European Union (EU) emission and efficiency standards for waste treatment BAT Reference Document for Waste Treatment (https://eur-lex.europa.eu/eli/dec_impl/2018/1147/oj) (European Commission 2018). However, there are various guidelines for EHS for onshore waste management operations that have been developed by entities with international interests and influence, including the following:

- WBG and IFC EHS Guidelines (2007)—this guidance document is a technical reference document with general examples of Good International Industry Practice. These guidelines are referenced by the industry specific guidelines, and include waste management aspects, including wastewater and ambient water quality, hazardous materials management and waste management (WBG and IFC 2007a). See: https://www.ifc.org/wps/wcm/connect/29f5137d-6e17-4660-b1f9-02bf561935e5/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES&CVID=jOWim3p.
- WBG and IFC EHS Guidelines for Onshore Oil and Gas Development (2007)—this guidance document includes sections on the impacts and management of wastewater/effluent discharges and solid and liquid waste management (WBG and IFC 2007b). See: http://documents1.worldbank.org/curated/en/858751486372860509/pdf/112103-ENGLISH-Onshore-Oil-and-Gas-Development-PUBLIC.pdf.
- WBG and IFC EHS Guidelines for Waste Management Facilities (2007)—this guidance document provides additional specific guidelines regarding waste classification, waste receipt, unloading, processing and storage, and various treatment technologies, including performance indicators and monitoring approaches. This document covers the most common commercial methods of waste management. It does not cover other activities such as the management of radioactive wastes, co-incineration at combustion plants, or deep well injection (WBG and IFC 2007c). See: https://www.ifc.org/wps/wcm/connect/5b05bf0e-1726-42b1-b7c9-33c7b46ddda8/Final%2B-%2BWaste%2BManagement%2BFacilities.pdf?MOD=AJPERES&CVID=jqeDbH3&id=1323162538174.
- IOGP—Guidelines for Waste Management—with special focus on areas with limited infrastructure (2008)—this report provides guidance and general information on waste management in areas with less established oil and gas industry activity (IOGP 2008). See: https://www.iogp.org/bookstore/product/guidelines-for-waste-management-with-special-focus-on-areas-with-limited-infrastructure/.

3.1.5 Land Transport of Waste Operations

There is currently no international standard accepted worldwide addressing the land transport of dangerous goods (including hazardous wastes and materials) which are similar to the IMDG standards established for international maritime transport of dangerous goods. However, the United Nations (UN) Recommendations on the Transport of Dangerous Goods are contained in the UN Model Regulations, which are prepared by the Subcommittee of Experts on the Transport of Dangerous Goods of the United Nations Economic and Social Council. These recommendations have been adopted by some, but not all

nation states. See the following link for details about the most recent version of these UN Model Regulations (Rev. 21 [2019]): https://unece.org/rev-21-2019https://unece.org/rev-21-2019.

Land transport laws and regulations have been widely established worldwide by countries and unions to manage the risks posed by the transportation of dangerous goods. For reference, the following are examples of three land transport laws/regulation schemes currently in use regarding the transport of dangerous goods:

- EU—Dangerous goods transport in the EU is regulated under EU Directive 2008/68—Inland Transport of Dangerous Goods (transport by road, rail, and inland waterways) (European Commission 2008). The road transport aspect of this directive is based on the International Carriage of Dangerous Goods by Road (ADR) Agreement (formally known as the Agreement of 30 September 1957 concerning the International Carriage of Dangerous Goods by Road), the most recent version of which entered into force on 1 January 2021 (UNECE 2021). See: https://unece.org/transportdangerous-goods/adr-2021-files.

  Annex A of the agreement includes provisions regarding classification, packaging and labeling, consignment, and carriage, loading, unloading, and handling of dangerous goods/hazardous materials. Annex B include the provisions concerning the transport equipment and transport operations of dangerous goods/hazardous materials. The ADR regulations are currently adopted by all EU and other European countries, as well as a few non-EU countries, including French Guiana, Nigeria, Tunisia, Morocco, Western Sahara, Russia, Turkey, Azerbaijan, Georgia, Kazakhstan, and Tajikistan.

- U.S.—Hazardous waste transport in the U.S. is regulated under RCRA Subtitle C, PART 263—STANDARDS APPLICABLE TO TRANSPORTERS OF HAZARDOUS WASTE. See: https://www.ecfr.gov/cgi-bin/text-idx?SID=a416df9b39e7a05fc0a655078320d627&mc=true&node=pt40.26.263&rgn=div5.

  These regulations define a hazardous waste transporter as any person engaged in the off-site transportation of the hazardous waste within the U.S. Off-site transportation of hazardous waste includes shipments from a hazardous waste generator's facility or property to another treatment, storage, or disposal facility (TSDF). The federal RCRA regulations have adopted portions of the U.S. Department of Transportation (DOT) regulations for the safe transport of DOT classified hazardous materials. The DOT references include requirements for labeling, marking, placarding, container requirements, and spill response requirements. Finally, individual states, and even some local municipalities within the U.S. also have their own waste transport regulations, which are allowed to be stricter, but not less restrictive, than the federal regulations. Many of the state and local regulations also formally regulate non-hazardous waste transport.

- Brazil—The transportation of dangerous goods in Brazil is regulated under the National Land Transport Agency (ANTT—Agências Nacionais de Transporte Terrestre). On 14 December 2016, ANTT approved Resolution 5.232 adopting the United Nations Recommendations on the Transport of Dangerous Goods. The transport of dangerous goods in Brazil is further regulated by IBAMA (Instituto Brasileiro do Meio Ambiente e dos Recursos) Normative Instruction 05/2012, which regulates federal and interstate maritime and interstate highway transport activity. Under this instruction, companies must obtain an environmental authorization for the transportation of dangerous products whenever such transportation encompasses more than one state. In addition, activity specifically within the boundaries of any of the Brazilian states must follow the regulations established by the respective state environmental agency. The IBAMA normative instruction references the ANTT requirements for land transport.

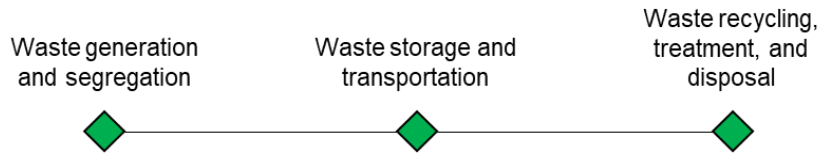
The Brazil Ministry of Environment also recently enacted Ordinance No. 280/2020 (June 2020) which established the waste transport manifest (MTR) and the National Solid Waste Inventory. Ordinance No. 280/2020 determines that the solid waste generators must register the handling of their waste in the MTR, establishing to all members of the chain (generator, transporter, temporary storage, if applicable, and the final receiver) the obligation to certify, successively, the generation, storage, transport and receipt of solid waste until its environmentally adequate final destination.

4. EEPGL'S CRADLE TO GRAVE WASTE MANAGEMENT APPROACH

A cradle to grave waste management analysis is defined by the EPA as the full life cycle assessment of waste from the point of generation of a waste or material to the final recycling, reuse, treatment, or disposal. Waste treatment may also result in the generation of new residual wastes to be considered. The cradle to grave waste management process should be viewed as an evergreen process, and the processes and tools used to manage waste should be sufficiently flexible for continued application if wastes types or volumes change, treatment technologies evolve or Guyana's governance framework is modified.

This section steps through each major phase in the waste management process as shown on Figure 4-1.

Figure 4-1: Key Waste Management Elements



In addition, this section also describes the auditing process for the waste treatment and disposal operations.

The numerous cradle to grave logistical steps for offshore to onshore handling of hazardous wastes, non-hazardous waste (recycled) and non-hazardous waste (not recycled) are illustrated in Appendix B (Cradle to Grave Logistics Flow Diagrams, Tiger Rentals Guyana (TRG) and Sustainable Environmental Solutions (SES) Waste Treatment Process Flow Diagrams). General process flow diagrams for the various waste treatment methods are also included in this appendix. In addition to the tables, graphs, schematics, diagrams, and photos included below, additional detailed information is contained in the appendices attached to this Study.

4.1 Waste Generation, Waste Stream Characterization and Classification, and Waste Profiles

4.1.1 Waste Generation

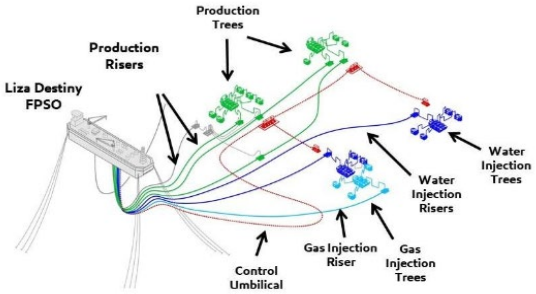
The cradle to grave waste management approach begins with understanding and identifying points of generation. Wastes are initially generated on the various types of vessels and infrastructure that are operating offshore (see Figure 4-2).

Figure 4-2: Vessels and Infrastructure

Drill Ship Vessels

Installation Vessels (MPV)

Subsea Infrastructure



FPSO Vessels

Support Vessels (PSV, FSV, MSV)

FSV = fast supply vessel; MPV = multipurpose vessel; MSV = marine support vessel; PSV = platform supply vessel

Appendix C, Marine Vessels Table, lists EEPGL-contracted marine vessels that have historically or are currently supporting all EEPGL offshore activities.

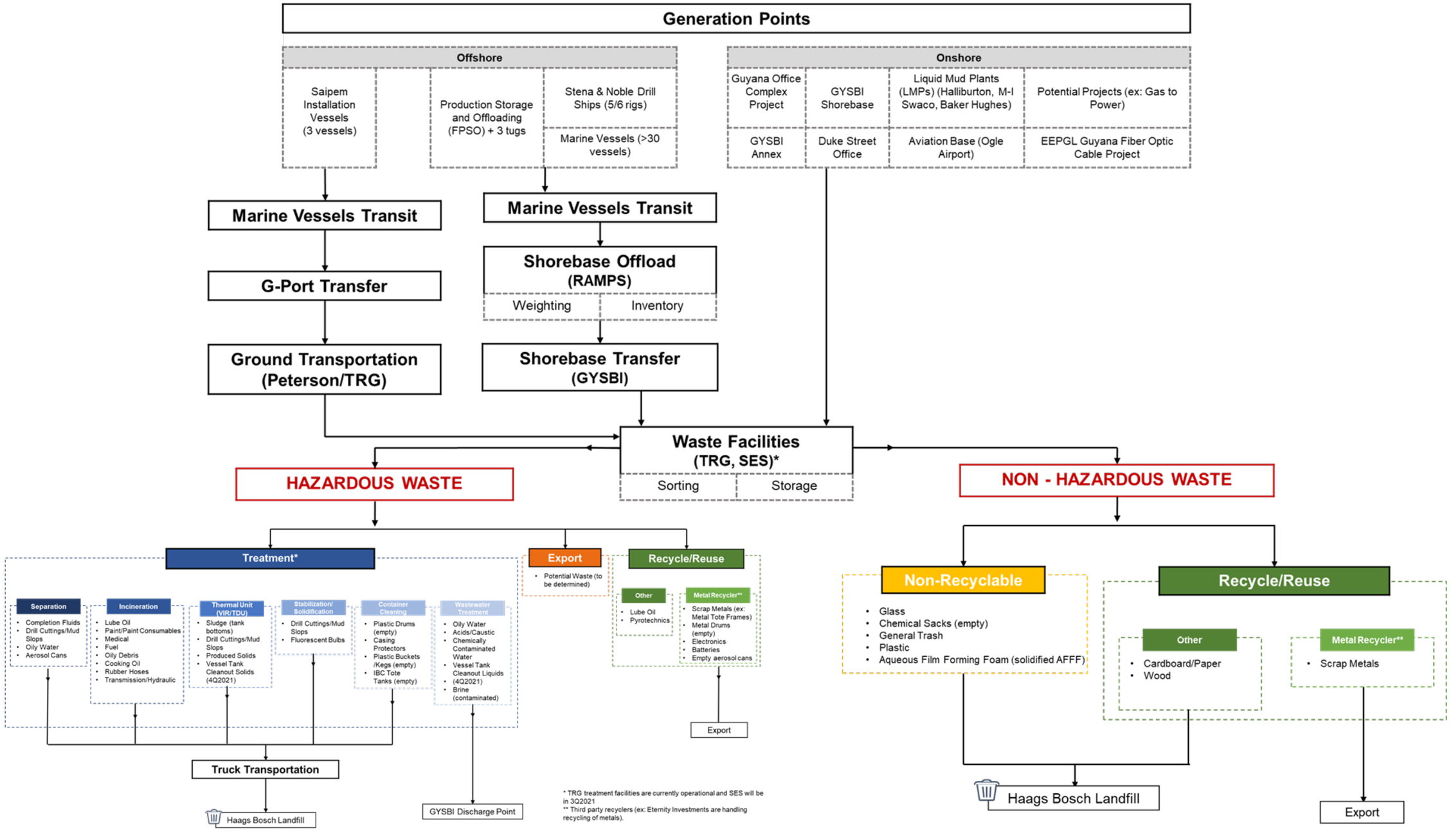
Wastes streams generated offshore generally originate from five processes:

- Drilling—Wastes from the drilling process and rig wastes, including drilling muds (both water-based and non-aqueous fluid [NAF]), drill cuttings, waste and completion brines, cement wastes (cement mix water, slurry, spaced, and drilled cement), various wastewaters (deck drainage discharge, oil/water separator discharge, surface cleaning spacer (pipe cleaner) discharge, displaced interface pills discharge (i.e., small quantities of specialized drilling fluid—less than 200 barrels [bbl] for each "pill"), and gravel pack fluids). Production well test fluids are also generated during drilling.
- Installation—Wastes from the installation of subsea umbilicals, risers, and flowlines (SURF), including umbilical steel tube storage fluids, leak tracer fluids, riser tensioner fluids, other control fluids, and commissioning waters, including produced water.
- Production (FPSO)—Waste from the production process, including produced water, chemically treated waters (including pressure maintenance wastewaters, well treatment, completion, and workover [TCW] fluids), produced solids, utility/fire wastewaters (including cooling water and potable water processing brines), and asset integrity chemical wastes (acids, solvents, de-foamers, corrosion inhibitors, scale inhibitors, subsea production control fluids, etc.).
- Marine—Wastes generated from all routine vessel operations (including drilling, installation, production, and support vessels), including waste oils (lube, hydraulic, and fuels), tank cleaning sludges and wastewaters, deck and machinery space drainage waters, ballast and bilge water, cooling water, incinerator ash, consumables (paint, aerosols, oil filters, oily rags, etc.), scrap wood, scrap metal, empty containers.
- Accommodations—Food waste, household garbage, used cooking oil, medical waste, treated sewage.

In addition to these offshore generated wastes, there are also a variety of wastes generated from onshore support operations, including those of the shorebases, LMPs, waste management facilities, and other land-based operations.

Figure 4-3 provides a general reference for waste stream identification, overall offshore/onshore waste generation, and downstream management.

Figure 4-3: Generation Point Flow Diagram



4.1.2 Waste Characterization and Classification

Waste characterization and classification is conducted to ensure:

- Proper selection of appropriate personnel protective clothing and equipment to mitigate worker hazards during waste handling, storage and transportation;
- Workers are trained to manage and mitigate hazards related to waste handling, storage, and transport;
- Appropriate emergency response measures are in place in case of spill or accident;
- Proper container selection for safe containment, handling, and transportation of waste; and
- Proper segregated storage of wastes based on incompatibility, reactivity, or other physical/chemical characteristics.

EEPGL's procedure for waste characterization begins with its existing generator and waste processing knowledge based on extensive experience in offshore developments where similar drill ships, FPSOs, and other marine vessels are deployed. The procedure also considers Guyana's Environmental Protection (Hazardous Wastes Management) Regulations 2000 that require accurate waste characterization and classification for each waste stream.

EEPGL has identified and characterized each waste stream generated from the project to date. This waste characterization has included an evaluation of processes and process knowledge, review of manufacturer's safety data sheets (SDSs) and product specifications. Where SDS and generator knowledge is not sufficient for proper characterization of wastes, sampling and laboratory analysis is conducted to ensure that information is available to assess the hazards for each waste, including whether they are flammable, corrosive (acid or base), reactive (oxidizer, pyrophoric, reducer), and/or toxic. Note that all waste analysis required to support waste characterization and classification to date has been conducted in Trinidad, as there is no current analytical provider in Guyana. However, this laboratory capability in country may be further developed in the future. Once the waste is characterized, the next step is the formal classification of the wastes. The EEPGL waste classification considers the following:

- Guyana's Schedule I and II (lists of hazardous wastes and characteristics);
- Guyana's environmental authorization application (Section 15);
- EPA's Waste Manifest form (Appendix D);
- EPA's WPS and EPA Instructions for completing WPS (Appendix D) ;
- EPA Environmental Permits (Section 5.16);
- EPA's Recording and Reporting Form of Hazardous Waste Characteristics (New and Existing Operations); and
- Basel Convention (Annex I [Categories of Wastes to be Controlled], II [Categories of Wastes Requiring Special Consideration], III [List of Hazardous Characteristics], VIII [List A—Wastes Characterized as Hazardous]) (Basel Convention 1989).

Given these considerations, a hazardous or non-hazardous waste classification is established for each waste stream. Going forward, the same characterization and classification process will be used as new waste streams are generated.

EEPGL and contractor procedures/practices for waste characterization and classification are integrated within existing EEPGL WMPs and contractor WMPs.

4.1.3 Waste Profiles

EEPGL has developed a waste profile for each waste stream to document the waste characterization and classification details. The purpose of the waste profile is to compile all the relevant information needed to manage waste into one document. This information is compiled into EPA's approved WPS.

The EPA's WPS requires the completion of numerous data fields. Those sections of the WPS relevant for the Study are pointed out below. Most of the WPSs are complemented with an SDS where applicable. For example, the WPS for Acids has corresponding SDSs for acid related materials (e.g., hydrochloric acid). However, SDSs do not exist for certain waste streams (e.g., empty drums, sacks and aerosol cans, etc.).

The WPS includes information about the generator, waste classification, projected annual volume, and various waste physical characteristics and chemical properties as illustrated in the Figure 4-4 with red arrows pointing to the specific information.

To date, EEPGL has developed 35 separate waste profiles for wastes generated from both offshore and onshore operations—this includes 28 hazardous waste profiles and 7 non-hazardous waste profiles. As used in this Study, the term "treated non-hazardous waste" means waste that was once hazardous but, after treatment, has been rendered non-hazardous.

In addition, EEPGL has developed a WMT that will also be available to the EPA. EEPGL's WMT was developed to store and maintain data and procedures. The WMT contains the Waste Profiles Table, Waste Profile Form with its SDS link, Waste Manifest Form, and Permitted Effluent Discharge Table, along with other items associated with procedures (e.g., Profile instruction, Manifest instructions). As the EPA modifies the requirements for manifest and profile data, or issues new requirements for hazardous waste management, the WMT is the primary data source to add new EEPGL procedures or supplement existing EEPGL procedures. The WMT is then used to support revisions and updates to WMPs.

EEPGL's WPSs (with SDSs, where applicable) and the WMT are included in Appendix D.

Figure 4-4: Waste Profile Sheet

Generator

Waste Classification

Projected Annual Volume

Physical Characteristics

Chemical Properties

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION								WASTE PROFILE NO. 20140506-0015	
1. GENERATORS NAME: Esso Exploration Production Guyana Limited									
2. FACILITY's NAME & ADDRESS: GYSBI Shorebase, Georgetown, Guyana									
3. TECHNICAL CONTACT: Jimmy Street			4. TITLE: Waste Management Lead					5. PHONE: 623-1104	
B. WASTE INFORMATION									
1. WASTE CLASSIFICATION		x	HAZARDOUS			NON-HAZARDOUS			
1A. LISTED HAZARDOUS WASTES Is this a listed waste under Annex I of the Basel Convention? Y ☐ N ☐ If "yes" then provide waste numbers Is this a listed waste under Annex VIII of the Basel Convention? Y ☐ N ☐ If "yes" then provide all applicable waste numbers: Hazardous Waste A4090 Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☐ N ☐ If "yes" then provide all applicable waste numbers: Guyana EPA AG.1 Hazardous Wastes Regulations : Hazardous Waste									
2. COMMON NAME OF WASTE: Acid solutions									
3. SITE ID/LOCATION OF WASTE GENERATION (if different than facility address above): Development & Exploration Drilling. Various wells									
4. PROCESS GENERATING WASTE: Contaminated or excess acid solutions in support of wells									
5. PROJECTED ANNUAL VOLUME: 2-10 MT			6. WASTE RECEIVING FREQUENCY			WEEKLY		MONTHLY	ONE-TIME SHIPMENT x	OTHER (As
7. WASTE VOLUME			CUBIC METERS			GALLONS		TONNES	BBLS	OTHER (SPECIFY)
8. WASTE CONTAINERS			BARRELS (42 GAL.)			DRUM (55 GAL.)		CUTTINGS BOX	TANK	OTHER (SPECIFY)
9. SPECIAL HANDLING REQUIREMENTS: Yes. Corrosive acid and caustic streams managed separately.										

PART II

1. PHYSICAL CHARACTERISTICS									
PHYSICAL STATE (CHECK ONE)		SOLID	x	LIQUID		SEMI-SOLID		GAS	OTHER (SPECIFY)
COLOR	Water clear to slight greenish			BOILING POINT (°C)	N/A				
ODOR & STRENGTH	None/Strong			pH	0-2 (Acidic)				
FLASH POINT (°C)	N/A			VISCOSITY	☐ Solid ☐ High ☐ Medium ☐ Low				
BTUs	N/A			TOTAL CYNAIDES (ppm)	N/A				
PCBs (ppm)	N/A			TOTAL SULFIDES (ppm)	N/A				
2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)									
NONE	X			OXIDIZER					
WATER REACTIVE				IGNITABLE					
SHOCK REACTIVE				MEDICAL/INFECT. WST					
AIR REACTIVE				DIOXINS					
EXPLOSIVE				PESTICIDE/HERBICIDE					
PYROPHORIC				POLYMERIZABLE					
REACTIVE CYANIDES				RADIOACTIVE					
REACTIVE SULFIDES				EXEMPT RAD					
PHENOLS				ASBESTOS					
ORGANIC PEROXIDE				THERMALLY UNSTABLE					

3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%) - MUST BE EQUAL OR GREATER THAN 100%	CONCENTRATION (ppm or mg/L)
	HCL solution	25-50	
	Water	60-80	

KNOWLEDGE IS FROM		LAB ANALYSIS	x	MSDS	x	PROCESS/GENERATOR KNOWLEDGE

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE:	DATE:

4.2 Waste Storage and Transportation

4.2.1 Waste Container Selection

Proper storage and waste transportation of both offshore and onshore generated wastes requires the accurate characterization and classification of each waste stream.

Based on the waste characterization and classification, appropriate containers are selected for waste storage, handling, and transportation. The container selection is based upon an evaluation of various waste characteristics, including:

- Physical matrix (solid, liquid, sludge), chemical properties (pH, density, viscosity, reactivity, flammability, etc.);
- Compatibility of wastes with container material construction and design;
- Container secondary containment requirements, waste volume (large vs. small quantities); and
- Container handling requirements (crane, forklift, and truck transport compatibility).

Note that the construction and testing of packaging, intermediate bulk containers (totes), portable tanks, etc. used in the maritime shipping of dangerous goods must meet the IMDG Code (2018 edition, including the most recent Amendment 39-18). However, there is currently no similar international standard employed worldwide for packaging used in the land transport of dangerous goods, although many jurisdictions throughout the world regulate packaging.

In general, each waste type is generally segregated into separate designated containers at the point of generation to the maximum extent possible to expedite and optimize the handling, treatment and recycling of these wastes at the onshore facilities. This approach minimizes the need for additional waste segregation and sorting onshore prior to processing. More importantly, this container segregation approach also prevents the mixing of incompatible waste types within any given container.

Figure 4-5 shows the typical containers currently used for the storage and transport of the various wastes:

Figure 4-5: Typical Waste Storage and Transport Containers

In addition to containerized wastes, bulk spent drilling muds are stored in below deck tank compartments of the offshore supply vessels for containment during transit to shore. These below deck tank compartments are full containment structures, and are separate from the outer vessel hull, which provides a secondary containment for these tank compartments.

After the containers are filled with waste and are closed and secured, they are then staged and segregated by waste type in the designated storage areas on the drill ship, FPSO, or other vessel pending maritime transport to Guyana Shore Base Inc. (GYSBI) or the G-Port shorebase. In addition, certain containers (such as bulk bags, totes, drums) will be further packaged in other sea worthy shipping containers (such as open top skips or cargo carrying unit [CCUs]) to meet IMDG Code requirements prior to transfer to the support vessel for transport.

All containers are marked with the appropriate waste classification, hazard, and tracking labels as appropriate as part of the initial offshore storage operation, and manifests are completed in preparation for waste transport. Labels/placards are used as required by the IMDG Code for carriage of dangerous goods in packaged form.

4.2.2 Waste Segregation and Storage

Once wastes are placed into the appropriate containers, they are moved to designated vessel storage areas pending transfer to shore. Where necessary, wastes are also segregated based on considerations of incompatibility or operational considerations regarding how they will be managed. Figures 4-6 and 4-7 illustrate the variety of onboard waste containers and waste segregation practices onboard a drill ship and FPSO.

Figure 4-6: Non-Hazardous Waste Bins

Figure 4-7: Onboard Waste Containers and Waste Segregation Practices

Each maritime vessel has designated waste storage areas, and these waste storage areas are often on multiple decks to facilitate operations. As per the MARPOL 73/78 and IMDG requirements, each vessel is required to have pollution control measures that are related to all operations, including waste storage operations.

The drill ships generate the most variety of offshore wastes, and therefore have the most variety of designated waste storage locations. The following is a brief description of the Stena and Noble drill ship waste storage operations.

4.2.2.1 Stena Drill Ship Waste Storage Description

The following are key features related to waste storage on the Stena drill ships:

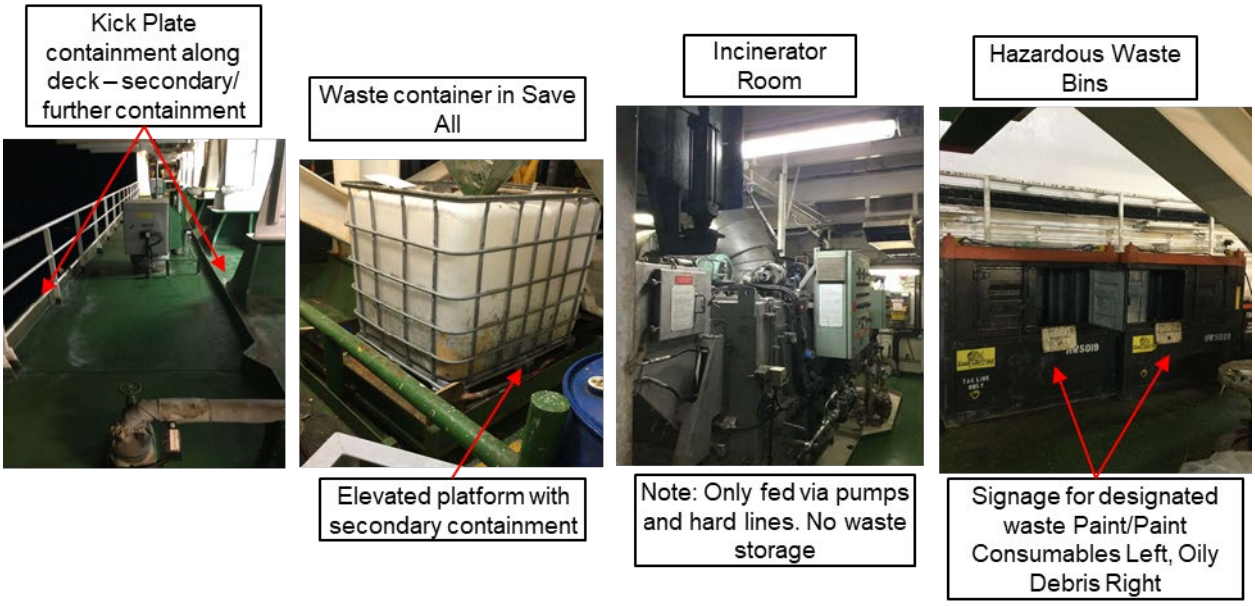
- Main fixed storage areas as they can and do move as they are loaded and unloaded from the drill ship. The exact position is subject to change. These units are safely stored side by side due to the nature of the transportation skids.
- Spills on board will ultimately lead to a lower deck (Deck 4), which is bunded via the drains system and then directed into holding tanks to allow natural separation and decanting.
- Deck crews inspect and ensure containers are secure on arrival on board and prior to back loading. Doors / Hatches / Drain Plugs are checked as secured. In the case of open topped waste skips for wood, scrap metals, and plastics, drains are open while on board due to rain but are closed again before shipping.
- All drains from all decks are collected to deck drain tanks to prevent spills / leaks from being released to over the side of the drill ship. Most drum storage areas and some bulk paint stores have additional fixed metal kick plate fitted all around as a secondary bund. Within machinery and other internal spaces all products are within bunded storage areas.
- Storage for solid wastes are metal offshore containers positioned on metal decks. Storage for liquid hazardous wastes are on metal platforms or within enclosed areas with secondary containment.
- There are no barriers to prevent access to hazardous waste containers on main deck, just signage. This is to encourage use of the facility as everybody on board is authorized to dispose of waste appropriately.

- Hazardous waste containers are primarily covered by the decks above. Where applicable and covering is not available, containers with hazardous waste are covered/closed.

Figure 4-8: Scrap Metal Waste Bins

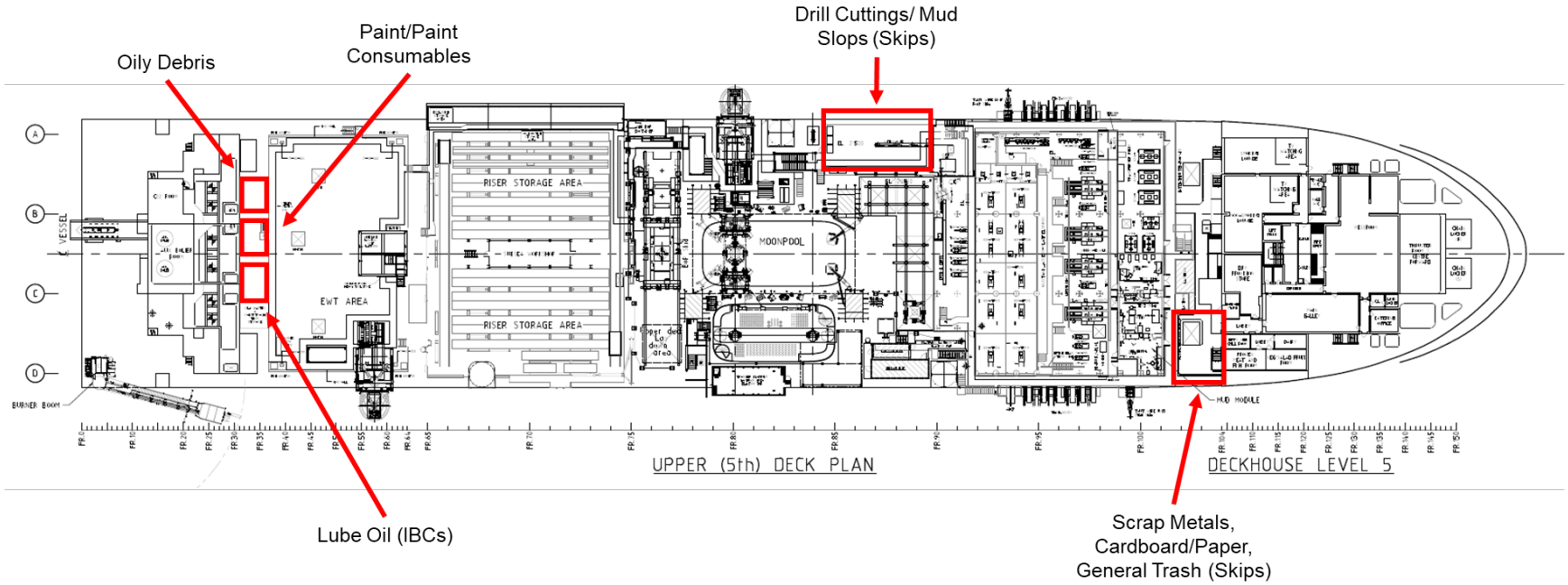
Figure 4-9 depicts typical Stena waste storage operations.

Figure 4-9: Typical Stena Waste Storage Operations



Further, the schematic in Figure 4-10 illustrates some of the designated Stena waste storage locations.

Figure 4-10: Example Stena Waste Storage Locations



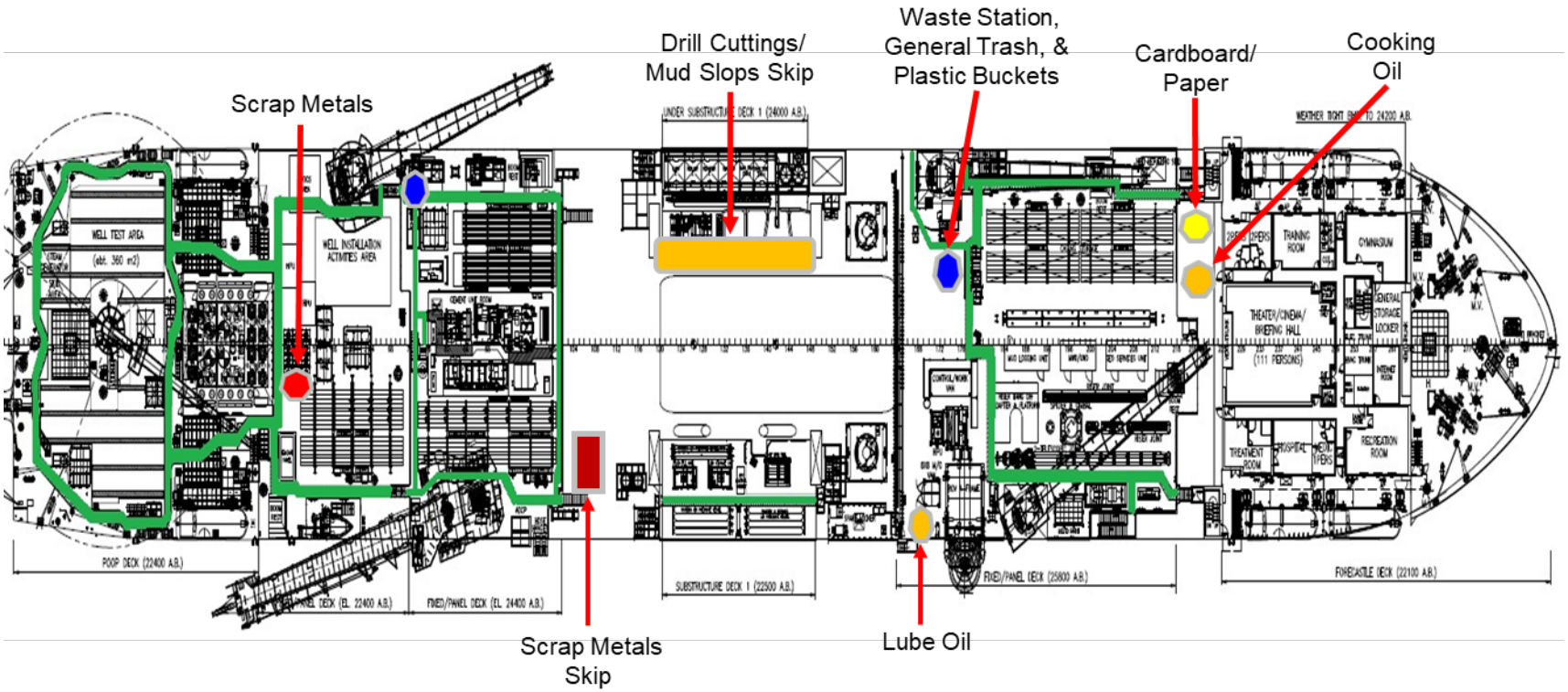
4.2.2.2 Noble Drill Ship Waste Storage Description

The following are key features related to waste storage on the Noble drill ships:

- Noble drill ships use waste stream information sheets that list various pollution control measures appropriate for each waste stream, including storage and accumulation requirements.
- Certain wastes must be stored in a dry area with a curbed solid deck with a secondary method of containment.
- Certain wastes are required to be stored in a hazardous designated area, away from heat or flames with a curbed solid deck with a secondary method of containment.
- Certain wastes require that containers be tightly closed in a designated dry, cool, and well-ventilated area either panned or within a curbed solid deck.
- All equipment or areas where and water and petroleum sources may come in contact shall be equipped with pollution pans and containment that can be accessibly drained.
- Containers are to be panned or stored over a solid deck curbed area along with proper identification and beginning date of accumulation.
- Oily wastes are required to be stored within a curbed solid deck in a non-flammable environment with lid or opening always to be fastened down and secure.

The schematic in Figure 4-11 illustrates some of the Noble drill ship designated waste storage locations:

Figure 4-11: Example Noble Drill Ship Waste Storage Locations



4.2.3 Waste Tracking

Waste manifests are required documentation for both hazardous and non-hazardous waste management for cradle-to-grave tracking of all waste movements. Further, a separate marine transport manifest is also required for tracking all ship to shore movements of all wastes and other materials, including bulk spent drilling muds. Figure 4-12 is an example waste manifest for current EEPGL operations from February 2021 and Figure 4-13 is example of the marine transport manifest used for cargo from the same ship journey.

Figure 4-12: Waste Manifest Example

REV 0.1

ESSO EXPLORATION PRODUCTION GUYANA LTD.
WASTE MANIFEST FORM

Generator Information		Transporter Information:	
Generator:	Esso Exploration & Production Guyana Ltd.	Transporter:	MV Russell Adams
Address:	99 New Market St., Georgetown GY	Contact:	Igor Melnichuk
Contact:	Jimmy J. Street	Position:	Master
Position:	Waste Management Lead	Phone:	985-377-0948
Phone:	+592-623-1104	Email:	mv.russell.adams@chouest.com
Email:	jimmy.j.street@exxonmobil.com		
EPA Region:	Region 4		
Regist. #:	TBD		

Originator Information		Receiving Facility Information	
Originator:	Noble Don Taylor	Facility:	Tiger Rentals Guyana
Manifest #:	198-LIZ_4i11-MVRUA-Russell-2021-02-06-NDT To GT	Regist. #:	20140506-TTTUL
Well:	LIZ_4i11	Location:	LOT A, East Bank Public Rd. Houston GY
Date:	7-Feb-21	Contact:	Shane Singh
Contact:	Anna Layne	Position	General Manager
Phone:	1-713-4299-372	Phone:	+592-501-0620
Email:	Logistics-DonTaylor@exxonobil.com	Email:	ssingh@tigerrentalsguyana.com

CCU #	Waste Stream	Comment	Verified Quantity	Unit	GY Classification	GY Characteristic	Physical Characteristic	Chemical Characteristic
DNVBS0062	General Trash	3 bags General Trash	3	m3	Non-hazardous			
DNVBS0055	General Trash	3 bags General Trash	3	m3	Non-hazardous			
ARRU1075180	Oily Water	Waste Oil			Hazardous	Toxic	Liquid	Organic
248402	Casing Protectors		8	m3	Hazardous	Toxic	Solid	Organic
AMH297	Metal Drums/Empty	RHEMOD RESIDUE	4		Hazardous	Toxic	Liquid	Organic
AMH270	IBC Tote Tanks/Empty	LE SUPERMUL RESIDUE	2		Hazardous	Toxic	Liquid	Organic
AMH274	IBC Tote Tanks/Empty	LE SUPERMUL RESIDUE	2		Hazardous	Toxic	Liquid	Organic
AMH293	IBC Tote Tanks/Empty	LE SUPERMUL RESIDUE	1		Hazardous	Toxic	Liquid	Organic
AMF753	IBC Tote Tanks/Empty	LE SUPERMUL RESIDUE	2		Hazardous	Toxic	Liquid	Organic
AORU71-01213	Drill Cuttings/Mud Slops				Hazardous	Toxic	Liquid	Organic
805884-9	General Trash		3	m3	Non-hazardous			
AMH293	Metal Drums/Empty	RHEMOD RESIDUE	4		Hazardous	Toxic	Liquid	Organic
805884-9	Plastic				Non-hazardous			
			1	m3				

ORIGINATOR: _____ _____ _____
GENERATOR: _____ _____ _____
TRANSPORTER: _____ _____ _____
RECEIVING FACILITY: _____ _____ _____
Print Sign Date

Figure 4-13: Marine Transport Manifest Example

Esso Exploration and Production Guyana Limited								**Noble Don Taylor to Georgetown, Guyana**			**Date:**	**Saturday, February 6, 2021**				
Well Number:	LIZ_4i11		**Transport By:**					**MV RUSSELL ADAMS**	**Manifest #:**			**198**	**LIZ_4I11**		**MVRUA**	**Rev1**
Dispatched From:									**Dispatched To:**							
Location:	**Noble Don Taylor**								**Location:**			**Georgetown, Guyana**				
Attention:	**Justin McMillian**								**Attention:**			**Johnny Lonsdale**				
Email:	justin.c.mcmillian@exxonMobil.com								**Email:**			johnny.e.lonsdale@exxonmobil.com				
Attention:	**Robert Perry**								**Attention:**			**Ramps Shorebase GY**				
Email:	Logistics_DonTaylor@exxonmobil.com								**Email:**			shorebase_gy@rampslogistics.com				
Number:	NDT: 1-713-422-9372								**Number:**			Guy: 592-608-6636				
ETD:	**2/6/2021 10:00 Hrs.**								**ETD:**			**2/7/2021 00:30 Hrs.**				
Dangerous Good Mark							No		MSDS							No
QA QC Report							No		Inspection Reports							No
Item #	**Qty**	**Unit**	**Container # / EEPGL IPES #**	**Supplier PN**	**Basket/ Cargo Box**			**Item Type/ UN # for DG**	**Description of Items**	**Unit Price in USD**	**Total Price in USD**	**Supplier**	**Vendor**	**Weight in MT**	**MR #**	**Voyage # Loaded or Backloaded**
					Length	**Width**	**Height**									
CARGO BELOW LOADED AT NOBLE DON TAYLOR - DISCHARGE IN GEORGETOWN																
21	1	EA	DNVBS00062		8'	6'	6'	Waste Skip	STC	$2,500.00	$2,500.00	Tiger Tanks	ExxonMobil	3	LIZ_4i11-052	296-SMT
	3	EA						BAGS	General Trash			Noble	Noble			
22	1	EA	DNVBS0055		8'	6'	6'	Waste Skip	STC	$2,500.00	$2,500.00	Tiger Tanks	ExxonMobil	3		198-RUA
	3	EA						BAGS	General Trash			Noble	Noble			
23	1	EA	709SE-8-16		16'	8'	4'	Cargo Basket	STC	$12,500.00	$12,500.00	Tanks-a-lot	Noble Drilling	5.9	HA1-104	296-SMT
	1	EA		312157					ASSY, DOOR 18-15M NXT 14 IN U2BIL - RIGHT HANDED DOOR PN: 20077515 SN: 20014900-782	$161,958.38	$161,958.38	Noble Drilling	Noble Drilling			
30	1	EA	ARRU1075180		10'	10'	8'	50 BBL Tank	Full Waste Oil Tank	$5,000	$5,000	OEG	ExxonMobil	10		190-RUA
32	1	EA	SCE163-10		8'	8'	10'	Connex Box	STC	5,000	5,000	Noble	Noble	2.2	HA1-079	180-RUA

EEPGL uses a waste tracking system that allows for the tracking of the waste from initial generation through final disposal, discharge, reuse, or recycling. The information included in the manifests is maintained in a database, and EEPGL also requires that its third-party waste management facilities (TRG and, eventually, SES) use a similar tracking database to show the storage, processing, and ultimate discharge, disposal, reuse, or recycle of the wastes and materials. EEPGL then compiles and reports this information to the EPA as part of annual waste summary reporting requirements.

4.2.4 Waste Transportation

This section presents a summary of the various waste transportation aspects, including the various steps involved in ship to shore transport, as well as onshore transport. The transport aspect is an important feature of the cradle to grave waste management process (see Figure 4-14).

Figure 4-14: Cradle to Grave Waste Management

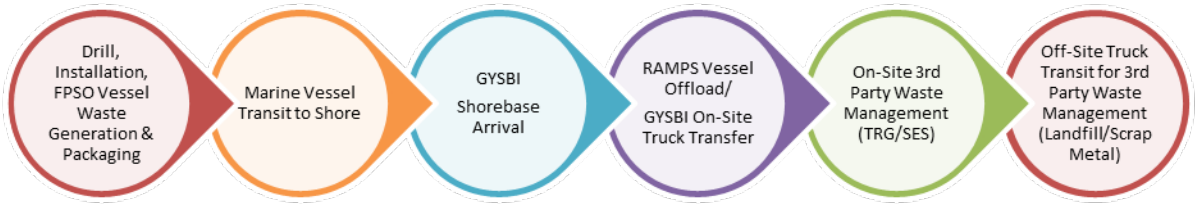


Figure 4-15: Drill Ship/FPSO Transfer of Support Vessel Example

The wastes generated from the drill ships, FPSO, and infrastructure operations are all subsequently off-loaded and transferred to other marine vessels for transport to the GYSBI (most wastes) or G-Port shorebase (installation vessel wastes and certain spent mud wastes destined for the Halliburton and Baker Hughes LMPs).

Figure 4-16: Marine Support Vessel and Typical Cargo Deck Configuration

Offshore Marine Vessel Transport to Shorebases—Marine vessels used to transport waste from the offshore areas to the shore base have the necessary licenses and approval from the Guyana authorities. All containers are required to be packed and secured according to the IMDG Code requirements, which include provisions for dangerous goods loading/stowage plans, considering ship stability, safety, and emergency preparedness. Crews on the vessels that transport dangerous goods (hazardous waste) must have training in basic emergency response, as well as have dangerous goods training as per the requirements of the IMDG Code. There also must be adequate emergency response equipment (spill and containment equipment) deployed onboard in the event of an incident. Further, crews must know safe practice to load/unload the cargo unit (containers) carrying the IMDG product, as well as how to handle the dangerous goods when the ship is under voyage. Vessels transporting waste must carry both a completed marine transport manifest and a completed Waste Manifest. These documents must contain the name, description, and quantity of all wastes being transported. EEPGL will confirm through periodic inspections that vessel waste shipments meet the appropriate requirements and that vessel crews have completed and documented compliance with the minimum training requirements.

Figure 4-17: Marine Vessels at GYSBI Shorebase

Marine Vessel Off-Loading at Shorebases—All offshore waste received at GYSBI (both hazardous and non-hazardous waste) is first off-loaded from the vessels by RAMPS Logistics (RAMPS) using onshore cranes. RAMPs weighs each container and also confirms the inventory during off-loading. Bulk spent drilling muds are off-loaded at shorebases using hoses and pipelines which connect directly to the Schlumberger/MI-Swaco LMP facility tank storage infrastructure. After off-loading is complete, the waste containers are then transferred by GYSBI staff using trailers/fork lifts directly to the waste management

facilities located at GYSBI (TRG, SES), or to a temporary transit area (oily water primarily) adjacent to TRG/SES should TRG/SES not be able to immediately receive the wastes because of operational challenges. RAMPS and GYSBI staff must have training in basic emergency response related to the off-loading of the containers and transfer to the waste management facilities. EEPGL confirms through periodic inspections that RAMPS and GYSBI staff also have completed and documented compliance with the minimum training requirements. Wastes received at the G-Port shorebase are off-loaded by G-Port contractor staff for conveyance to the LMPs (Halliburton and Baker Hughes), or transported by Peterson Integrated Logistics to the TRG GYSBI location (installation vessel waste only).

Figure 4-18: Waste Transport at GYSBI

GYSBI Onshore Transfer Operations—TRG currently handles the various containers it receives at its facility using fork lifts. The containers are stored in designated areas pending processing. It is anticipated that SES, once operational later in 2021, will also use fork lifts to move containers to the operational areas once received. All TRG staff have specialized in-house training in emergency response and spill protection as it relates to its waste management operations—SES staff will also have this training once that facility is operational, as this training is routine for employees of waste management facilities. EEPGL periodically audits the TRG operation to determine if TRG staff have completed and documented compliance with the training requirements—similar audits will be done for the SES operation in the future.

Figure 4-19: GYSBI Transfer Operations

GYSBI to Off-site Locations—TRG currently transports treated non-hazardous wastes received or generated from its operations from GYSBI directly to the HBL for disposal. TRG transports the treated wastes to HBL in bulk bags which are secured (tied/closed) to prevent tampering at the disposal site, whereas other wastes, including wood, cardboard, paper, etc. may be transported in bins. TRG may also transport other wastes (batteries) to an off-site third-party metal recycling facility (Eternity Investment Inc. [EII]). All TRG vehicles are required to be inspected and a checklist completed to ensure road worthiness prior to engaging the waste transportation services. The TRG Journey Management Plan is used to manage the transportation of waste to off-site locations. All land-based waste transport is currently done in accordance with the Guyana Environmental Guidelines for the Transportation, Storage, and Occupational Handling of Chemical/Industrial Hazardous Waste (EPA 2011), as well as the Environmental Protection (Hazardous Wastes Management) Regulations (Government of Guyana 2000), and the Motor Vehicles and Road Traffic Act (Government of Guyana 1998) (applicable to both hazardous and non-hazardous waste transportation).

Other Land Waste Transport Activities—The onshore LMPs currently arrange with TRG to transport their wastes from the GYSBI and G-Port locations to the TRG facility for treatment. Saipem (installation vessels) also currently arranges with Peterson Integrated Logistics for TRG to transport their wastes from the G-Port shorebase to the TRG facility for treatment.

EEPGL is also involved with various land-based operation or development projects in the Georgetown area (including the EEPGL Guyana Fiber Optic Cable Project, Guyana Office Complex Project, future Gas to Energy Project, etc.) that may require the transportation of various types of construction or operations related non-hazardous wastes (wood, construction debris, excavated soil, etc.), or potentially hazardous wastes (lube oil, batteries, etc.). Any transporters contracted for hazardous waste transport will be required to have prior permission (valid Permit) from the EPA for transport of hazardous waste as well as any other permissions that may be required under the Motor Vehicles and Road Traffic Act, 1998 (applicable to both hazardous and non-hazardous waste transportation).

4.3 Waste Treatment and Disposal

Wastes generated from EEPGL offshore operations can be managed in one of two ways: 1) Wastes are managed directly on the drill ships, FPSO, or other vessels using on-board recycling, treatment, and discharge methods; or 2) Wastes are transported to onshore facilities for recycling, treatment, and discharge/disposal.

As described previously, wastes streams generated offshore generally originate from five processes:

- Drilling—Wastes from the drilling process and rig wastes, including drilling muds (both water-based and NAF), drill cuttings, waste and completion brines, cement wastes (cement mix water, slurry, spaced, and drilled cement), various wastewaters (deck drainage discharge, oil/water separator discharge, surface cleaning spacer [pipe cleaner] discharge, displaced interface pills discharge [i.e., small quantities of specialized drilling fluid—less than 200 bbl for each “pill”], and gravel pack fluids). Production well test fluids are also generated during drilling.
- Installation—Wastes from the installation of SURF, including umbilical steel tube storage fluids, leak tracer fluids, riser tensioner fluids, other control fluids, and commissioning waters, including produced water.
- Production (FPSO)—Waste from the production process, including produced water, chemically treated waters (including pressure maintenance wastewaters, well TCW fluids), produced solids, utility/fire wastewaters (including cooling water and potable water processing brines), and asset

integrity chemical wastes (acids, solvents, de-foamers, corrosion inhibitors, scale inhibitors, subsea production control fluids, etc.).

- Marine—Wastes generated from all routine vessel operations (including drilling, installation, production, and support vessels), including waste oils (lube, hydraulic, and fuels), tank cleaning sludges and wastewaters, deck and machinery space drainage waters, ballast and bilge water, cooling water, incinerator ash, consumables (paint, aerosols, oil filters, oily rags, etc.), scrap wood, scrap metal, empty containers.
- Accommodations—Food waste, household garbage, used cooking oil, medical waste, treated sewage.

See Appendix D for the WPSs for all offshore generated wastes. For reference, see 2020 LP1 and LP2 Annual Environmental Report (EEPGL 2020a), which provides quantities of wastes generated from offshore operations in 2020.

Some of these wastes listed above are suitable for discharge overboard after pre-treatment, whereas others must be managed exclusively at appropriate onshore facilities for recycling, treatment, or disposal/discharge. All waste and effluents must be managed in accordance with the LP1, LP2, and Payara Permit requirements and Guyana EPA regulations, and must conform with international conventions (MARPOL 73/78 [IMO 2019], Basel Convention [Basel Convention 1989], Cartagena Convention [UNEP Undated]), international best practices (IOGP, IFC EHS General Introduction Guidelines and Offshore Oil and Gas Development Guidelines, IMO, etc.).

The following is a description of the waste treatment and disposal methods for both offshore and onshore waste management of the EEPGL wastes. Process flow diagrams for some of the treatment methods employed are also included in Appendix B for further reference.

4.3.1 Offshore Waste Management Methods

All wastes generated from offshore operations are either treated and discharged offshore or sent to onshore facilities for recycling, treatment, or disposal/discharge.

The general types of EEPGL wastes currently being discharged offshore include:

- NAF mud and drill cuttings;
- Water-based mud and drill cuttings;
- Various tank wash waters, slops, and other wastewaters that pass static sheen or other tests;
- Bilge water that have <15 parts per million (ppm) hydrocarbon oil content;
- Produced water;
- Inert materials, including cement, barite, bentonite, calcium carbonate, gravel pack, sand, etc.;
- Food waste <25 millimeters; and
- Treated sewage.

However, all of these wastes are subject to some type of pre-treatment and/or monitoring prior to discharge overboard in accordance with permit requirements, international conventions, relevant international standards, or best industry practices. The pre-treatment method varies between Noble drill ships vs. Stena drill ships or the installation/FPSO vessel operations, but the technologies employed are similar and are described in general in the next sections.

A small number of specific wastes are also treated offshore using thermal destruction technology. These include production well test fluids and certain other hydrocarbon based wastes (such as oily sludges, engine oils, lube oils, etc.). Production well test fluids (reservoir fluids) are generated from a temporary production test performed to investigate how a newly drilled well will perform when it is subject to various flow conditions. The well test fluids are treated on the drill ships using a flare boom, which is a burner attached to a boom located downwind of the drill ship. Combustion may be initiated using diesel or similar fuel to ignite the mixture to ensure complete combustion of well test fluids. However, only certain drill ships (Noble Don Taylor and Stena Carron) have the equipment required to perform well testing, including the fluid combustion. The use of a flare boom can last for several hours to several days, and is usually intermittent during the well test. All well test flaring must meet the requirements of the permits.

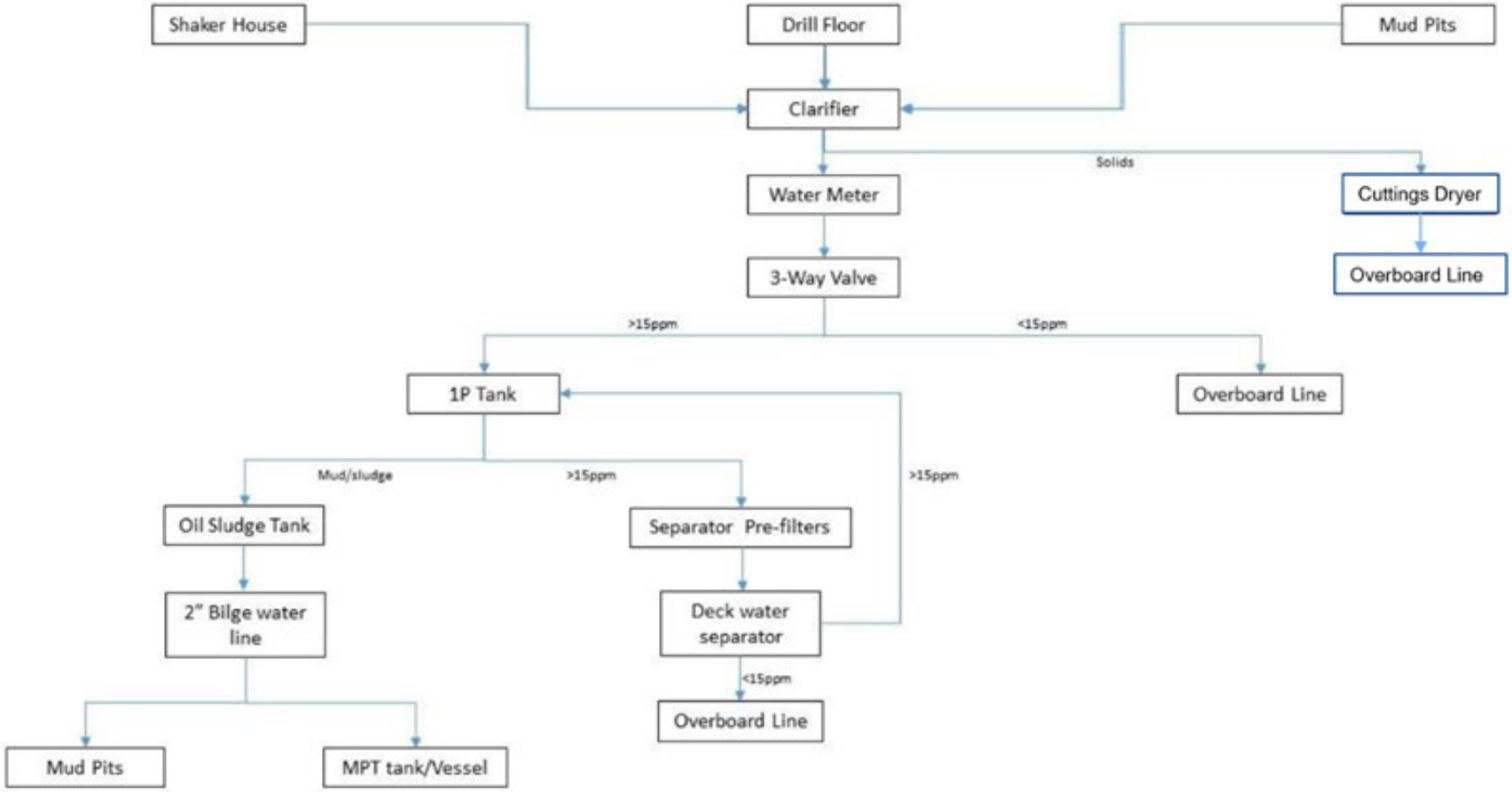
Figure 4-20: Example of Drill Ship Well Test Flaring

Other hydrocarbon impacted wastes, including oily sludges, may also be treated offshore on vessels which are equipped with incinerator units. Any incinerator employed for use offshore must have an IMO type approval certification consistent with IMO and MARPOL 73/78 requirements for shipboard incinerators. Further description of these incinerator operations are described in the following sections.

4.3.1.1 Noble Drill Ship

There are currently several Noble drilling ships operating offshore in support of EEPGL efforts, and all are generally designed the same with respect to the offshore management of drilling wastes. Figure 4-21 is a general flow diagram illustrating how drilling wastes are managed offshore on the Noble drill ships.

Figure 4-21: Noble Drill Ships Drilling Wastes Management



The following sections provide additional details about the waste management technologies employed.

Initial Solids Separation—Initial physical separation of the drill cuttings returned from the borehole by the drilling mud is conducted using angled vibratory screen equipment known as shale shakers to remove solids >100 microns in size. The separated drilling mud is then recycled and reused in the drilling operations.

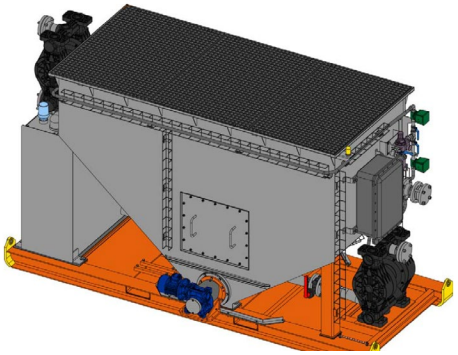
Figure 4-22: Shale Shaker

Note that this treatment process is only applicable for drilling mud and cuttings returned to the drill ship. At the very start of drilling operations, when the structural pipe casing (0.91 m diameter pipe) and conductor pipe casing (0.71 m diameter pipe) are being installed through the overlying non-oil bearing stratigraphy immediately below the seabed, the water-based drilling mud and cuttings are not returned to the drill ship. This drilling mud and cuttings are discharged directly at the seabed.

Clarification—Fluids/solids originating from the shaker operation as well as overflow fluids from mud system tanks are directed to a multiphase clarifier or Boss solid separator for secondary separation of solids and fluids. Clarifiers use lamella style plate settlers, which are a series of inclined plates which allow for solids to gravity settle and drop into a basin for collection. A Boss solid separator employs a patented process that also uses plates combined with fluid velocity controls to separate solids from fluids. The fluids and solids are then further managed using separate processes. Note that there is no oil separation in this step.

Figure 4-23: Clarification

Clarifier



Boss Solids Separator

Automated Fluids Screening—Oil in water analyzers (OIWA) are used to measure hydrocarbon concentration in the fluids separated by the clarifier/separator as well as from deck drain areas. Measurement is continuous during any waste processing activities. If the fluid concentration is <15 ppm it can be discharged overboard with no further treatment. However, if the concentration is >15 ppm the fluid is directed to other onboard storage tanks for storage prior to further treatment in oil/water separators.

Fluids Oil/Water Separator—Fluids containing >15 ppm hydrocarbons are processed through separator pre-filters (to further remove solids) and then an oily water separator (OWS) to further remove hydrocarbons. The oil/water separator employs parallel plates that allow oil to separate and rise out of the hydraulic flow path through the device for recovery, and the remaining liquid is then recovered for discharged. If the effluent is <15 ppm, fluid can be discharged overboard. The frequency of discharge can be continuous or batch based on operational requirements. The Noble drill ships have multiple OWS units to manage various wastewaters, including bilge water, contaminated deck water, and the clarifier wastewaters. Residual fluids which cannot be treated to below the 15 ppm threshold are placed into tote (1,000 liter) containers or tanks for transfer onshore for further treatment. Further, oils recovered from the separators are either recycled into the mud process (if sufficient quality), or are also placed into containers or tanks for transfer onshore. Note that all vessels have an International Oil Pollution Prevention Certificate which gives details of all oily water separation and filtering equipment and also the associated monitoring equipment required under the MARPOL convention.

Figure 4-24: Fluids Oil / Separator

Oily Water Separator

Pre-filters

Drill Cuttings/Solids Treatment—Solids recovered from the clarifier are further processed using a cuttings dryer system. Cuttings dryer systems use centrifugal force (up to 500+ G's—gravitational force equivalent) to recover NAF from the cuttings. Screen bowls in the unit trap wet solids and the solids are accelerated so that the liquids are forced through the screen openings and the solids are extracted by angled flights. NAF can be further recovered from this process and recycled back into the active mud system. If the recovered cuttings meet the discharge requirements (NAF retention on cuttings less than 6.9 percent by weight as per USEPA 40 CFR § 435.13—Effluent limitations representing the degree of effluent reduction attainable by the application of the economically achievable BAT), the dried cuttings are then mixed with seawater and are discharged to the sea a few meters below the water surface. The frequency of overboard discharge can be continuous or batch depending on operational considerations. Cuttings which exceed this requirement are either re-treated or transferred onshore for further treatment. The frequency of cuttings sampling and analysis is based on the requirements of USEPA Method 1674.

Oily sludges/solids recovered from the main storage tanks are either recycled into the mud system, or are transferred onshore for further treatment.

Figure 4-25: Cuttings Dryer

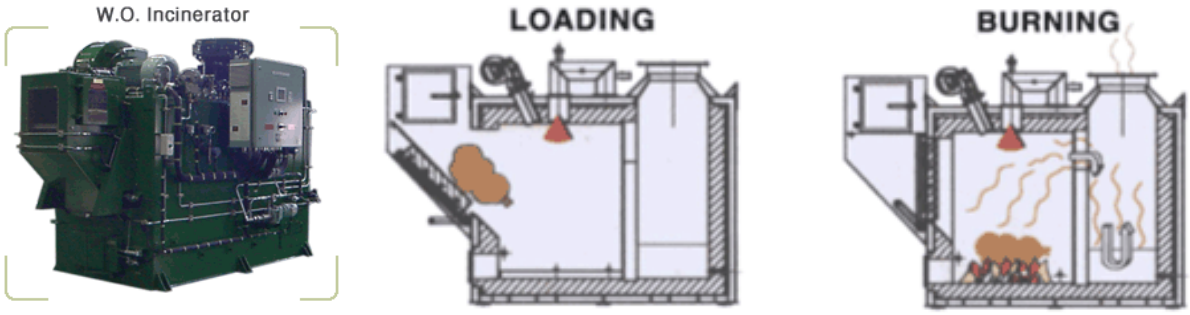
Gravity Settlement and Separation—Various other wastes, including waste brine, slops containing used drilling fluids, tank cleaning sludges and wash waters, and TCW fluids and can be stored temporarily in cutting boxes or designated pits on the drill ships or other vessels and allowed to settle and separate using gravity. If feasible, liquids are then decanted and processed in the OWS systems. The remaining wastes are then subject to static sheen testing (USEPA Method 1617—a method used as a compliance test for the “no discharge of free oil” requirement for discharges) to determine if they can be discharged overboard—otherwise, they are transferred onshore for treatment and disposal. This waste treatment process is done in batches based on operational requirements. Static sheen testing is conducted prior to discharge.

4.3.1.2 Stena Drill Ship

The Stena drill ships employ the same general solids separation, drill cuttings processing, and gravity settlement and separation technology as the Noble drill ships, but do not employ OIWA or OWS systems for fluids management. Therefore, static sheen tests are used for all fluid management decisions to determine what fluid wastes are appropriate for discharge overboard. Fluid wastes with >15 ppm hydrocarbon content are transferred onshore for treatment or disposal, or may also be treated offshore in the Stena drill ship onboard incinerators (certain fluids only).

Incineration—The Stena drill ships currently deployed in Guyana employ onboard Hyundai-Atlas Waste Oil Incinerators (Type MAXI NG150 SL WS) for the offshore treatment of certain fluids (oily water, lube oil) and solid wastes (sludges). These are designated shipboard incinerators with an IMO type approval certification consistent with IMO and MARPOL 73/78 requirements for shipboard incinerators. The incinerators have a capacity to treat a maximum of 150 kilograms (kg)/hour of solid waste and 99 kg/hour of liquid waste, and its fuel source is marine diesel oil. The incinerators have a primary and two secondary combustion chambers and operate at a temperature of 850 to 950°C. The primary chamber is designed to burn the wastes, and the secondary chambers (two in series) are designed to burn the combustion gases with a 1 to 2 second retention time. Flue gases are subject to shock cooling to control emissions. Incinerator ash (non-hazardous) is transferred onshore for treatment and disposal. Incinerator operations are conducted in batch mode based on operational requirements.

Figure 4-26: Incineration



4.3.1.3 Installation Vessels

The installation vessel operations generate specific waste streams related to the installation of the subsea drill centers and related flowlines and risers (pipelines), as well as umbilicals that provide power, control, and chemicals to the drill centers. The risers and umbilicals are connected to the FPSO. Saipem is currently contracted for the offshore installation efforts, and operates/manages the installation and related support vessels. There are several waste streams that are discharged overboard, including ballast water, cooling water, bilge water, sanitary waste (after treatment), food waste, and some commissioning waters (which may contain biocides, oxygen scavengers and corrosion inhibitors). Most hazardous and non-hazardous wastes generated offshore are transferred onshore for treatment and disposal, except for medical wastes and certain spent oils, lubes, and chemicals which are incinerated offshore in accordance with IMO and MARPOL 73/78 requirements for shipboard incinerators. Saipem also operates a Hyundai-Atlas Waste Oil Incinerator (Type MAXI NG150 SL WS), which is certified to meet the requirements of MARPOL 73/78, Annex VI.

4.3.1.4 Floating Production Storage and Offloading Vessels

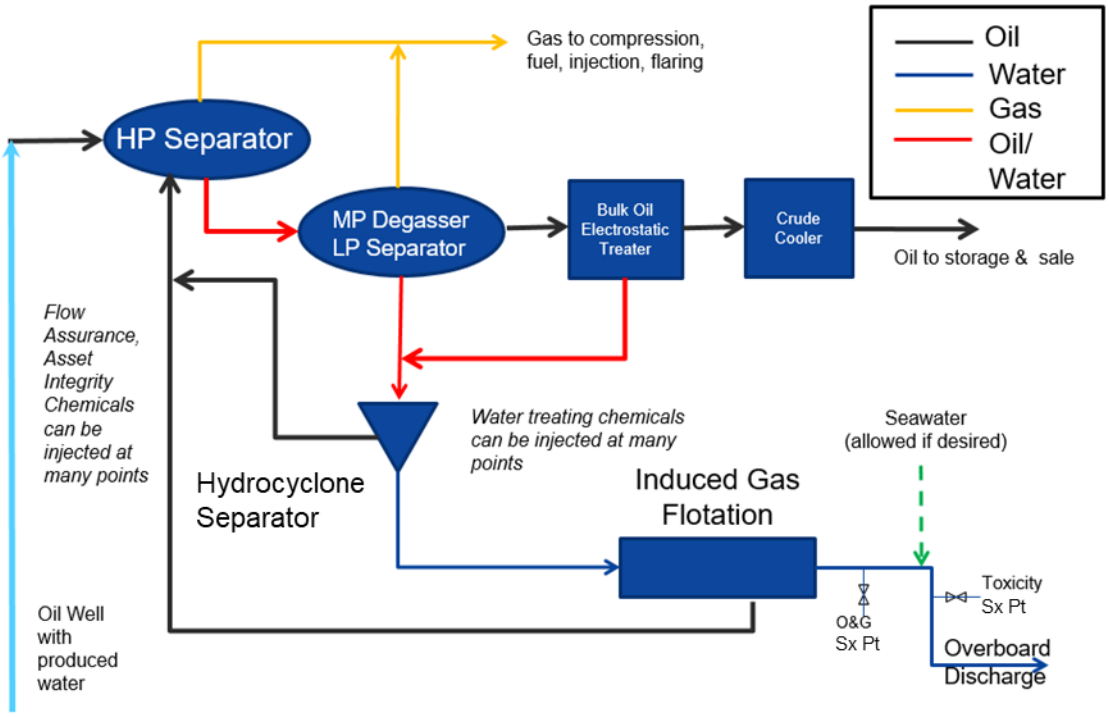
The FPSO vessel operations generate specific waste streams related to the production, storage, and off-loading operations that are discharged overboard, including produced water, and potable water treatment wastewaters. FPSO vessel operations also generate routine marine vessel waste streams that are discharged overboard, including deck drain wastewaters (after oil-water separator treatment), grey and blackwater, food waste, ballast water, cooling water. Most hazardous and non-hazardous wastes generated offshore are transferred onshore for treatment and disposal, except certain spent oils, lubes, and chemicals which are incinerated offshore in accordance with IMO and MARPOL 73/78 requirements for shipboard incinerators. The Liza Destiny FPSO operates a TeamTec AS shipboard incinerator which is certified to meet the requirements of MARPOL 73/78, Annex VI (IMO 2019).

Oily Waste Pre-treatment – Sludges and oily debris are generated from the FPSO operations related to the periodic cleaning of the various onboard oil/water separators and the produced water treatment process (separator and induced gas flotation operations). These wastes can be stored temporarily in skips or other containers on the FPSO and then are allowed to settle and separate using gravity. If feasible, liquids are then decanted and processed back with the incoming crude oil through the high pressure separator on the FPSO. The remaining solid/sludge wastes are then properly packaged and transferred onshore for treatment and disposal. This waste pre-treatment process is done in batches based on operational requirements.

Produced Water Treatment—Produced water is the residual byproduct of the extraction of oil. After the fluids are pumped from the well, they are initially processed through separators which separate the oil, water, and natural gas. The resulting oily water mixture is further treated in a hydrocyclone separator for additional oil separation, and then the produced water is further treated using induced gas flotation technology for final polishing and oil removal prior to being discharged overboard. Off specification fluids are directed to holding tanks for re-treatment. The system is designed to produce a discharge that does not exceed 42 ppm of oil in water (OIW) on a daily basis, or 29 ppm on a monthly average.

Produced water processing is conducted continuously or batch mode based on operational requirements of volumes of produced water received. There is an onboard auto sampler that measures OIW, and there is also an onboard permanent laboratory with technicians that monitor quality.

Figure 4-27: Typical Produced Water Source and Treatment



Potable Water Treatment—The FPSO is equipped with seawater treatment plant for the production of low sulfate water using nano filtration membrane technology and the production of potable process water using desalinization reverse osmosis technology. A concentrated brine effluent is generated from the water treatment process that is discharged overboard. Potable water treatment is continuous in operation.

Figure 4-28: Typical Reverse Osmosis Unit

Cooling Water Management—Cooling water is the largest quantity discharge from the FPSO (as well as from the drill ships). Large quantities of seawater are continuously used by the offshore vessels in their cooling systems as a heat exchange medium to cool down various equipment, including power generators and other processing equipment. The cooling system generally involves a once-through circuit, where seawater is drawn in from intakes, passed through the system, and discharged as a thermal waste stream back into the sea. The cooling water may be dosed with biocide chemicals (such as hypochlorite—chlorine bleach) prior to use to prevent biofouling of the pipe work and heat exchangers. These chemicals are continuously dosed into the seawater at the intake and in other locations. This dosing results in a residual chlorine concentration in the cooling water that is discharged to the sea. Temperature control to meet discharge requirements involves cooler water blending or additional heat exchangers. Cooling water is discharged below the sea surface to assist with dilution and dispersion of the cooling water plume.

Food Waste Treatment—For FPSOs located >12 nautical miles from shore, food wastes can be treated through a shredder or a macerator and pass through a 25-millimeter mesh screen prior to overboard discharge. Food waste discharge must to be visually monitored to ensure there are no floating solids after treatment. Food waste treatment is conducted in batch mode when required. Liza Destiny's macerator is manufactured by Hoover Ferguson.

Figure 4-29: Liza Destiny FPSO Food Macerator

4.3.1.5 All Vessels

All vessels have food and sanitary wastewater that is treated and discharged overboard as described below.

Sanitary Waste Treatment—Sanitary wastewaters (including grey water and blackwater) and sludges are treated prior to discharge. Macerators (sewage waste grinders) are used for treatment prior to discharge from vessels with less than 10 personnel. However, all vessels with more than 10 personnel are equipped with an MSD. MSDs use various technologies, including sewage oxidation using electrochemical cells, or traditional biological treatment methods that include coarse screening, aeration, clarification, and settling. All MSDs also use disinfection chemicals as part of the final process prior to discharge overboard. In accordance with MARPOL 73/78 requirements, vessels are required to have an International Sewage Pollution Certificate that requires periodic renewal surveys. Sanitary waste treatment is continuous in operation.

Figure 4-30: Sanitary Waste Treatment

Macerator **Electrochemical MSD** **Biological MSC**

Food Waste Treatment—For vessels located >12 nautical miles from shore, food wastes can be treated through a shredder or a macerator and pass through a 25-millimeter mesh screen prior to overboard discharge. Food waste discharge must to be visually monitored to ensure there are no floating solids after treatment. Food waste treatment is conducted in batch mode when required.

Figure 4-31: Shipboard Food Shredder

4.3.2 Onshore Waste Management Facilities

At present, there is currently a limited number of onshore waste service providers of hazardous and non-hazardous waste management in Guyana. A description of the existing and proposed waste management service providers is provided below. The EPA has advised that Guyana hazardous waste regulations will be revised such that onshore facilities will be subject to RCRA-like hazardous waste regulations. Accordingly, waste service providers' operations may be impacted. One of the major revisions to these regulations will be the adoption of RCRA-like disposal treatment standards.

4.3.2.1 Existing Waste Management Facilities

TRG—TRG, which is located at GYSBI, is currently the primary provider of hazardous and non-hazardous waste services to EEPGL projects. TRG employs a variety of waste treatment technologies (sorting/segregation of recyclables, physical/chemical/and thermal treatment of hazardous and non-hazardous wastes) and discharges its treated fluids as permitted to the Demerara River, and sends its treated non-hazardous solid waste as well as other wastes received (including general waste, paper/cardboard, and scrap wood) to the publicly owned and operated HBL. TRG receives wastes from EEPGL directly, as well as many other companies involved with the offshore oil E&P operations.

Figure 4-32: TRG GYSBI Facility

HBL—The HBL, which is located in Eccles East Bank Demerara (EBD) area, is government owned under the jurisdiction of the Guyana Ministry of Local Government and Regional Development (Sanitation Management Unit) and is operated by a third-party contractor Waste Solutions Landfill Inc. (joint venture between Puran Brothers and Cevons Waste Management).The HBL is the only engineered sanitary landfill in Guyana, and started operations in early 2011. The HBL is the current destination for most municipal and commercial solid non-hazardous waste generated from the greater Georgetown area, including wastes generated from the 25-plus Neighborhood Democratic Councils between Mahaica, the Seawall, Timehri, and Parika. All non-hazardous solid wastes generated to date from the EEPGL projects have been disposed at the HBL. The original disposal cell (Cell 1) is at 99 percent capacity, and Cell 2 started operations in late March 2021. At current disposal rates, Cell 2 will have approximately 4 to 6 years of disposal capacity. The facility currently receives approximately 500 tons of waste per day.

Figure 4-33: Haags Bosch Landfill

Eternity Investment Inc.—EII, which was established in 2009, is a scrap metal consolidation and exporting facility, which also accepts and manages lead acid batteries and electronic waste. EII is currently the only facility authorized by the EPA to manage electronic wastes. The main scrap yard for the facility is located in a sparsely developed area of Madewini near the Cheddi Jagan International Airport. The company receives non-ferrous (including lead acid batteries), ferrous, and electronic waste scrap, and then sorts and consolidates these materials. These materials are then packaged in sea going containers and exported to buyers worldwide. Historically, materials have been exported to the U.S., Malaysia, Korea, Vietnam, Spain, and Belgium. EII receives scrap metal from throughout Guyana.

Figure 4-34: EII Madewini Scrap Yard

Aerial View

Ground View

Liquid Mud Plants (LMPs)—There are currently three onshore drilling services providers that operate cement and drilling fluids facilities, also known as a LMP, including Schlumberger Guyana, Inc./MI-Swaco (located at GYSBI [blue]), Halliburton Guyana, Inc. (located at G-Port at the mouth of the Demerara River red]), and Baker Hughes Guyana Inc. (also located at G-Port [yellow]). The LMPs manufacture drilling fluids (mud) for the offshore operations, but also receive spent fluids (mud) from the offshore operations for onshore reconditioning. The used drilling mud is reclaimed using mechanical (centrifugation) and chemical processes, and the reconditioned muds are then returned to the drilling ships for use in new drilling operations. However, the LMPs also generate hazardous and non-hazardous wastes from their reconditioning operations, including fluids, cuttings and other solids recovered from the used drilling muds, as well as other operational wastes (wastewaters, oily rags, garbage, etc.). These residual wastes are currently being managed by TRG. The LMPs only receive drilling mud wastes from the offshore drill ships.

Figure 4-35: Liquid Mud Plants

Schlumberger Guyana, Inc./MI-Swaco at GYSBI (blue)

Halliburton Guyana, Inc. (red) and Baker Hughes Guyana Inc. at G-Port (yellow)

4.3.2.2 Planned Waste Management Facilities

Sustainable Environmental Solutions Guyana, Inc. (SES) is currently constructing a new integrated waste management facility (IWMF) at GYSBI for managing wastes that are generated from offshore operations and is expected to be operational in July 2021. The SES facility will employ various hazardous and non-hazardous waste management technologies, including hot oil thermal desorption, incineration, decanter/centrifuge separation, wastewater treatment, waste shredding, container crusher/baling, and container washing operations.

Figure 4-36: SES GYSBI Facility (under construction)

Oilfield Waste Management Services (OWMS) submitted a permit application to the EPA in 2020 for the construction of a 5,000 square meters (m^2) drilling waste processing plant in the Little Diamond EBD area (located approximately 5 kilometers (km) south of GYSBI). OWMS will employ thermal desorption separator (hammer mill) technology to treat drilling muds. Oil and water recovered from the process are proposed to be recycled in the formulation of new drilling muds, and the solids are proposed to be used in the bitumen manufacturing process or sent to the HBL. It is unknown when the OWMS plant will become operational.

Environmental Waste Management Services Guyana Inc. (EWMSG) submitted a permit application in late 2020 for the construction and operation of a waste treatment (bioremediation) facility for mud sludge generated from activities in the Oil and Gas sector. The proposed location of the facility is at Lots 21 and

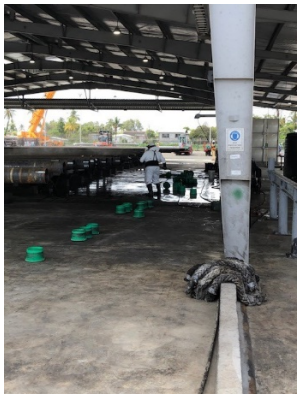
22, Block XXV111 Zone Plantation Friendship, EBD area. According to the EPA Public Notice issued in December 2020, the operation will involve the development of two treatment ponds lined with High Density Polyethylene (HDPE) Geomembrane liners and contained by 91.4cm high berms. In addition, four existing structures will be repaired and developed into administrative units, laboratories, storage areas, and homes for caretakers. A screen will be constructed to separate the office area from the treatment ponds. The status of this application is not currently known, and it is also unknown when the EWMSG facility would become operational.

GYSBI currently operates a steel pipe warehouse, storage, and handling operation at its Annex location which involves the washing of virgin steel pipe prior to transfer to the wharf and loading onto the vessels for offshore transit. The non-hazardous wastewater from this washing operation is currently collected and treated in on-site evaporators—there is no discharge of this wastewater. This location is being considered as part of a feasibility assessment for developing a new Protectors Grinding and Pelletizing to exclusively and specifically manage used plastic drill pipe thread protectors that are generated from the pipe handling operations. Pipe thread protectors are designed to protect the critical threads of the steel pipes during storage, handling, and transport, and tens of thousands of these metal reinforced plastic caps will be generated as a result of offshore well installation operations. These used plastic caps will first be subject to grinding to separate the plastic and metal parts, and the plastic will then be melted and pelletized and returned to the original manufacturer as a raw material for the production of new plastic caps. The recovered metal will also be recycled. Although being considered, it is uncertain when this type of facility would move forward at this location.

Figure 4-37: GYSBI Annex

GYSBI Annex Pipe Management Facility

Pipe Washing

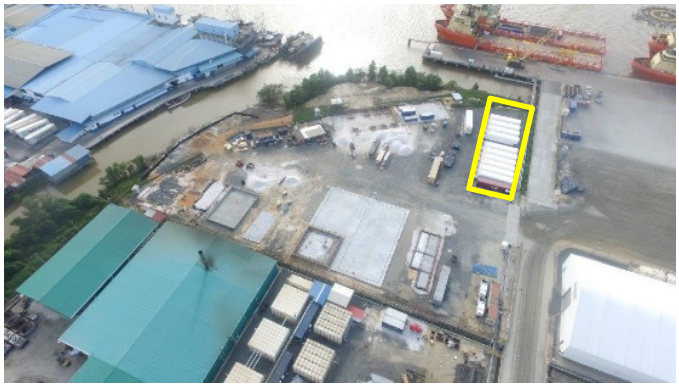


Pipe Protectors

4.3.2.3 Temporary Oily Water Transit Facility

At present, most wastes received from offshore are currently held at GYSBI pending processing at the permitted TRG/SES (future) locations at GYSBI, except for spent drilling fluids which may be stored at the LMPs pending reconditioning (GYSBI and G-Port). However, given the increased demand for space at GYSBI and increased workload for TRG/SES (future), EEPGL has developed an alternative temporary transit area that is identified as the GYSBI Sliver Plot. This area can be used for the transiting of oily waters in the event of TRG/SES (future) workload challenges or unplanned shutdown. The GYSBI Sliver Plot is located immediately adjacent to the SES location and approximately 100 meters northeast of the current TRG GYSBI location. The GYSBI Sliver Plot (approximately 1,500 m^2 in area) currently holds eleven (11) 500 bbl frac tanks with secondary containment to support these backup operations.

Figure 4-38: GYSBI Sliver Plot



4.3.2.4 Proposed Emergency Waste Storage Facility

All non-hazardous wastes managed at TRG are currently stored at TRG pending off-site transfer to the HBL for final disposal. TRG currently transports these wastes every 1 to 2 days to the HBL once a complete truckload of waste has accumulated. However, TRG has very limited space available for non-hazardous waste storage. Therefore, any unplanned shutdown or operational challenges at the HBL could disrupt TRG operations.

EEPGL has developed a contingency option that identifies an additional location (GYSBI Annex Plot 4) that can be used for emergency storage of solid (no-free liquid) treated non-hazardous waste in the event of an unplanned shutdown or operational challenges at the HBL (i.e., the landfill cannot accept wastes because of weather or other operational challenges). The GYSBI Annex Plot 4 site is located on the east side of East Bank Public Road approximately 1 km southeast of the GYSBI entrance, and encompasses an area of approximately 40,000 m^2. This area could be used for the emergency storage of up to 1,000 tonnes (at a minimum) of treated non-hazardous waste pending the resumption of routine HBL operations.

Figure 4-39: GYSBI Annex Plot 4 Location

In addition to the options for these additional storage locations, contingency planning involving the potential export of hazardous waste (under Basel Convention) and non-hazardous wastes is also under development.

4.3.3 Current and Future Waste Treatment Technologies

The following is a summary of the various waste treatment technologies currently used or proposed for use at each of the major waste service providers. The existing technologies currently being deployed or planned are typical and have been proven effective worldwide for treating oil and gas exploration, development, and production wastes. These physical, chemical, and thermal treatment technologies are consistent with those described in the WBG and IFC EHS Guidelines for Waste Management Facilities (WBG and IFC 2007c).

4.3.3.1 Tiger Rentals Guyana Inc.

The following is a brief description of the waste management technologies currently employed by TRG.

Wastewater Treatment—The oily wastewater treatment system employs an oil-water separator, which is followed by filtration (sand, particulate and carbon filters). Treated wastewater is also dosed with bleach prior to batch discharge to address coliform concentrations should they be present. This unit can process approximately 50 bbl per day.

The wastewater discharge is covered under the facility environmental permit—the permit does not specify a frequency of sampling, but each treated wastewater batch is tested prior to discharge. Samples are analyzed for pH, total petroleum hydrocarbons (TPH), total suspended solids, biological oxygen, and fecal coliforms. Once the analyses are received and are reviewed to be within the discharge limits, the treated wastewater is discharge through the GYSBI outfall and into the adjacent Demerara River. In general, it takes about 12 hours to discharge an entire 500 bbl frac tank. Treated wastewaters can also be used for container cleaning at TRG, or as make up water for the incinerator scrubber system (oil or chlorine free water only).

Figure 4-40: TRG Wastewater Treatment

Oil-Water Separator

Filtration Units

Solidification/Stabilization Treatment of Drilling Muds and Sludge—The solidification/ stabilization process involves the use of a pug mill to mix cement with the drilling muds and sludges to solidify and stabilize the material prior to off-site transfer for landfill disposal. There are currently two pug mill units in operation and combined these units can treat approximately two bbl of waste per hour. A small excavator is used to load cement and sludges into the pug mill for mixing. The treated wastes are then loaded into bulk bags (also known as supersacks and constructed of woven polypropylene) for curing under cover prior to off-site

transfer for disposal. Treated wastes are also periodically tested for TPH, total oil and grease (TOG), and the Toxicity Characteristic Leaching Procedure (TCLP) extractable metals content (arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, and zinc—USEPA SW-846 Test Method 1311—RCRA 8 metals [USEPA 1992]) to ensure they have been rendered non-hazardous in the solidification/ stabilization process. Wastes are re-treated if they do not pass the referenced USEPA standard.

TRG has updated the Sampling Plan (revised April 2021) to include sampling frequencies and volume parameters.

- Incineration is composite sampled at minimum every (3) Mega bags or 5 metric tons (MT).
- The Pug Mill is composite sampled every (18) Mega bags or 25 MT.
- The Wastewater is batch treated and sampled prior to every discharge.

The frequency and volume are usually based on waste stream variation and treatment technology.

Figure 4-41: Pug Mill Operations

Thermal Desorption Treatment—Thermal desorption treatment of oily sludges, drill cutting, tank cleaning sludges, produced solids etc. is conducted using a vertical infrared desorption (VIR) unit. The VIR utilizes infrared heating elements to heat the waste (100 to 350 degrees Celsius [°C]) and thermally desorb the contaminants. The contaminants (primarily hydrocarbons) evaporate and are then vented through a thermal oxidizer system (900 to 1,200°C) for destruction of the volatilized contaminants and other off-gases. However, some liquids may also remain after the completion of VIR treatment, and these are subject to collection and further treatment in the wastewater treatment plant or treatment in the pug mill. The VIR unit at TRG can process approximately 100 bbl of waste per week.

Wastes are loaded into the refractory lined VIR unit (30 cubic meters [m^3] capacity) with an excavator, and then the infrared heating elements are inserted and the unit sealed in preparation for treatment. The contaminated solids are batch treated, and the batch treatment can last from 12 to 72 hours (depending on moisture content and oil content). After treatment, the wastes are loaded into bulk bags and stored pending transport to the landfill for final disposal. Treated wastes are also subject to periodic composite batch sampling and testing for TPH, TOG, and TCLP extractable metals to ensure they have been rendered non-hazardous in the thermal desorption process.

Figure 4-42: Thermal Desorption Treatment

VIR Unit

VIR Infrared Heating Probes

Thermal Oxidizer System

Incineration Treatment—Certain hazardous wastes, including oily rags, spent solvents, paint cans, brushes, biomedical wastes, etc., are treated in an incinerator unit. The incinerator unit is a single hearth unit with the main burner temperature set at 450 to 500°C, and the secondary burner temperature set at 850 to 900°C. The incinerator has an air pollution control system that consists of the secondary combustion unit, a rapid quench system, and a wet scrubber for gas emission neutralization prior to stack discharge. The water in the wet scrubber is recirculated within the scrubber system, with a portion of the liquid ultimately evaporating daily as steam as part of the stack discharge. New water needs to be added as needed to the process to maintain the proper operation of the wet scrubber. In summary, there is no effluent or discharge from the wet scrubber system.

This unit generally operates 12 hours per day, and can treat approximately 1,500 kg/day. The incinerator fuel source is diesel fuel.

Wastes are manually loaded into the burning chamber in quantities of approximately 150 kg, and additional charges are added when the burning appears to be complete and only ashes are left (a visual observation only). When charges are added, the main burner is turned off, and an additional charge is manually added to the hearth. All the ashes are removed after the unit has cooled down after the 12 hour operating period. This cool down takes approximately 2 hours. Wastes are then unloaded and placed into bulk bags and stored pending transport to the landfill for disposal. Treated wastes are also periodically tested for TPH, TOG, and TCLP extractable metals to ensure they have been rendered non-hazardous in the incineration process.

Figure 4-43: Incineration

Incinerator Unit

Incinerator Loading Hatch

Incinerator Ash

Separation Treatment—The separation of oily wastewaters is currently being done on-site using frac tank storage and gravity separation techniques. The wastewaters are stored in the frac tanks and the liquids

are allowed to separate over a time (a period of days). The oil fraction is then siphoned off the top for treatment, and the remaining wastewaters are treated accordingly.

Figure 4-44: Frac Tank Storage

Specialty Hazardous Waste Treatment—TRG operates two specialty hazardous waste treatment units—a fluorescent bulb crusher unit and an aerosol can processing unit. The fluorescent bulb crusher unit (Bulb Eater Brand) requires manual loading of lamps, which are then crushed in the unit. The unit has a side-mounted 4-stage filter system that includes both high-efficiency particulate absorbing/arrestance (HEPA) and carbon filters to neutralize mercury vapors released during crushing. Metal and glass from the unit are then recycled (metal) or disposed (glass) as non-hazardous waste at the landfill, and the air filters are stabilized in the pug mill prior to landfill disposal. The aerosol can processing unit requires manual loading, and the unit punctures the cans and allows the liquids to collect in a steel 205L drum. The vapors are directed through a coalescing filter/carbon cartridge to capture emissions. The recovered liquids are then incinerated on-site.

Figure 4-45: Specialty Waste Treatment

Aerosol Can Unit

Bulb Crush Unit

Container Cleaning—TRG conducts cleaning of the various containers being used for waste containment and transport (including CCU, IBC, 205 liter drums (plastic and metal), and other containers). Pressure washers are the primary tool used for cleaning operations. Solids and liquids recovered from the container cleaning operation are treated in the other on-site waste treatment processes, and the containers are returned to service. Containers which cannot be reused are crushed (metal) or cut (plastics) prior to disposal or recycling (metal).

Figure 4-46: Drum Crusher

Segregation/Sorting/Storage—TRG maintains a separate non-hazardous waste storage and processing area where non-hazardous wastes are manually sorted and segregated pending off-site transfer for further recycling or disposal. This area is used to manage glass, paper, plastic, scrap metal, etc.). The only operations conducted are consolidation, bulking, and size reduction for ease of transport.

Figure 4-47: Non-hazardous Waste Operations Area

Landfill Disposal—TRG transports treated non-hazardous solids from its waste processing operations and other sorted non-hazardous wastes (garbage) received from offshore operations to the government owned and operated HBL for landfill disposal.

The HBL is the only engineered sanitary landfill in Guyana, and the two cells constructed to date include a leachate collection layer that was placed over the thick section of native clay subsoils (>20 meters thick) at the site. Leachate is collected within the leachate collection system which includes two facultative ponds (aerobic zone near the surface and anaerobic zone at depth) and two stabilization ponds (aerobic), prior to discharge to drainage ditches which discharge to the river (3 km distant). Cell 2 has also been constructed with air vents to promote a semi-aerobic decomposition of the waste (Fukuoka Method) in the future.

Wastes received at the landfill site are off-loaded into the active disposal cell, and the wastes are periodically covered with soil or other waste. Although there is no formal waste processing conducted at this facility, there is informal waste processing being conducted by recyclers (i.e., waste pickers) who are authorized to recover items from the landfill site for recycling. The recyclers recover, recycle or reuse anything with value from the inbound waste shipments (including food wastes) after the wastes are off-loaded and spread out by the heavy equipment at the working face area. There is currently no segregation of the TRG waste from other municipal solid waste disposed at the landfill site.

Figure 4-48: Landfill Disposal

Working Face Disposal Area

Recycler Recovery Operations

Leachate Treatment Pond

4.3.3.2 Sustainable Environmental Solutions Guyana Inc.

SES is currently developing an IWMF at GYSBI that is expected to be operational in July 2021. The facility is designed to manage both hazardous and non-hazardous wastes that are generated from offshore operations, and will include thermal desorption, incineration, separation (decanter/centrifuge), wastewater treatment, container cleaning, and solids reduction (shredding and crushing) technology. The general flow diagram for the SES IWMF operations is shown in Figure 4-49.

The following is a general description of the various waste management technologies proposed for the SES operation.

Thermal Desorption Treatment—The planned high temperature thermal desorption unit (NOV Hot Oil Thermal Desorption Unit [HTDU] Model 500) is designed for the treatment of hazardous oil based drilling wastes with up to 80 percent liquid content. The HTDU Model 500 can process up to 2 tons of wet cuttings per hour and can operate 24 hours per day/7 days per week, with periodic maintenance shut downs (5 to 7 day duration) required every quarter.

Figure 4-49: SES IWMF Operations Flow Diagram

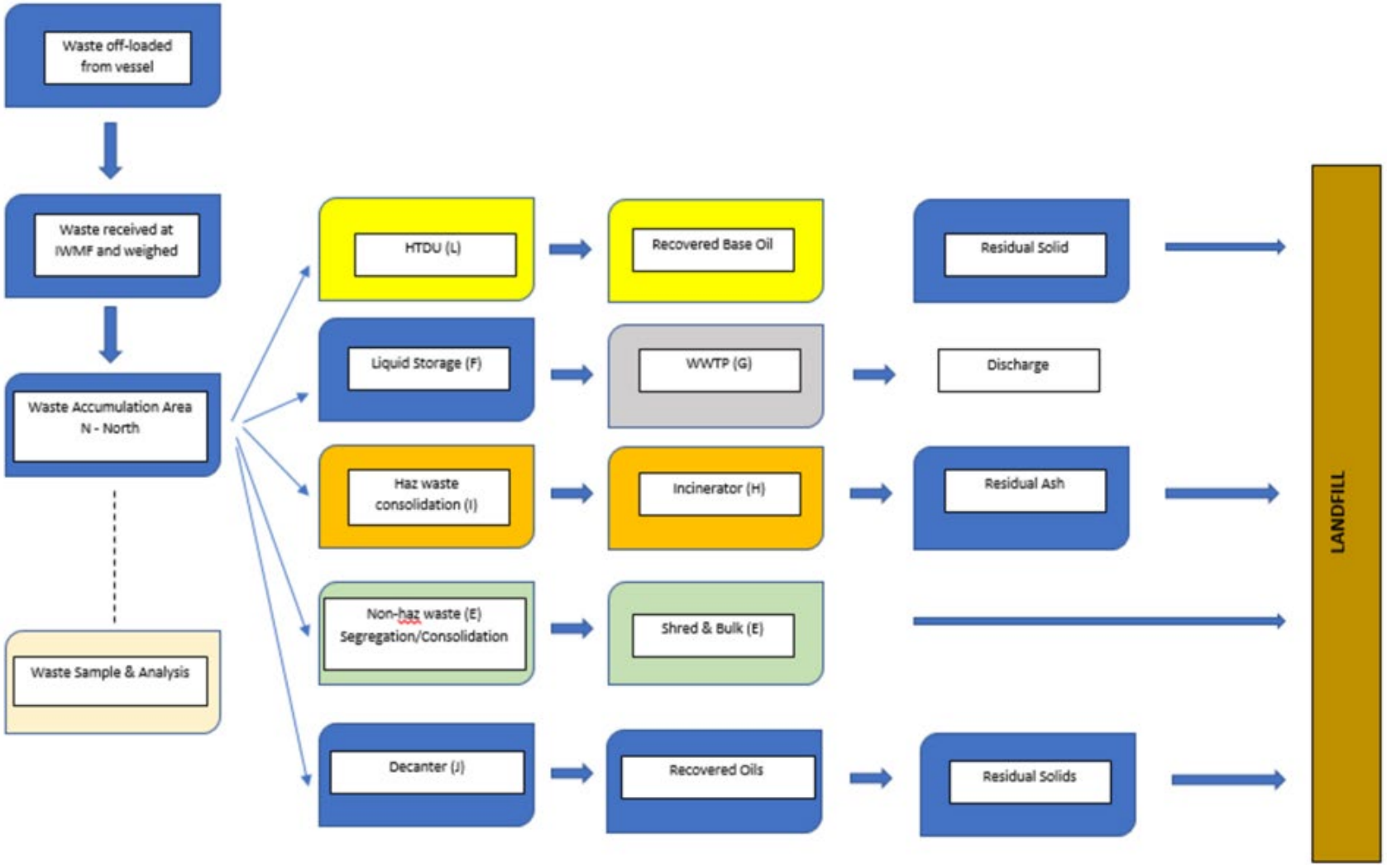
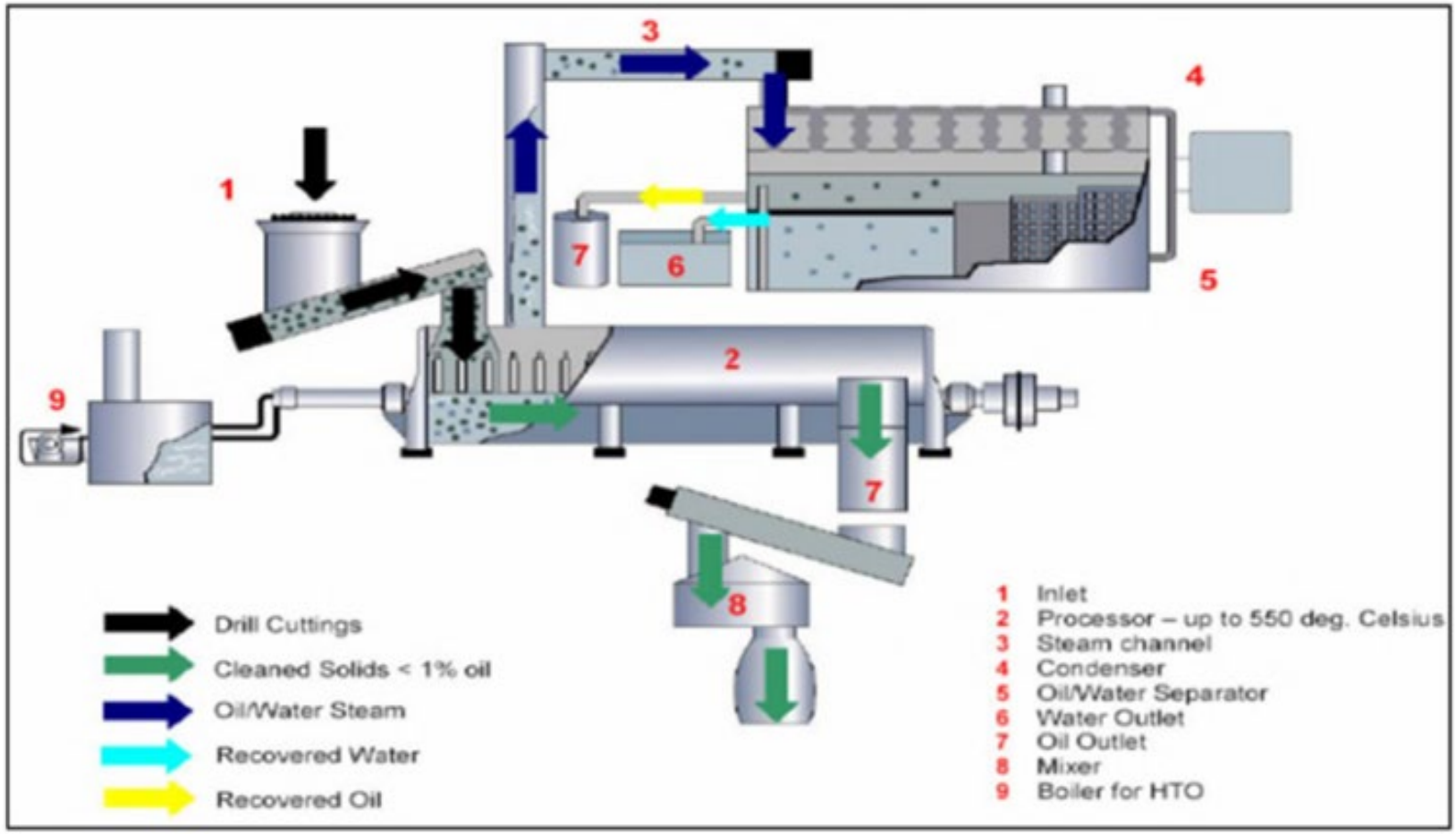


Figure 4-50: Thermal Desorption Treatment



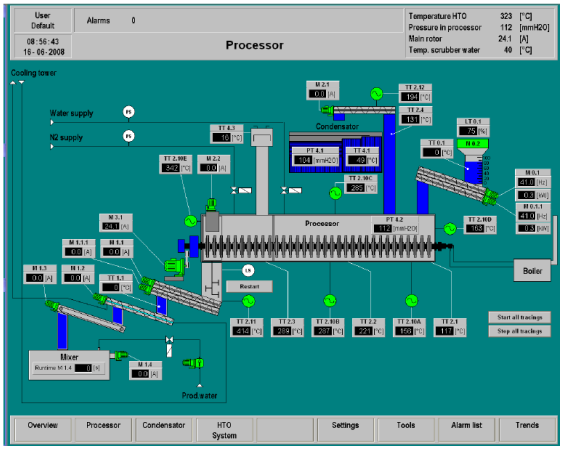
Wastes will originally be received in an unloading pit, and then transferred to open top steel storage tanks that are located within a covered structure to protect from wind and rain. The contents of the tanks will be mixed with an overhead traverse crane, and then will be loaded with a clamshell bucket into the HTDU. The HTDU employs desorption by heating and mixing of sludge in a deoxygenated atmosphere, and heat transmission oil, heated in an adjacent boiler system, is used to heat the HTDU up to 550°C. The thermal treatment evaporates the water and hydrocarbons, which are then treated in a condenser unit and oil/water separator.

Non-condensable gases are treated in a gas dryer and burner. The oil is recovered and reused in the manufacture of new drilling fluids, and the recovered water is used in the HDTU quencher unit or used to rehydrate the treated solids. The dry solids are cooled and rehydrated, and then are packaged in bulk bags for testing prior to transport to the landfill for disposal. All HTDU operations will be computer monitored and controlled.

Figure 4-51: HTDU Unit and Operations

Typical HTDU Unit

Typical HTDU Control Screen



Incineration Treatment—The planned incinerator unit is designed to treat both liquid and solid hazardous wastes. An Addfield C200 incinerator is proposed for installation. The incinerator is a single hearth unit with a burning chamber capacity of 200 kg/hour. The unit is proposed to have a pneumatic operated automatically sequenced ram feeder unit, which minimizes the amount of manual waste handling associated with the incinerator loading.

This incinerator has two burning chamber—the primary chamber will operate in excess of 700°C and secondary chamber will operate at greater than 1,100°C to ensure complete destruction of gases prior to stack discharge. No additional air emissions controls beyond the secondary chamber are currently specified to be installed on this unit. Ash is removed after each burning episode, placed in bulk bags, and stored pending approval sampling and transfer to the landfill for disposal. All incinerator operations are controlled with a programmable logic controller based control system to provide fully automated monitoring and control of the plant.

Figure 4-52: Addfield C200 Incinerator

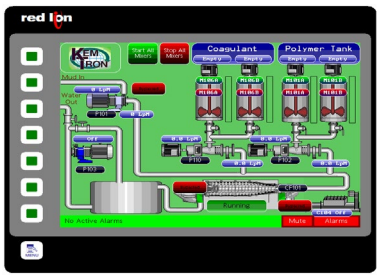
Separation Treatment—The planned decanter/centrifuge unit is part of the SAS Environmental MIST (Microemulsion Injection and Separations Technology) system, which is a separation technology which separates liquids from solids. This unit is designed for the treatment of hazardous waste streams that are 70 to 80 percent liquid with up to 10 to 25 percent oil content. The MIST system has blending tanks to optimize the feedstock (proper mixture of solids and liquids), prior to separation, and then unit uses a decanter and centrifuge to produce a mixture of oil and water, and dry solids. The recovered liquids are treated in the wastewater treatment system, and the solids are subject to further thermal treatment or stored in bulk bags pending approval sampling and landfill disposal.

Figure 4-53: SAS Environmental MIST System

MIST Decanter Centrifuge Unit

Side View of MIST Unit

MIST Control Panel



Wastewater Treatment—The planned wastewater treatment unit is designed to treat petroleum and chemical containing wastewaters. The treatment process will include:

- A coarse screen;
- Initial oil/water separation employing gravity separation;
- Top skimmer for oil recovery;
- A two phase oil flotation unit (dissolved air flotation);

- A pH adjustment unit;
- A second oil/water separator;
- A final pH adjustment unit; and
- Final polishing with a reverse osmosis unit as required prior to discharge to the GYSBI channel for discharge to the river.

Figure 4-54: Example Wastewater Treatment Unit

Container Cleaning—The planned container washing unit is designed to wash and clean the various containers being used for waste containment and transport (including CCU, IBC, 205 liter drums (plastic and metal), and other containers). Solids and liquids recovered from the container cleaning operation are treated in the other on-site waste treatment processes, and the containers are returned to service. Containers which cannot be reused are crushed or shredded prior to disposal or recycling (metal).

Figure 4-55: Container Washing Unit

IBC Wash Unit

Drum Wash Unit

Solids Reduction—The IWMF will also have shredder equipment for size reduction of non-hazardous wastes (bulk wood and plastics), as well as a drum crusher (for metal and plastic drums up to 210 liters in size). The purpose of these solids reduction measures is to reduce the overall volume of wastes to optimize handling, transport, and disposal of the wastes.

Figure 4-56: Solids Reduction Measures

Drum Crusher Unit

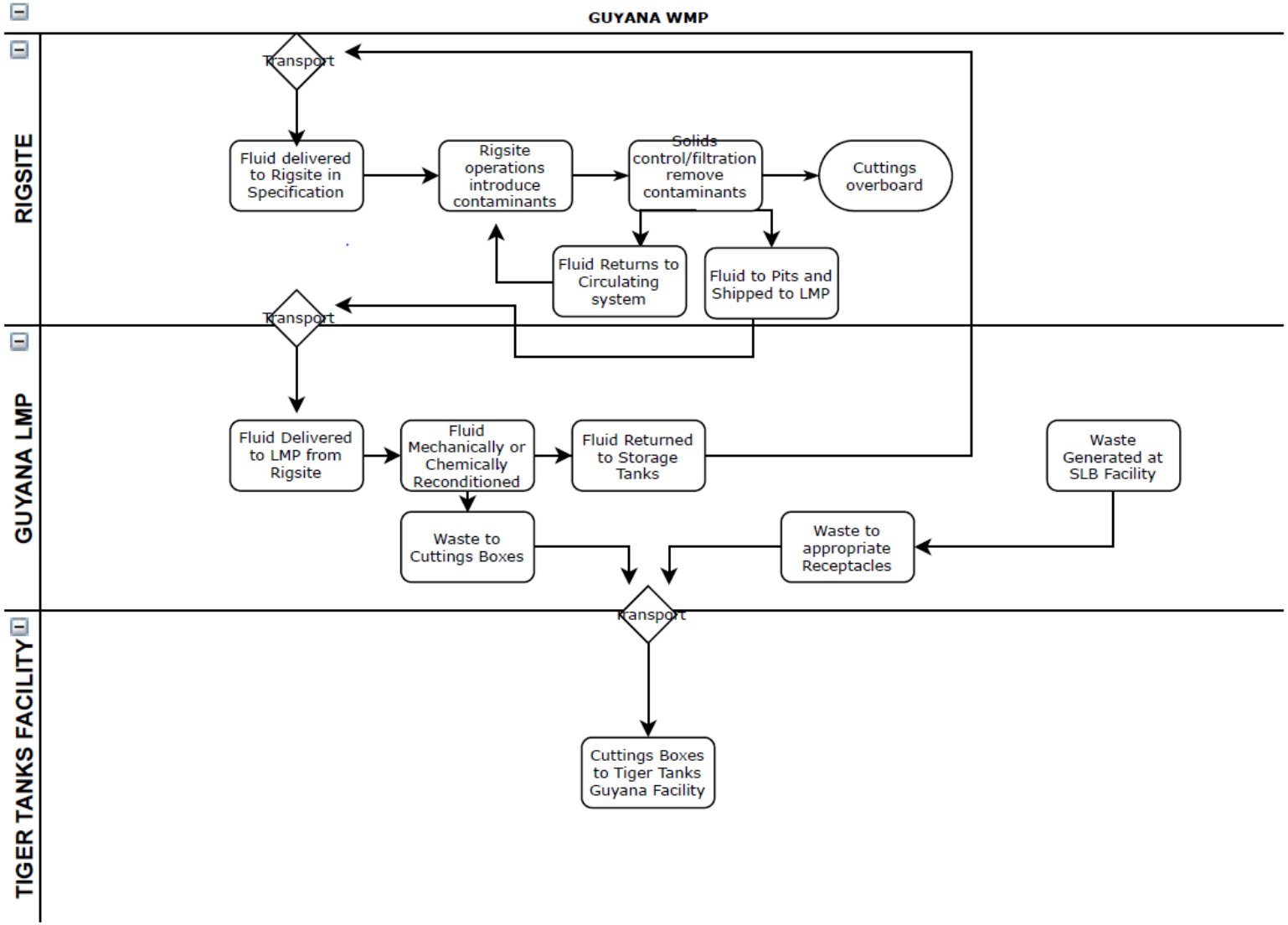
Waste Shredder Unit

4.3.3.3 Liquid Mud Plant

The LMPs currently operating to support EEPGL offshore drilling operations (Halliburton, Schlumberger/MI-Swaco, and Baker Hughes) are the EPA-permitted facilities which manage drill ship fluids for reconditioning. Each LMP has its own Emergency Preparedness Plan, WMP, and annual reporting requirements regarding waste management as required by their respective EPA Operation Permit. Each of these LMPs has its own proprietary reconditioning technologies and processes for managing the drill ship fluids, but all generate wastes from their operations that are currently being managed by TRG. Some of these wastes including spent drilling muds (fluids) and cuttings recovered from the reconditioning processes.

Figure 4-57 is an example workflow diagram of how all of the LMPs generally manage the drill ship fluids and their reconditioning processes.

Figure 4-57: Example Liquid Mud Plant Workflow Diagram



Source: Schlumberger WMP, January 2019

4.4 Waste Facility Auditing

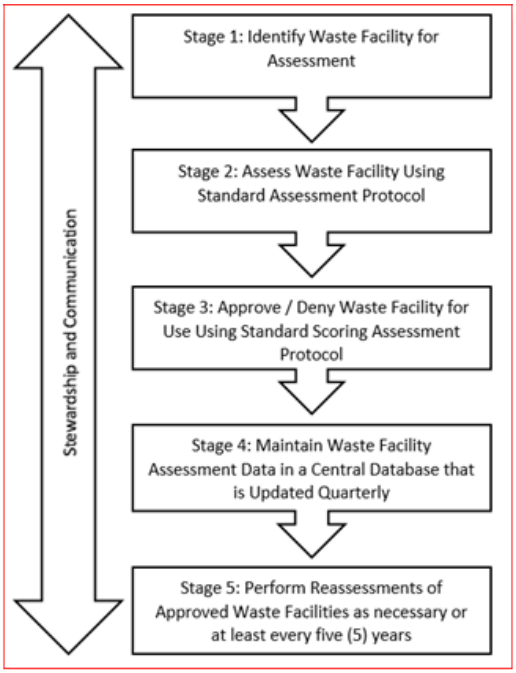
ExxonMobil has a corporate level Approved Waste Site List (AWSL) Program which governs usage of third-party waste management facilities globally. Specifically, the purpose of the system is to mitigate potential Safety, Security, Health & Environment (SSH&E) concerns associated with the recycle, treatment, storage, transfer, and disposal of Exxon Mobil Corporation and Affiliates generated wastes globally. The third-party waste management facilities currently being used in Guyana by EEPGL are subject to the requirements of the AWSL Program.

The AWSL Program requirements take into account the level of risk associated with hazards of the waste, the technology used, and the operation of the facility itself. The AWSL Program is used to monitor and assess third-party waste management facilities. The program uses a clear and consistent documented process by which waste management facilities are assessed and selected.

The AWSL Program waste facility assessment protocol consists of two (2) independent aspects that include information gathering and scoring. The protocol examines ten different technical and non-technical categories of a waste management facility. The categories are:

- Facility operations
- Regulatory compliance
- Management / management systems
- Location
- Security
- Facility Design
- Site geology/groundwater
- Community Relations
- Financials / insurance

Figure 4-58: AWSL Program Audit Process



Information gathering is the first aspect of the protocol and involves a site visit, the use of a standard questionnaire (see Appendix G, Waste Facility Assessment Questionnaire) to gather and document information for each of the ten categories, and the gathering of additional supplemental documentation provided by the waste facility or obtained from other publicly available sources. Photographs from the site visit are also part of the documentation required. In special circumstances (i.e., travel restrictions due to a pandemic or other just causes) and actual site visit may be replaced with a virtual inspection or hybrid audit.

The scoring aspect is the second part of the protocol that involves the assignment of a score for each of the ten categories. Examples of aspects identified in the audit that can affect the scoring in the various categories include:

- Recent community activity, including sponsoring community programs or community complaints or opposition;
- Proximity to sensitive environments (wetlands, residences, etc.);
- Safety record (poor to excellent);
- Waste inventory (limited to excessive);
- Experience for key management/technical staff (minimal to extensive);
- Extent of containment measures (inadequate to complete);
- Frequency of regulatory inspections (never to full time) ;
- Scope and frequency of training or inspection programs (minimal to extensive);
- Historical or visible air, soil, water contamination, or lack thereof;
- Owner’s financial equity/investment (minimal to high);
- Scope of safety programs (minimal to comprehensive);
- Pollution insurance coverage (none to comprehensive);
- Security/control measures (lacking to fully secure);
- Housekeeping (poor to excellent);
- Audit cooperation (minimum to maximum);
- Maintenance/facility condition (poor to good);
- Technology deficiencies (e.g., lack of air pollution controls, undersized equipment, incomplete treatment, etc.) or attributes (e.g., secondary containment, automated monitoring, computer controls, etc.);
- Record keeping (none to comprehensive);
- Regulatory compliance issues, violations, fines;
- Staffing (insufficient to more than sufficient); and
- Media coverage (negative to positive).

Based on the scoring assessment, a facility is categorized with a rating of GOOD, FAIR, or POOR as defined below:

- GOOD Rating—the facility is approved for use and added to the AWSL.
- FAIR Rating—the facility is only approved for use with appropriate regional management documented endorsement.
- POOR Rating—the facility is prohibited from use, unless it is specifically required by a regulatory authority.

The rating assigned to a specific facility is based on what is referred to as a “balanced risk” approach that considers all the aspects. The criterion for a specific facility rating is based on the overall facility score (represented by the sum of the 10 category scores) and whether or not the score is above or below the GOOD, FAIR, or POOR scoring thresholds. Individual category scores are not necessarily the determining factors, just the overall facility score.

Facilities that have been assessed and approved will have subsequent periodic assessments to keep apprised of potential changing conditions in the technology applications, regulatory environment and compliance, facility financial situation, and changing economic conditions. Once the facility is approved, subsequent assessments are conducted at least every 5 years with the following exceptions:

- The ExxonMobil Business Line sponsor (in the case of Guyana, EEPGL) may request a more frequent assessment schedule.
- Facilities with a FAIR rating will be subject to more frequent assessments (every 1 to 2 years) based on Business Line use.
- Facilities with concerns such as change of ownership to a company, worsening of company financials, key management turnover, environmental concerns, severe SSH&E incident (fire, explosion, severe injury, etc.), changes in technology, or expansion may be subject to additional audits at a shorter cycle.

In Guyana, the TRG facility located at GYSBI and the HBL facility are currently supporting EEPGL operations. Both have been subject to assessment previously under the AWSL Program, with an initial assessment audit conducted in June 2018, and a follow-up audit conducted in September 2019. Additional AWSL Program audits of these two facilities, as well as audits of the new SES GYSBI facility (planned to commence operation in July 2021) and other potential waste management facilities supporting the EEPGL operations (including metals recycler EII) are scheduled to be conducted later in 2021. The frequency of future audits of these facilities will be assessed based on the 2021 audit findings.

The documented AWSL Program waste facility assessment process used by ExxonMobil was developed exclusively on enterprise and risk management experience gained over the last 20+ years—ExxonMobil currently tracks and assesses over 2000 waste management facilities worldwide as part of its AWSL Program. This program has been developed over time based on operational experience and is currently managed by the ExxonMobil Operational Excellence Safety, Security, Health & Environment Group.

Note that there are currently no international standards for auditing waste treatment providers and disposal facilities that would be directly applicable to facilities operating in Guyana. However, there are various auditing best practice aspects that have been developed as described by the following resources—some of the best practice aspects described in these references (such as types of records to review and the physical features to inspect), are part of the ExxonMobil AWSL Program:

- Protocol for Conducting Environmental Compliance Audits Regulated under Subtitle D of RCRA (Non-Hazardous Wastes)—USEPA—Issued March 2000—USEPA Publication 300-B-00-001—

Protocol for Conducting Environmental Compliance Audits of Facilities Regulated under Subtitle D of RCRA (USEPA 2000)—www.epa.gov/sites/production/files/documents/apcol-rcrad.pdf

- Protocol for Conducting Environmental Compliance Audits of Treatment, Storage, and Disposal Facilities under RCRA (Hazardous Wastes)—USEPA—Issued December 1998—USEPAUSEPA Publication 305-B-98-006—Protocol for Conducting Environmental Compliance Audits of Treatment, Storage and Disposal Facilities under RCRA (USEPA 1998) www.epa.gov/sites/production/files/documents/apcol-rcratsdf.pdf.
- Treatment Storage and Disposal Facility Audit Program Plan and Reference Guide (DOECAP 2020)—U.S. Department of Energy Consolidated Audit Program (DOECAP)—issued July 2020—DOECAP TSDF Finding Trends (projectenhancement.com)—https://doecapasp.projectenhancement.com/Presentations/Week-1-2020/TSDF%20Audit%20Program%20Plan%20and%20Reference%20Guide.pdf.
- CHWMEG Inc.—CHWMEG is a U.S.-based non-profit trade association comprised of manufacturing, and similar industrial organizations that has developed a Facility Review Program that develops reports to obtain critical environmental, operational, and financial information relating to facilities that treat, dispose, recycle, and/or store manufactured wastes and spent materials worldwide. CHWMEG has developed a comprehensive review protocol, questionnaire, and data management system that serves as the framework for the CHWMEG report. The CHWMEG report considers all aspects of each facility including its history, setting, design, operations, management, and financial strength. The focus is on environmental risk and the inherently associated financial risk. To date, CHWMEG has conducted over 5,600 reviews of 2,049 unique waste management facilities in 55 countries. See CHWMEG: Globally Promoting Responsible Waste Stewardship for details. www.chwmeg.org.
- Waste Facility Audit Association—WFAA was established in 1993 and is a United Kingdom (UK)-based nonprofit association of companies that assists members in obtaining authoritative information on UK, Irish, and mainland Europe waste management facilities through commissioning and sharing independent audits. They have developed an audit protocols to assist their members with risk assessment. See WFAA for details. www.wfaa.eu/wordpress/.
- Waste Receiver Assessment Program—WRAP was established in Canada in 1999 by a consortium of upstream oil and gas producers to develop a protocol and assessment program to determine the liability and risk associated with sending wastes to third-party waste management facilities. The reports include a description of the assessment process, a facility description, plot plans, facility photographs, observations and findings, a detailed assessment scoring protocol, and the overall facility rating. See WRAP for details. www.wrapaudit.com.
- Environmental, Health & Safety Audit Center (Center)—Established in March 2016, the Center is a service to auditors working in the EHS field and who are members of The Institute of Internal Auditors. The mission of the Center is to advance the professional practice of EHS auditing through thought leadership, education, professional guidance, and advocacy. Activities in support of this mission include, but are not limited to, providing:
  - A comprehensive certification program, including the Certified Professional Environmental Auditor® and the Certified Process Safety Auditor®;
  - Beneficial, cost-effective training tailored to EHS auditors; educational products and research; and
  - Deliver relevant insights, perspectives, and content dedicated to EHS auditing.

See www.theiia.org/centers/ehsac/Pages/welcome.aspx for more information.

5. ESTIMATED WASTE VOLUMES

This section includes a comprehensive forecast for waste volume estimates expected to be generated during the period 2021–2046. These volumes include total wastes, total hazardous wastes, and total non-hazardous wastes that are to be generated. This forecast is exclusively for waste volumes that will be managed onshore in Guyana. Offshore effluents are excluded from the 2021–2046 forecast as the TOR for this Study focuses primarily on waste generation, transport, treatment, disposal, waste facilities, and auditing. EEPGL's Annual Environmental Report submitted to EPA includes an Effluents Summary for drill ships, logistics vessels, FPSO, FPSO support vessels, and installation vessels. The summary also provides associated effluent volumes. EEPGL suggests that a more accurate and representative basis for forecasting effluents is through the factoring of the number of drill ships, logistics vessels, FPSOs, FPSO support vessels, and installation vessels".

To date, LP1 has been fully developed and is operating, LP2 is currently under development, and the Payara Project has also been recently approved. Additional exploration drilling associated with the approved 25 E&A Wells is also underway. The scope of the current and approved projects includes the following:

Approved Scope

- LP1—17 operating wells and 1 FPSO (14 wells completed—FPSO in operation);
- LP2—30 Dev Wells and 1 FPSO (4 wells completed and subsea installation underway);
- Payara—41 Dev Wells and 1 FPSO (well drilling to commence later in 2021—no FPSO operations to date); and
- E&A Operations—25 E&A Wells (well drilling underway).

The theoretical waste projections are based on the approved project scope and theoretical additional project activity that have not yet been approved. The scope of the theoretical projects includes the following:

Theoretical Scope

- 8 FPSOs
- 281 Dev Wells
- 111 E&A Wells

The following major EEPGL project related activities were considered as part of this waste volume forecast and include contractor assets/activities/facilities as well as approved future projects:

- E&A Wells
- Dev Wells
- Drill Ships (Stena, Noble)
- FPSOs (SBM)
- Installation & Hook Up marine vessels (Saipem)
- Logistics Vessels (SEACOR, Chouest, others)
- LMPs (Halliburton, Schlumberger Guyana, Inc./M-I Swaco, Baker Hughes)

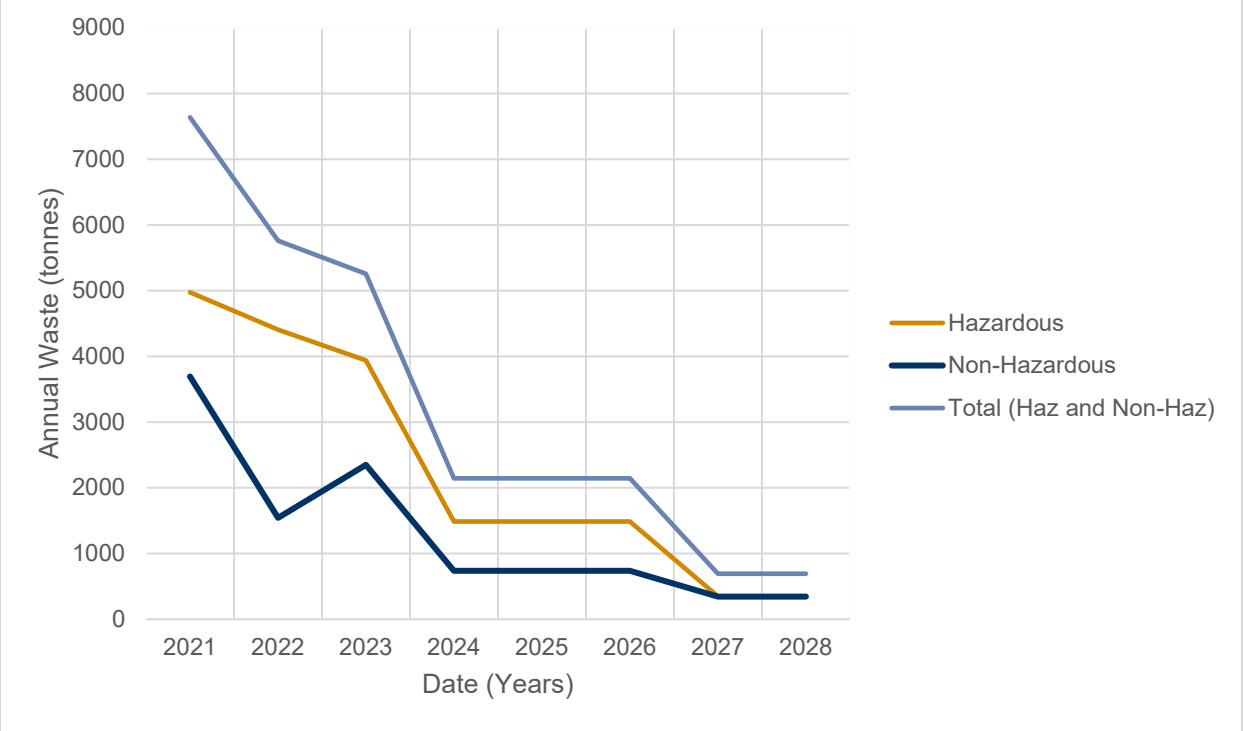
Figures 5-3 and 5-4 show the period of 2021 through 2046 and are provided to satisfy EPA requirements as described in the TOR. These graphs are waste projections based on theoretical scope. Note the longer-term forecast of waste volumes is uncertain for the period beyond 2028.

Figure 5-1 shows projected total volumes of hazardous and non-hazardous wastes, and Figure 5-2 summarizes projected total waste volumes by waste generating source. The total waste volume

anticipated for 2021 is approximately 8,000 tonnes and includes all hazardous and non-hazardous wastes from LP1 operations, continued full field development efforts for LP2, and the 25 E&A drilling efforts. Approximately 6,000 tonnes/year of total wastes are projected to be generated in both 2022 and 2023 as LP2 drilling winds down and the Payara Project continues its development drilling activities. For reference, approximately 5,000 tonnes of total waste were generated during 2020 from LP1, and the start of LP2 activities along with other exploration activities.

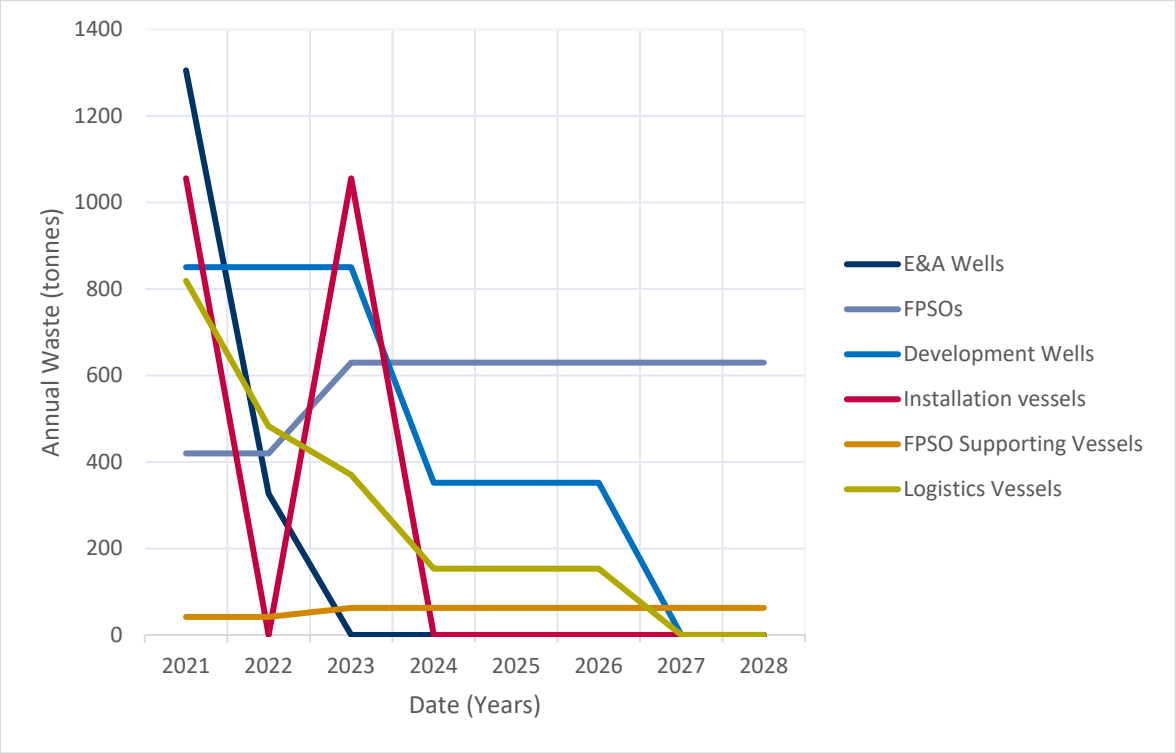
The drill ships routinely generate the most waste among the various types of vessels and the FPSO operations are estimated to generate 200 to 250 tonnes of wastes annually per FPSO.

Figure 5-1: Projected Waste Volumes 2021–2028
Total Waste by Type
Offshore Generation/Onshore Management
Approved Projects



Note: Includes all waste sources besides EEPGL Guyana Fiber Optic Cable Project and Guyana Campus Office Project

Figure 5-2: Projected Total Waste Volumes 2021–2028
Total Waste by Source
Offshore Generation/Onshore Management
Approved Projects

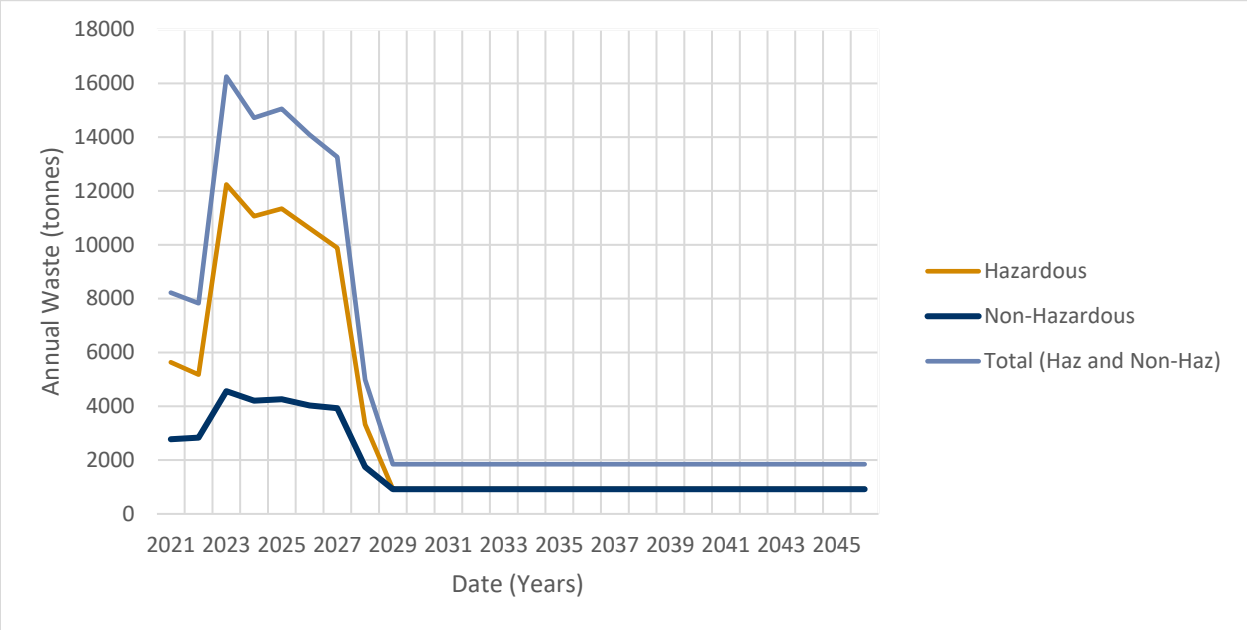


Notes: Includes hazardous and non-hazardous waste. See Appendix C, Marine Vessels Tables, for more information.

Figure 5-3 forecasts estimated waste volumes between 2021 and 2046 (total volumes for hazardous and non-hazardous wastes) and Figure 5-4 provides projected total waste volumes by waste generating source within this same timeframe. The increase of waste volumes observed in the 2023 timeframe is due to theoretical increases from further development of Guyana resources. As noted above, these longer-term forecasts of waste volumes are uncertain beyond 2028 as the potential future projects outlook is unclear.

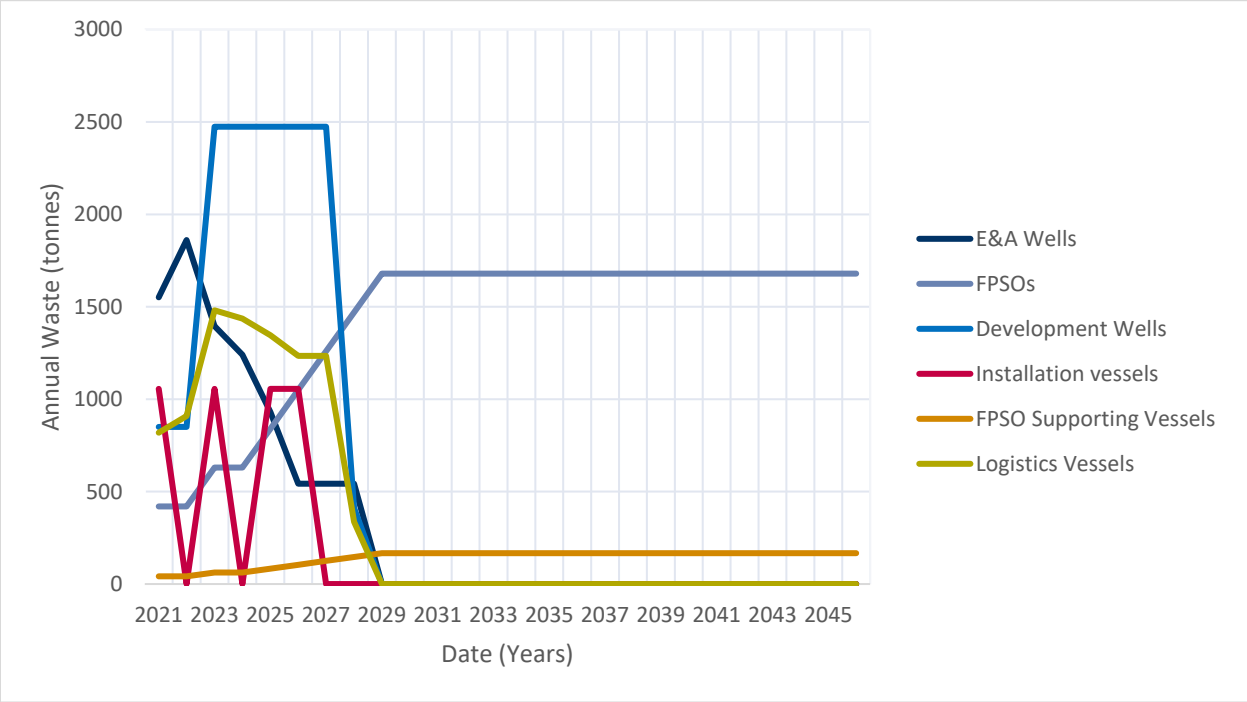
Please refer to Appendix H, which provides a comprehensive methodology for these waste estimates over time combined with detailed assumptions used to generate these volume estimates.

Figure 5-3: Projected Waste Volumes 2021–2046
Total Waste by Type
Offshore Generation/Onshore Management
Approved & Theoretical Projects



Note: Includes all waste sources

Figure 5-4: Projected Waste Volumes 2021–2046
Total Waste by Source
Offshore Generation/Onshore Management
Approved & Theoretical Projects



Notes: Includes hazardous and non-hazardous waste. See Appendix C, Marine Vessels Tables, for more information.

6. WASTE MINIMIZATION STRATEGY

EEPGL and its contractors have implemented a number of steps to minimize the generation of waste that requires treatment and disposal. This section includes the discussion of the following:

- Drilling Fluids and Mud Plant Minimization Strategy
- Other Waste Minimization Strategies

6.1 Drilling Fluids Minimization Strategy

EEPGL's use of drilling fluids and LMP operations are expected to increase substantially during the 2021–2023 time period given the potential that six drill ships may be operating concurrently. As a result, drilling fluid management will be a key focus area for waste minimization of drilling fluids, which has historically been one of the largest waste streams requiring treatment and disposal.

Drilling fluids are already recycled and reused to the maximum extent possible, and three LMPs have been established in Guyana to support the offshore drilling operations. Further, a new integrated two-prong approach drilling fluids strategy has been implemented which will further result in a reduction of Dev Well and exploration well drilling fluid wastes. This approach streamlines the NAF processes, reduces waste at source, increases drilling fluid re-utilization, and greatly reduces dilution (which can increase waste volumes). The overall environmental benefits are multi-faceted, including but not limited to the following areas:

- Fewer tank rentals needed to contain wastes;
- Fewer boat trips/boat cleaning needed to transport wastes;
- Simpler and faster displacement/filtration with fewer interfaces;
- Less pit cleaning and waste generation at the rig between systems; and
- Less onshore-based waste processing (especially slop).

The integrated, two-pronged approach for drilling fluids can be summarized as follows:

- For the Dev Wells, the fluids are envisioned to be fine-grind barite for both 17 ½-inch and 12 ¼-inch intervals and MicroDense for the 8 1/2-inch interval. Any excess MicroDense mud will be either reclaimed or reused, or incorporated into the 12 ½-inch system. These systems are going to be fully compatible across any Dev Wells service providers, so no excessive cleaning or whole mud removal will be required.
- For the exploration wells, there will be a single, fine-grind barite system. This will reduce the type of systems across the field to only three, compatible across all the service providers, and allow for reuse of drilling fluids to the maximum extent possible.

Advantages of this new fluid formulations and the unified fluid approach across all LMP providers are:

- More reuse and recycling of drilling fluids;
- Fewer tank cleaning (rigs and vessels) requirements because of more options for fluid reuse resulting in reduced cleaning wastewater volumes; and
- Fewer vessels will be needed to support operations, which also results in less tank cleanings and reduced cleaning wastewater volumes.

6.2 Other Waste Minimization Strategies

- Waste Minimization during Development Drilling
  - Noble Drilling's waste minimization activities include reducing small volume plastic water bottles with 5 gallon water jugs so as to decrease annual domestic waste sent ashore for disposal or recycling.
  - Drill cuttings/mud slops are continually separated on drill ships to recover mud for reuse.
- Waste Minimization during FPSO Production Operations
  - FPSO waste minimization activities include substituting small volume plastic water bottles with 5-gallon water jugs so as to decrease annual domestic waste sent ashore for disposal or recycling in addition to issuing water bottles to each individuals on board the FPSO.
  - Plastic tapes, disposable shoe covers and single use ear plugs are prohibited onboard the FPSO.
  - Bar soap distribution has stopped and the use of soap/shampoo dispensers has been instituted.
  - Domestic waste is reduced by replacing plastic cutlery with metal, ceramic, and glass cutlery and using less plastic packaging for food, laundry, and beverages.
  - Sludge (tank bottoms) is pre-treated by de-watering and the remaining hydrocarbon liquids recovered for further crude oil processing.
  - Oily debris is pre-treated by gravity draining to decrease liquid content and any remaining hydrocarbon liquids recovered for further crude oil processing.

- Hazardous Waste Minimization by Waste Treatment
  - Most hazardous waste streams are rendered suitable for land disposal through use of treatment services provided by waste treatment facilities
  - TRG's Environmental Management Plan, dated February 2018, describes the processes used to treat hazardous waste so as to reduce volumes and render them non-hazardous prior to landfill disposal. Permit applications for each treatment process utilized by TRG may also detail TRG's waste minimization initiatives. SES is in the process of permitting its hazardous waste facility with permit applications for each of its processes and potential waste minimization efforts.
- Waste Minimization by Reuse and Recycle/Recovery
  - Scrap metals, batteries, and electronics are currently handled at EII.

Figure 6-1: Liza Destiny FPSO 5-Gallon Water Dispenser

Figure 6-2: Liza Destiny FPSO Individual Water Bottle

Figure 6-3: Noble Tom Madden Drill Ship 5-Gallon Water Dispenser

7. WASTE MANAGEMENT PROGRAM DEVELOPMENT AND COST / BENEFITS ANALYSIS

7.1 Regulatory Agency Waste Management Knowledge Development

In 2017, EEPGL conducted waste management workshops in collaboration with the EPA and the Ministry of Communities to expand the knowledge base for all shareholders associated with EEPGL projects as part of a capacity building effort. Numerous topics were included in the workshops. The primary workshop topics included:

- Integrated waste management
- Waste definition
- Life cycle perspective
- Waste hierarchy
- Recycle/reuse/repurpose/prevention
- Disposal technologies
- Collection of waste data
- Landfill design, engineering, maintenance, monitoring
- Landfill site investigation/selection
- Open waste piles
- Upgrading of open waste piles
- Leachate management
- Health and safety measures
- HBL data
- HBL funding
- Material recovery
- Waste pickers

Further discussions with the EPA and Ministry of Communities took place in 1Q2020 for the planning of additional capacity building waste management workshops. A workshop was planned initially for March 2020, but was subsequently postponed because of the COVID-19 pandemic. This workshop was subsequently held 16 to 17 March 2021 and focused on the presentation of EEPGL's current cradle to grave management of wastes generated from the offshore E&P operations.

Additional workshops are expected to be planned during the remainder of 2021. Suggested timing is one workshop per quarter, however, the scope and scheduling of the workshops may continue to be impacted by the continuing COVID-19 pandemic.

Since 2020, the EPA has been developing a draft on Requirements for Hazardous and Non-Hazardous Waste Management, which will eventually become part of revised waste regulations. The evolution of these draft requirements, along with feedback/questions/concerns from the March 2021 workshop and this Study are likely to influence the selection of topics for future waste management knowledge sharing and capacity building workshops.

EEPGL recommends the next collaborative workshop follow and address the EPA's draft Requirements for Hazardous and Non-Hazardous Waste Management. The remaining 2021 workshop topics could be based on the EPA priorities developed following their review of this Study and could include the following topics:

- Environmental laboratory capacity in Georgetown;
- Landfill operations, including expanded HBL environmental monitoring, additional HBL landfill disposal cell development, dedicated industrial waste cells, or new landfill development at another location in the Georgetown area;
- An expanded review of the recommended standards for analytical methods and disposal treatment standards for common waste streams generated by Guyana industries;
- Waste treatment processes utilized by TRG and SES; and
- Develop focused CBA process/methodology and identify waste management issues for prioritization for application of a CBA.

Depending upon the topic, EEPGL recommends the participation of key stakeholders in the remaining 2021 workshops, such as the Ministry of Local Government and Regional Development, TRG, SES, HBL, non-oil/gas industries, and subject matter experts.

7.2 Waste Facility Infrastructure Development

Existing and near future planned waste facility infrastructure in Guyana is expected to meet the near term requirements for offshore oil and gas development over the next 2 to 3 years. Further, the existing waste facility infrastructure at TRG and SES can also be expanded to include more waste treatment and processing units to meet project needs. However, there are several areas where the existing or near future planned waste facility infrastructure may become potentially limited in meeting future waste management needs of Guyana. These aspects are discussed in the following sections.

7.2.1 Landfill Infrastructure

At present, the HBL is the only engineered landfill in Guyana for the disposal of municipal solid waste and non-hazardous commercial/industrial wastes. The original cell (Cell 1) started receiving wastes in 2011 and is currently at 99 percent capacity. Cell 2 became operational in March 2021. The landfill currently receives approximately 500 tonnes of waste per day, including about 30 to 35 tonnes per day of residual wastes generated from EEPGL projects. However, with an increase in offshore activity expected, along with potential for growth in other industrial and commercial sectors, the quantity of wastes going to the HBL will increase going forward.

At current disposal rates, Cell 2 is expected to last for approximately 4 to 6 years. This estimated life span of Cell 2 depends upon how much the waste volumes received at the landfill increase with the expanded economic development expected in the Georgetown area over the next five years. There remain two additional cells at the site (Cell 3 and Cell 4) for future development. Each cell is 6.5 hectares in size and could be anticipated to last for 5 to 6 years each.

The currently available landfill capacity certainly appears sufficient for the short term (2 to 3 years) with Cell 2 having entered service in March 2021, even considering the forecasted growth in waste volumes from industrial use. Presuming Cells 3 and 4 would be constructed, the future HBL landfill capacity also appears reasonable for the long term (up to 10 years). However, there are several development aspects related to the HBL that may impact future operations. New housing, commercial, and industrial developments continue to be developed in the Eccles area in the vicinity of the landfill. In general, landfills and residential development are not perceived as compatible land uses in light of the potential for odors, traffic, and smoke from fires. At HBL, the nearest residences are currently 500 meters distant. Further, a new roadway is currently under construction nearby the landfill site which will serve as a main connector to the East Bank- East Coast Road Linkage Project. The new roadways are expected to create new

access for housing and other economic activities in the nearby areas that were previously inaccessible. The new roadways will also increase traffic in the area.

These competing land uses and expansion of residential and commercial areas create uncertainty as to whether the HBL will be a sustainable location in the future. Consequently, new landfill development in the region may be appropriate for consideration going forward. The potential for further expansion of HBL and/or the development of a new landfill is a likely candidate for a detailed CBA.

7.2.2 Vessel Tank Cleaning Capabilities

At present, all marine vessel tank cleaning operations are conducted in Trinidad. The cleaning process employed in Trinidad is manual and generates large volumes of washwater and solids. Material recovered from tank cleaning services will be evaluated for reuse at LMPs. Tank cleaning waste streams that are unable to be reclaimed will be evaluated for treatment. However, there is a Tender currently underway in Guyana to provide tank cleaning services locally using technologies that minimize generation of waste.

The need for MSV) tank cleaning services in Guyana is part of the strategy for LMP operations in Guyana. The operation of three LMPs in Georgetown to support offshore operations efficiently requires co-located tank cleaning services. The expected startup for MSV tank cleaning capabilities in Guyana is 3Q-4Q 2021.

The tank cleaning system selected for Guyana includes a solids removal system and washwater reuse technology. The solids removal system and water reuse technology selected will reduce the waste generated from tank cleaning. The waste stream volumes generated are expected to be treated by the Wastewater Treatment System and Thermal Desorption Unit at SES.

The addition of MSV tank cleaning capacity is considered necessary infrastructure to efficiently support additional LMPs in Guyana. For this reason, conducting a detailed CBA for tank cleaning infrastructure is unnecessary insofar as the benefits of establishing a more efficient and more environmentally responsible vessel tank cleaning operation would be expected to outweigh any costs associated with the operation.

7.2.3 Alternative Waste Management Technologies

The existing technologies currently being deployed or planned are conventional, practicable, and in some cases BAT for managing oil and gas exploration, development, and production wastes. The existing capacity of these technologies can be expanded in the future to meet EEPGL project needs. However, there are alternative, larger scale waste management technologies available and potentially feasible, which could combine oil and gas treatment with the larger scale treatment of other municipal, commercial, and industrial wastes that will be generated in Guyana as its economy continues to develop and grow. Such technologies are discussed below.

Municipal Wastewater Treatment—Municipal wastewater treatment plants (also known as publicly owned treatment works [POTW]) are employed worldwide for the treatment of sanitary wastewaters, and many also have pre-treatment programs which allow for the discharge of certain commercial and industrial wastewaters. For example, many POTWs receive leachate directly from municipal landfill sites for treatment, as well as industrial wastewaters, including non-saline oily waters (such as those generated from EEPGL operations), after some level of pre-treatment, such as oil/water separation, pH adjustment, etc. Municipal wastewater treatment technology is proven and reliable, as are typical pre-treatment technologies. The cost of the construction, operation, and maintenance of these systems is also well established. The two main factors affecting cost include the size of the system (daily flow rate) and the

effluent quality discharge requirements, which determine the selection of the various treatment components.

There is currently no formal municipal wastewater treatment infrastructure in the Georgetown area. Wastewater is collected in a sewerage system and ultimately discharged without further treatment into adjacent waterways.

Guyana Water Incorporated (GWI) is responsible for water and wastewater management in the Georgetown area. GWI's new strategic plan for 2021–2025 includes an investment program for wastewater treatment plants. Two new wastewater treatment plants are proposed—one for the Georgetown Sewerage System and one for the Tucville Sewerage System. A small pilot system is currently being operated at the Tucville sewer station. The pilot scale treatment process (5 m^3/day vs. actual volume of 600 m^3/day) includes physical treatment by screening and grit removal, biological treatment using an up-flow anaerobic sludge blanket reactor followed by a constructed wetland and ultraviolet disinfection. This pilot test is being developed to provide design information for a full scale wastewater treatment plant.

The oil and gas development and production wastes best suited for treatment in a POTW system include oily washwaters, wastewaters from oil/water separators, and sanitary wastewaters. Further, leachate generated from HBL, which receives treated solid wastes, would be suitable for POTW treatment. The primary benefits of the use of a POTW for treatment of these wastes are 1) a reduction in the number of separate river discharge points that need to be regulated and monitored; and 2) more consistent treatment of wastewaters to ensure compliance with discharge standards.

Any future municipal wastewater treatment planning efforts should consider provisions to accept commercial and industrial wastewaters for treatment, including the development of pre-treatment programs to ensure that commercial and industrial wastewaters have no material impacts on the municipal wastewater treatment systems.

Cement Manufacturing/Alternative Fuels and Raw Materials (AFR)—Cement manufacturers worldwide have implemented AFR programs which use waste materials, including used tires, used oil, oily wastewaters, organic chemical wastes, and other wastes with calorific or elemental value into the cement production process. This waste co-processing and the use of AFR is intended to substitute the use of traditional kiln fuels (such as coal or diesel fuel) as well as certain raw materials (shale, clay, etc.) in the cement manufacturing process, which uses high-temperature kilns to produce the cement clinker product. For example, as of 2019, over 70 percent of cement plants in the USA use some type of alternative fuel—40 plants used tire derived fuel, 15 plants used waste oil fuel, 11 plants used solvents as fuel, and 62 plants used some other material. Some examples of the 'other' types of fuels used by plants are engineered fuels, refuse derived fuels, agriwaste, biomass, carpet, plastics, rice hulls, sawdust, textile waste, and wood. Alternative fuels are also currently being used in cement plants in Brazil, Chile, Ecuador, Colombia, and Argentina. The primary benefit of waste co-processing is that there are no residuals generated from the process (compared to incineration, which generates ash), and that cement kilns offer superior waste destruction performance given the high temperatures (>1,400ºC) used in the cement manufacturing process.

There is currently no cement manufacturing in Guyana—at present, all cement is imported in bulk. Historically, a cement manufacturing operation was started up in December 2014 but ceased operations in October 2017. As recently as January 2019 a new concrete mixing plant was commissioned by TCL Guyana/CEMEX, but this new plant relies on imported cement manufactured abroad. At the press conference announcing the new concrete plant, the Guyana Minister of Finance and the Guyana Manufacturing and Services Association urged TCL Guyana/CEMEX to explore the idea of manufacturing cement in Guyana given the future growth potential for construction in Guyana.

Currently, the largest barriers to the establishment of cement manufacturing in Guyana are lack of primary raw materials (limestone) and the high cost of energy, as cement manufacturing requires a high energy input. There are no extensive limestone deposits located in northern Guyana, so all bulk limestone materials would have to be imported from the Caribbean Region. Furthermore, there is currently no reliable low cost energy available to support cement manufacturing. Consequently, under the current scenario, cement manufacturing in Guyana does not appear feasible.

However, the proposed Gas to Power Project offers up the potential to change cement manufacturing economics in Guyana. It is possible that low cost energy resulting from the proposed Gas to Power Project could off-set the high costs of importing raw materials from the distant Caribbean Region. This could make the prospect of cement manufacturing in Guyana more feasible. However, the overall feasibility of such an endeavor would require a detailed economic analysis as well as the interest of a multi-national cement manufacturer.

The oil and gas development and production wastes best suited for treatment in cement co-processing include all drill cuttings (alternative raw material), oily sludges, oily rags, contaminated packaging, and other hydrocarbon wastes (alternative fuels). The primary benefits of the use of cement co-processing for treatment of these wastes are (1) reliable and effective treatment of hydrocarbon based hazardous wastes; (2) the elimination of all landfill disposal of residual wastes; and (3) more consistent treatment of waste.

Any future cement manufacturing planning efforts should consider provisions for waste co-processing and the use of AFR.

Waste Oil Recycling—The recycling of waste oil (also known as used oil, black oil, lube oil, etc.) for recovery and reuse is a common waste recycling initiative worldwide. Waste oil from vehicles, equipment, vessels, cooking, etc. is collected and can be treated using various recycling methods depending on the use of the recovered oil product. Simple recycle treatment processes may involve filtering and removal of water content to produce a recycled oil product that can be used for an alternative fuel for industrial boilers, asphalt/bitumen plants, etc. More sophisticated oil recycle treatment processes can include the physical, chemical, and thermal treatment (re-refining) to produce new lubricating oil products. Cooking oils can also be recycled and converted to biodiesel. Waste oil recycling technology is proven and reliable.

The cost of the construction, operation, and maintenance of these systems is also well established. The main factors affecting cost of a waste oil recycling facility include the size of the system (weekly/monthly quantities of waste oil received, which dictate storage capacity design) and the intended quality of the recovered oil product, which determines the selection of the various recycling components (filtration, separation, heating, dehydration, evaporation, condensing, etc.). The overall feasibility of a waste oil recycling system is also dependent on a reliably available volume of base stock, as well as having a sustainable demand for the recovered oil product.

Guyana does not currently have a formal waste oil collection and recycling program. Waste oils are informally collected and reused in various industries, including the logging industry which uses the waste oil for fuel and chainsaw lubrication.

However, there is some history of waste oil recycling in Guyana. Used frying oil was used as a component of a biodiesel product produced from 2006–2013 in the Wauna Region 1 area. More recently in December 2017 a proposal was submitted to the City of Georgetown for the construction of a mini used oil refinery (10 bbl per day capacity), although it appears that proposal never moved forward with construction. Finally, used oils have also been used by the bauxite industry for alternative fuel in processing equipment.

Current barriers to the successful development of a waste oil recycling operation in Guyana include the high cost of capital required to initially establish an oil recycling facility, lack of local expertise for refinery operations, and lengthy time frame and effort that would be required to establish a supply chain of waste oil suppliers (vehicle maintenance garages, industrial entities, etc.) to generate a sustainable volume of waste oil to support recycling operations. A market for recycled oil finished product is also not apparent in Guyana, although there may be a market for recovered product overseas.

Despite these barriers, however, a small scale waste oil recycling facility could be feasible under government support and initiatives—e.g., collecting waste oil fees to fund investment and operations, or government mandates or requirements for waste oil recycling. Government paid incentives to promote waste oil recycling is another option. As an example of government initiatives, consumers in British Columbia Canada are charged an “environmental handling fee (eco-fee)” when purchasing oil, and garages are paid for every liter of waste oil they place into recycling. See the following web link for more details: www.usedoilrecycling.com/bc

The equipment for recycling can be readily scaled up with increased demand should the supply chain be established for both sustainable volumes of waste oil inbound as well as outbound product sold to customers. The oil and gas development and production wastes best suited for recycling in a waste oil operation would primarily include spent lube and other equipment oils. The primary benefits of the use of waste oil recycling for the recovery and reuse of these wastes are the reliable and effective recycling of hazardous waste oils into a new product, which results in reduction in waste.

7.3 Reduce / Reuse / Recycle Education and Infrastructure

Guyana currently has very limited reuse/recycle infrastructure. Since EEPGL projects started, infrastructure for paper/cardboard, wood, aluminum cans, and plastics has not been sustainable. Scrap metals recyclers have come and gone. EEPGL has used various paper/cardboard and scrap metal recyclers.

ExxonMobil was the first energy company to join The Recycling Partnership, a nonprofit organization dedicated to increasing recycling in the U.S. ExxonMobil has committed $1.5 million to this organization to help develop sustainable solutions and support activities.

An initial collaboration step for EEPGL and the EPA could be to develop a plan leveraging The Recycling Partnership’s tools, resources, and information. During the drafting process for this section of the Waste Study, EEPGL used The Recycling Partnership’s website for grounding on these broad topics. EEPGL began with a review of the Recycling 101 document for Guyana relevance. The document acknowledges that recycling is not the same everywhere but provides commonality and across the board awareness such as all recyclables being empty and dry. The Recycling Partnership’s website includes:

- Recycle Campaign Builder
- Engage Your Residents
- Material Decision Tools
- Assessment Tool
- Tracking & Measurement
- Recycling Social Media Kit
- Grants
- Blogs
- Newsletter
- Leader Forum
- Approaches for Recycling Partnership Initiatives

Other U.S. websites with funding options for education and infrastructure are Resource Recycling (https://resource-recycling.com/recycling/) and California (Cal) Recycle (https://www.calrecycle.ca.gov). These websites offer case studies, perspectives associated with consumers, government and business, schedules for educational conferences, and recycling for plastics and electronics.

Given the breadth of this section's topics, EEPGL recommends a workshop on infrastructure with additional planning input from the EPA, Ministry of Communities, TRG, Sustainable Environmental Solutions, Waste Solutions Landfill Inc., a leading Caribbean or South American recycle think tank, a Guyana waste transporter, an EPA-approved Guyana recycler, Administrative Region 4, Guyana legislative sponsors and other stakeholders to be nominated by the Government of Guyana. An appropriately scaled qualitative CBA would be a key agenda item for the workshop.

7.4 Third-Party Analytical Laboratories

In Guyana, EEPGL reviewed four laboratories that are in operation performing various degrees of analytical services, or have future planned operations.

Kaizen (Georgetown) has a small lab with limited testing capability (no solid waste) with a small staff of approximately eight people for executing testing and other functions of this business.

University of Guyana (Georgetown) has multiple analytical instruments but no laboratory. The analytical instruments are not currently available for commercial purposes nor on a routine basis. Staffing may be limited to two people.

Ecotox Environmental Services Ltd. (Ecotox) is a Trinidad based environmental testing and consultancy service that is considering the establishment of an environmental laboratory operation in Guyana. Ecotox currently provides all of the analytical services to TRG and EEPGL for its waste management programs—however all samples must be shipped via air to Trinidad for analysis, and this adds delays to obtaining time critical analytical results. However, Ecotox is in a startup mode and currently has no building or laboratory, nor a staff. Ecotox may not be ready for offering services for another five years.

Ground Structures Engineering Consultants Ltd. (GSEC) has an existing geotechnical laboratory, but it is not currently equipped for environmental testing and is essentially in a startup mode. GSEC may not be ready for offering services for another five years.

A laboratory service company that does pharmaceutical and U.S. Federal Drug Administration testing has expressed interest in developing environmental testing capabilities. They have the experience in managing a laboratory, acquired a location, and are in the process of procuring equipment. Identifying the testing protocols and equipment needs are the next steps.

Currently, suitable analytical testing is available in Trinidad but use of a Trinidad laboratory extends the timeline for completion of test results along with attendant challenges associated with transport of samples.

In order for Guyana laboratories to be fit for purpose and have the ability to service Guyana industry, the following criteria is often used for determining and developing capability/capacity:

- Established analytical methods for all appropriate solid and liquid waste streams;
- Appropriately sized laboratory;
- Correct analytical equipment for offshore, nearshore and onshore environments;
- Analytical equipment can accommodate analytical methodology;
- Access to capital for a rapid startup in Guyana;
- Adequately staffed with a strong Quality Assurance and Contracting Team for commercialization;

- Data integrity assurance framework in place;
- Knowledge of quality roadmap and timing;
- International Organization for Standardization (ISO) certification or on track for ISO certification;
- Robust training budget for ISO certification and renewal;
- No affiliation with Guyana industries needing laboratory services; and
- More than one laboratory for backup capacity and ability to confirm or rerun test results.

EEPGL suggests an economic feasibility study be considered to determine if a commercial environmental laboratory in Guyana is a sustainable business with respect to supply and demand. Economic feasibility studies consider the following factors:

- Estimated startup cost for land purchase/lease, Greenfield construction or retrofit, equipment, staff labor, training budget, maintenance, sparing, and certification;
- Local technical staffing availability in Guyana;
- Customer demand and pricing considerations;
- Type and number of Guyana industries requiring 3rd party analytical services; and
- Government regulations that require environmental monitoring.

Other options to the development of a commercial environmental laboratory includes the expansion of the existing University of Guyana laboratory to provide additional analytical services to commercial customers, or the development of an EPA owned and operated laboratory that can provide analytical services to support its environmental protection needs.

EEPGL recommends further collaboration with the EPA and potential stakeholders on the feasibility of expanding environmental testing services in Guyana to support commercial and government environmental data needs.

8. COST / BENEFITS ANALYSIS POST-STUDY RECOMMENDATIONS

As an element of considering potential capacity building, new infrastructure, and alternative technologies, this Study has identified certain benefits that could be achieved by implementing such actions, identified potential challenges to the same, and indicated where monetary cost information might be available. CBAs provide an approach to weigh various benefits of certain waste management activities with costs resulting from implementation of that action. In some cases, costs and benefits can be expressed in monetary terms, but in other cases, a qualitative approach may be more appropriate, using other evidence of costs and benefits and considering how those costs and benefits relate to one another. Appropriate CBAs (quantitative or qualitative) should be designed based on the waste management activity, considering areas necessary to support economic growth and that are a priority for the Government of Guyana.

EEPGL recommends the following approach to conducting CBAs:

- Identify issues for prioritization to conduct focused CBA;
- Consider focusing CBA on issues such as Industrial landfill, additional landfill site selection and construction, recycling of wood, plastic, Environmental testing laboratory, Guyana University Environmental Testing collaboration, Oil recycling;
- Based on Government priorities, align on issues and conduct CBA consistent with agreed execution plan; and
- Conduct additional workshops to enhance collaboration with industries and stakeholders.

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APPENDIX A TERMS OF REFERENCE REQUIREMENTS CROSSWALK TABLE

Terms of Reference Section/Title	Summary	Waste Analysis Study Section
1. Introduction	Purpose and waste analysis study (WAS) objective in accordance with Payara EPA Environmental Permit #20181204-PPOIX	1
2.1 Objective	1. Characterize EEPGL waste streams and provide waste profiles including concentration and composition based on best information available.	4.1.2
	2. Provide waste treatment flow diagrams covering each waste stream and standardized waste manifest form(s).	4.1.1
	3. Evaluate EEPGL waste streams, estimated volumes, waste treatment methodologies, and waste disposal methods.	4.1.3, 4.3, 4.3.1, 4.3.2, 4.3.3, 5
	4. Provide anticipated EEPGL waste volumes for permitted projects (Liza Phase 1, Liza Phase 2 and Payara) from 2021 - 2045 to be produced and disposed.	5
	5. Provide applicable international best practices and standards for the treatment, transport and disposal of waste, and auditing waste treatment providers and disposal facilities.	3.1, 4.4
	6. Conduct best available technology (BAT) evaluation for all waste processing and treatment equipment and provide alternatives where necessary to ensure the most appropriate industry-proven technologies are used to process and treat each waste stream; and	4.3.2, 4.3.3
	7. Develop cost/benefits analyses for third-party laboratory (ies), recycling opportunities, capacity building workshops, new landfill, vessel tank cleaning capability and drilling/mud plant waste minimization strategy and alternative technologies.	7.4, 7.3, 7.1, 7.2.1, 7.2.2, 6.1, 7.2.3
2.2.1. Waste Stream Identification and Profiles	1. Point(s) of generation along with composition, concentration, and quantity generated.	4.1, 4.1.1, 4.1.3
	2. The steps taken to minimize the amount of waste generated from exploration and production activities.	6
	3. A description of the procedures implemented for waste characterization and segregation; and	4.1.2, 4.2.2
	4. A profile of each waste stream generated which will detail the typical material composition of the waste streams, i.e. the physical and hazardous characteristics and important chemical constituents. Each waste profile will be documented on the EPA approved “Waste Profile Sheet.”	4.1.3
2.2.2. Waste Management—Waste Generation	1. Estimated waste volumes per annum for each of the waste streams identified in the document.	4.1.3
	2. The design of storage areas on each FPSO and drill ship to ensure waste compatibility (in cases where various waste streams may be mixed) and pollution control; and	4.2.2.1, 4.2.2.2
	3. A description of the pre-treatment activities, with a process flow diagram, completed by EEPGL before the materials are transported to third party waste treatment facilities.	6.2
2.2.2. Waste Management—Waste Transportation	1. The procedures implemented to ensure proper packaging, labelling and storage of waste before transport.	4.2.2, 4.2.3, 4.2.4
	2. The procedures implemented to ensure waste compatibility in transport containers.	4.1.2, 4.2.1, 4.2.2, 4.2.4
	3. A description of the waste tracking or manifest systems used by EEPGL to regulate and monitor the transportation of waste	4.2.3

Terms of Reference Section/Title	Summary	Waste Analysis Study Section
	from production and exploration vessels to the onshore treatment and disposal facilities, including contingency plans.	
	4. Provide applicable international standards and best practices regarding waste transportation and justifications for the methods/procedures currently implemented by EEPGL; and	3.1
	5. EEPGL's storage and transportation criteria based on profile of each waste stream.	4.2.1, 4.2.2, 4.2.4
2.2.2. Waste Management—Waste Treatment and Disposal	1. Treatment methods/technologies (for both onshore and offshore treatment), which will include a detailed technical description of each treatment process accompanied by flow diagram(s), and a profile for each waste stream.	4.3, 4.3.1, 4.3.2, 4.3.3, 4.1, 4.1.3
	2. If the waste stream is discharged offshore, provide waste profile along with the quantity and frequency of the discharge.	4.1, 4.1.3
	3. If the waste stream is disposed of onshore provide a waste profile, quantity, frequency of disposal and disposal location.	4.1, 4.1.3, 4.3, 4.3.2
	4. The waste acceptance criteria provided to EEPGL from third party Logistics, third party waste treatment facility and the third party Landfill, as applicable.	*
	5. EEPGL's treatment criteria based on profile of each waste stream; Treatment method (incineration, neutralization, stabilization, etc.) selected will be based on hazardous characteristics (pH, flash point, metal content, etc.) of each waste stream. Treatment criteria will be described for each treatment method.	4.1.3, 4.3.1, 4.3.1.1, 4.3.1.2, 4.3.1.3, 4.3.1.4, 4.3.1.5, 4.3.3.1
	6. EEPGL's disposal criteria based on profile of each waste stream after treatment; final disposal or discharge criteria will be recommended for each treatment method (incineration, solidification, container cleaning, etc.)	**
	7. Provide applicable international standards and best practices regarding treatment criteria for the waste streams, and justifications for the methods/procedures employed by EEPGL, including an evaluation of the methods proposed by its Third Parties.	3.1
	8. Contingency plan(s) for the treatment and disposal of waste should there be an unplanned event rendering the treatment and/or disposal facility inoperable; and	4.3.2, 4.3.2.3, 4.3.2.4
	9. An evaluation of local and regional institutions or environmental laboratory services, suitably qualified and capable of conducting monitoring and verification analyses of the waste streams of the project.	7.4
	10. The procedures implemented for the treatment and disposal of waste rejected from third party companies; and	4.3.2.3, 4.3.2.4
	11. Standards and best practices currently being adhered to, in regards to waste generation, treatment, and disposal (both onshore and offshore).	3.1, 4.1.2
2.2.2. Waste Management—Waste Facilities	Existing third party waste treatment infrastructure	4.3.2
	Additional facility for waste treatment capacity in development	4.3.3
	Third party Landfill infrastructure	7.2, 7.2.1
	Scrap metal recycling infrastructure	7.2, 4.3.2.1

Terms of Reference Section/Title	Summary	Waste Analysis Study Section
	Temporary waste storage areas (pre-treatment and post-treatment wastes)	4.3.2, 4.3.2.3
2.2.3. Auditing	EEPGL will provide templates/samples of the inspection checklist based off the approved Waste Management Plan. The completed audit can be pass/fail or risk assessed scored based on variable components. Recommendations or audit frequency are often determined by audit results.	4.4
	The study will include an evaluation of international standards and best practices for auditing waste treatment providers and disposal facilities.	4.4
	This part of the Study will also include a discussion of appropriate monitoring guidelines against which contractor performance will be reviewed.	4.4
2.2.4. Anticipated Waste Volumes	A schedule of anticipated EEPGL waste volumes from permitted projects from 2021–2045 to be produced and disposed for the following items: ▪ Estimated Annual Hazardous Waste Volumes ▪ Estimated Annual Non-hazardous Waste Volumes ▪ Waste Estimates from third party waste management facility to landfill; these estimates will include non-hazardous waste stream volumes for direct landfill. Hazardous waste stream volumes for treatment will be coordinated with the waste treatment facility.	5 *** ***
	▪ EEPGL will make recommendations for Analytical Standards, and Disposal Treatment Standards based on treatment type.	4.1.2, 4.3.2
2.2.5. Waste Management Capacity and Cost/Benefit Analysis	Cost/Benefits analysis of: 1. Regulatory structure/agency capacity	7.1
	2. Planning collaborative design construction, and project management expertise for a new landfill	7.2.1
	3. Developing Vessel Tank Cleaning Capability in Guyana	7.2.2
	4. Planning of Drilling Fluids and Mud Plant Waste Minimization Strategy: System integration, Waste reduction, recycling	6.1
	5. An evaluation to determine the cost of alternative technology	7.2.3
	6. Reduce/reuse/recycle education and infrastructure	7.3
	7. Support services	7.4

EEPGL = Esso Exploration and Production Guyana Limited; EPA = Guyana Environmental Protection Agency; FPSO = floating, production, storage and offloading vessel

Notes:

* EEPGL has been working in collaboration with Tiger Rentals Guyana (TRG) on a draft Waste Acceptance Criteria 2021. The criteria have been finalized by TRG and the EPA. EEPGL anticipates using it to support the management of hazardous waste. The TRG Waste Sampling and Analytical Process 2021 has also been finalized by TRG and EPA.
** EEPGL is ensuring effective management of waste generated by EEPGL Projects as required by the EPA's issued environmental permits through extensive interaction with TRG and Sustainable Environmental Services (SES) on disposal criteria for each EEPGL approved Waste Profile Sheets.
*** EEPGL does not itself have the necessary information to estimate the amount of Project waste sent to the landfill. TRG advised EEPGL it filed a confidential 2020 Annual Environmental Report with EPA that included actual waste volumes from third parties sent to Haags Bosch Landfill (HBL).

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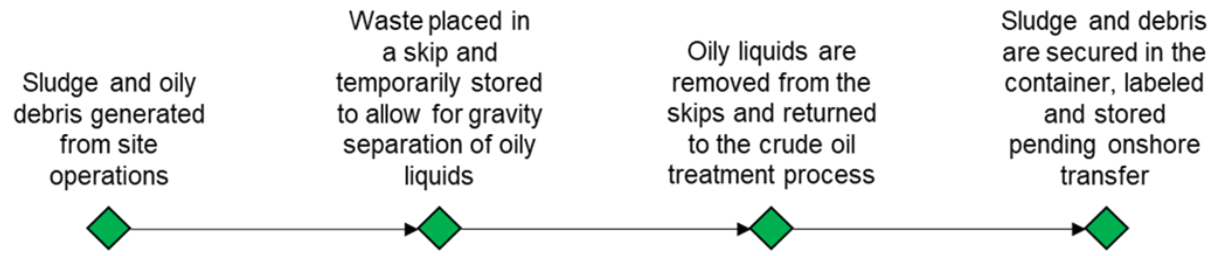
APPENDIX B

- **Pre-treatment Process Flow Diagram**
- **Cradle to Grave Logistics Flow Diagrams**
- **TRG Waste Treatment Process Flow Diagrams**
- **SES Waste Treatment Process Flow Diagrams**

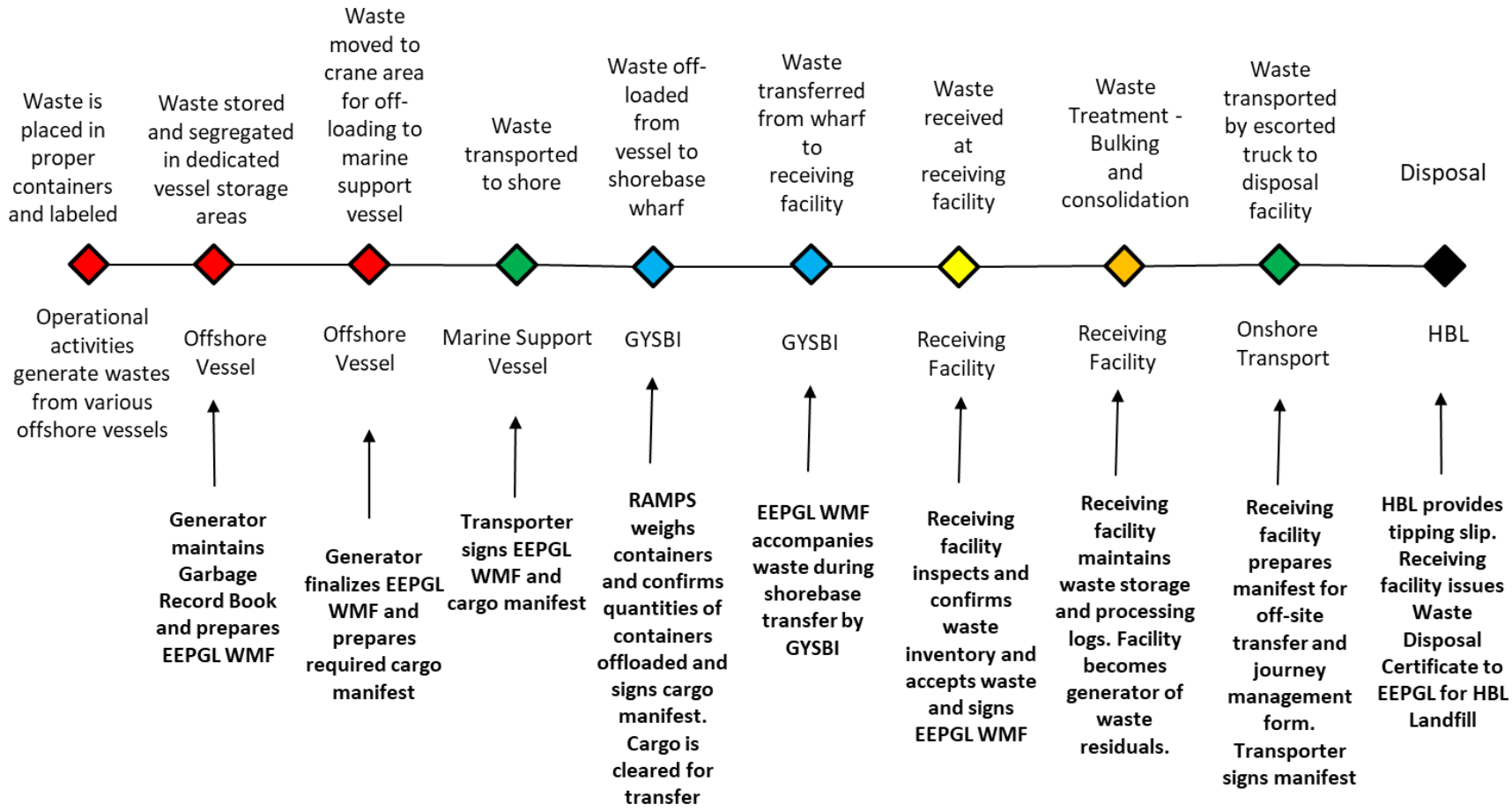
Pre-treatment Process Flow Diagram



Cradle to Grave Logistics Flow Diagrams

Non-Hazardous Waste Management—Cradle to Grave
Offshore Generated Waste—Onshore Management

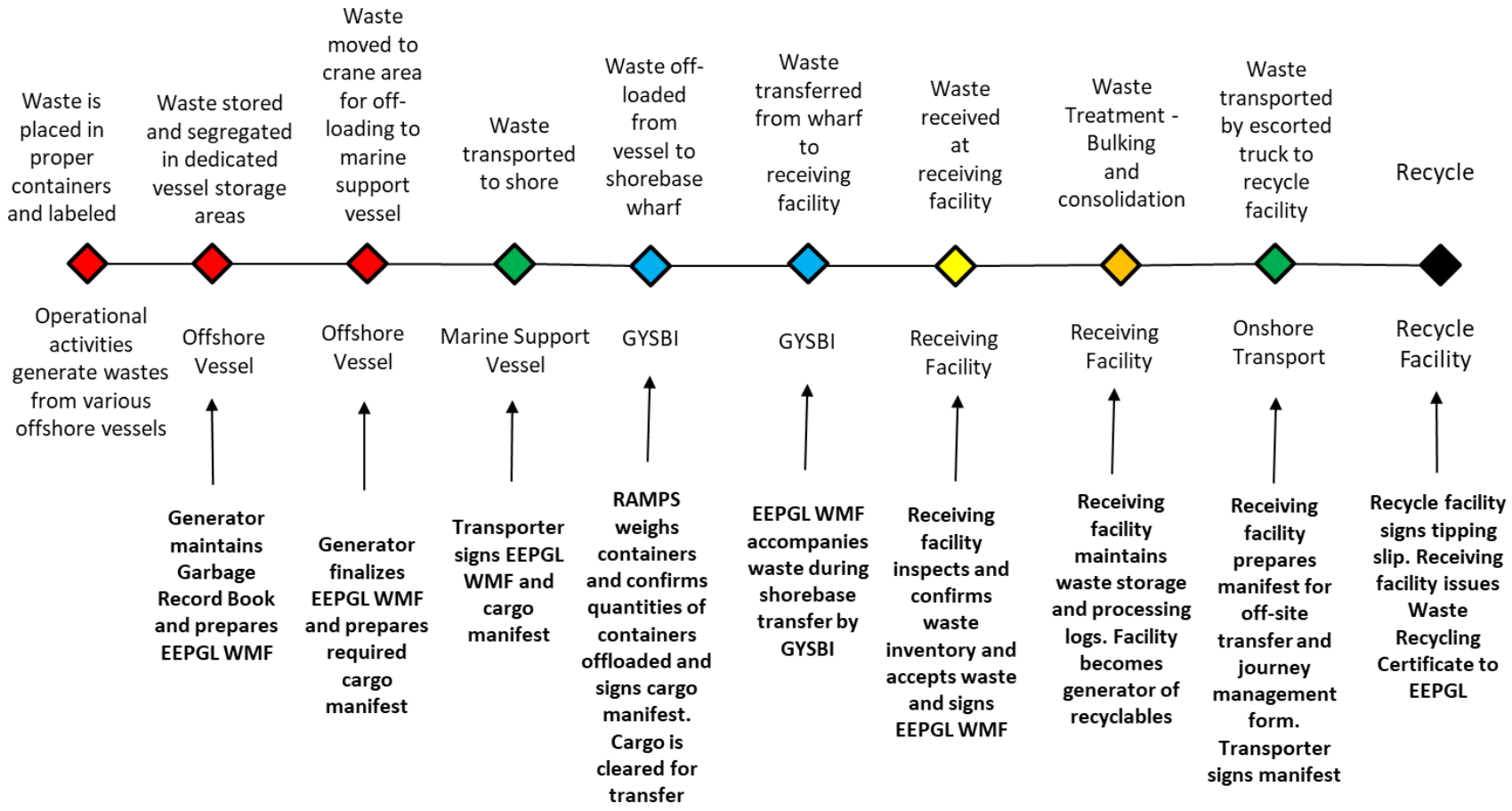
Waste streams: Wood; General Trash; Plastic; Glass; Cardboard/Paper



EEPGL = Esso Exploration and Production Guyana Limited; GYSBI = Guyana Shore Base Inc.; HBL = Haags Bosch Landfill; RAMPS = RAMPS Logistics; WMF = Waste Management Form

Non-Hazardous Waste Management—Recyclables Cradle to Grave
Offshore Generated Waste—Onshore Management

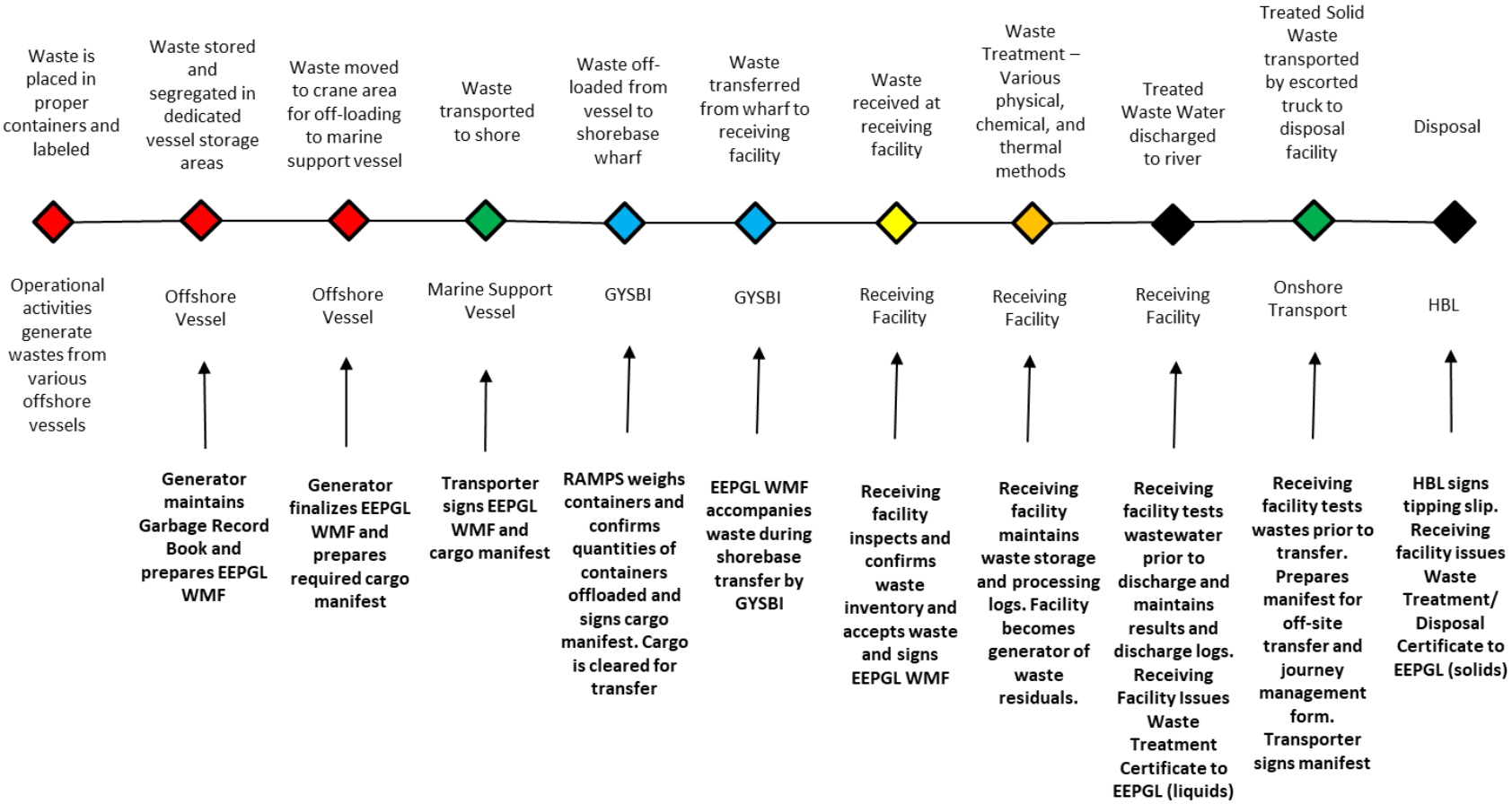
Waste streams : Scrap Metal/Batteries/Other Recyclables



EEPGL = Esso Exploration and Production Guyana Limited; GYSBI = Guyana Shore Base Inc.; RAMPS = RAMPS Logistics; WMF = Waste Management Form

Hazardous Waste Management—Offshore Generated Waste—Onshore Management

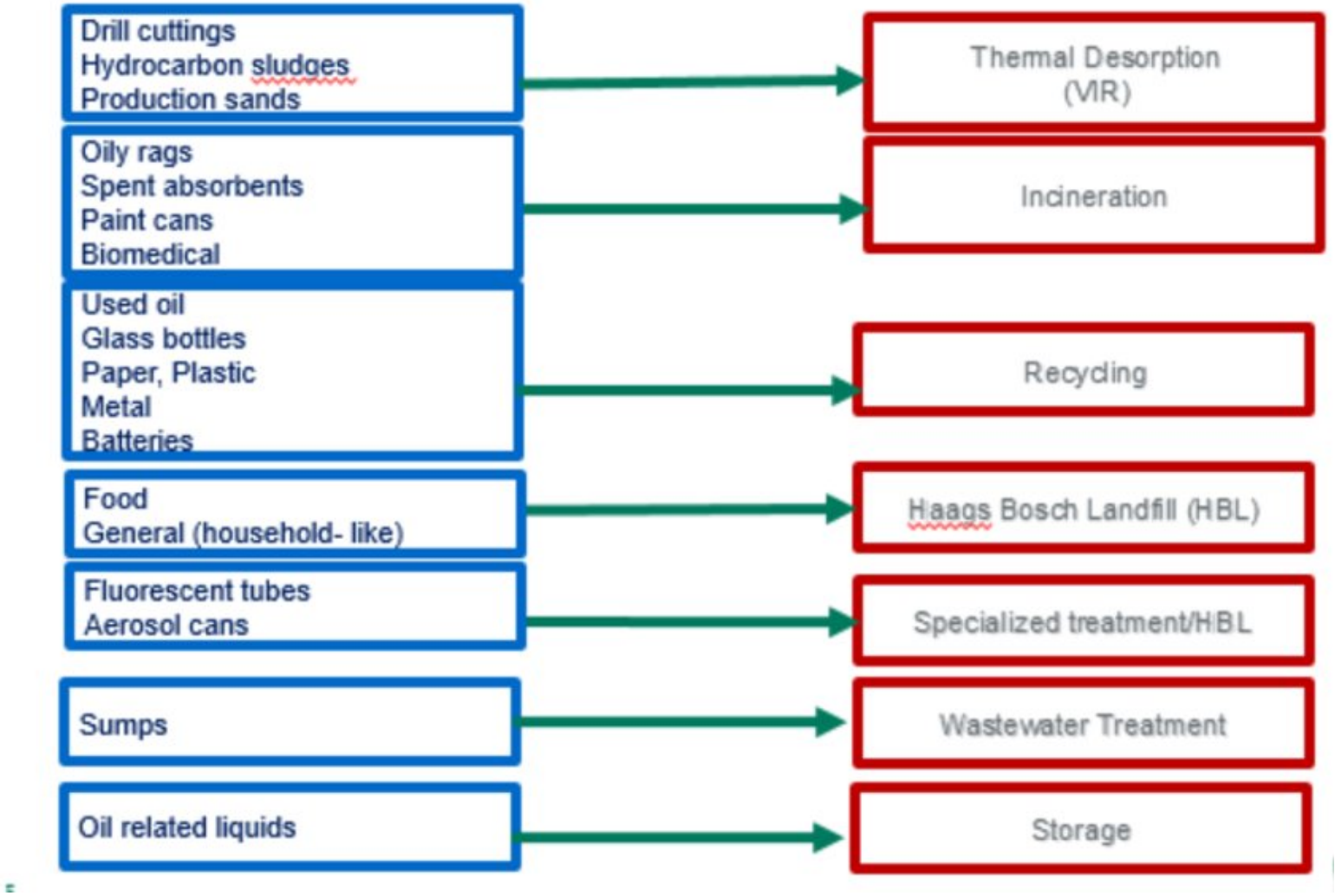
Waste streams: Various Liquids, Solids, Sludges



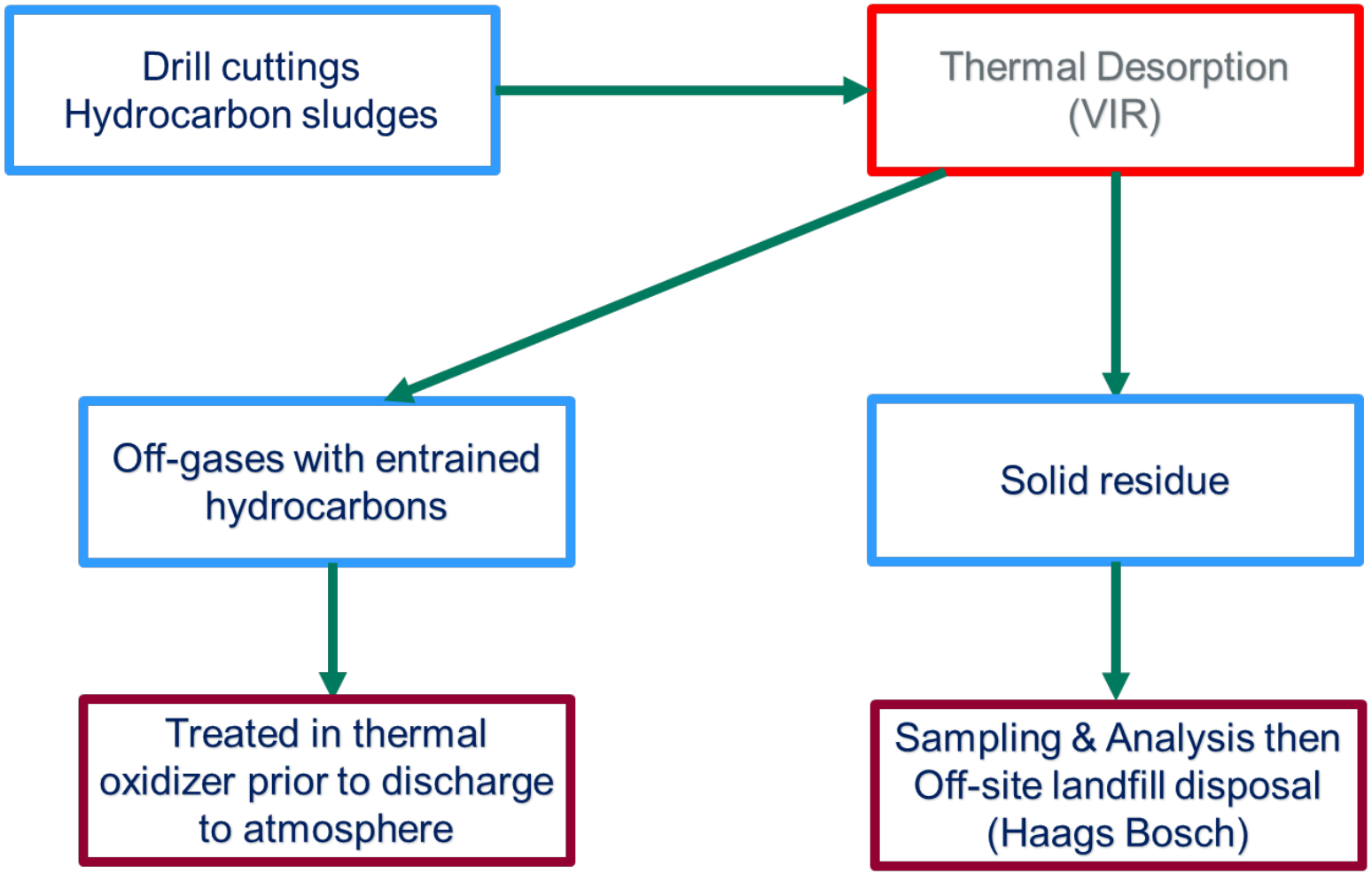
EEPGL = Esso Exploration and Production Guyana Limited; GYSBI = Guyana Shore Base Inc.; RAMPS = RAMPS Logistics; WMF = Waste Management Form

TRG Waste Treatment Process Flow Diagrams

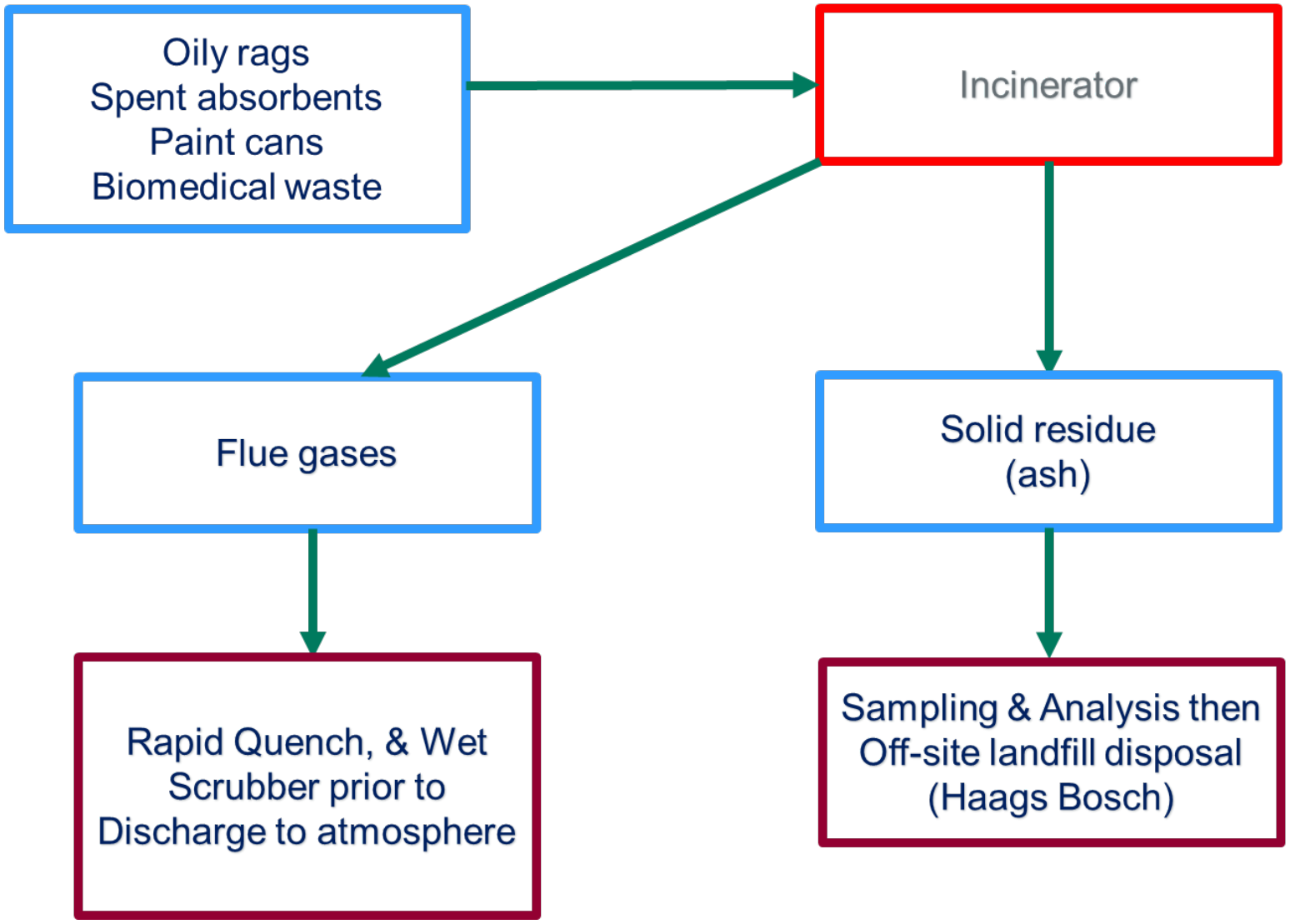
TRG Waste Treatment Technologies



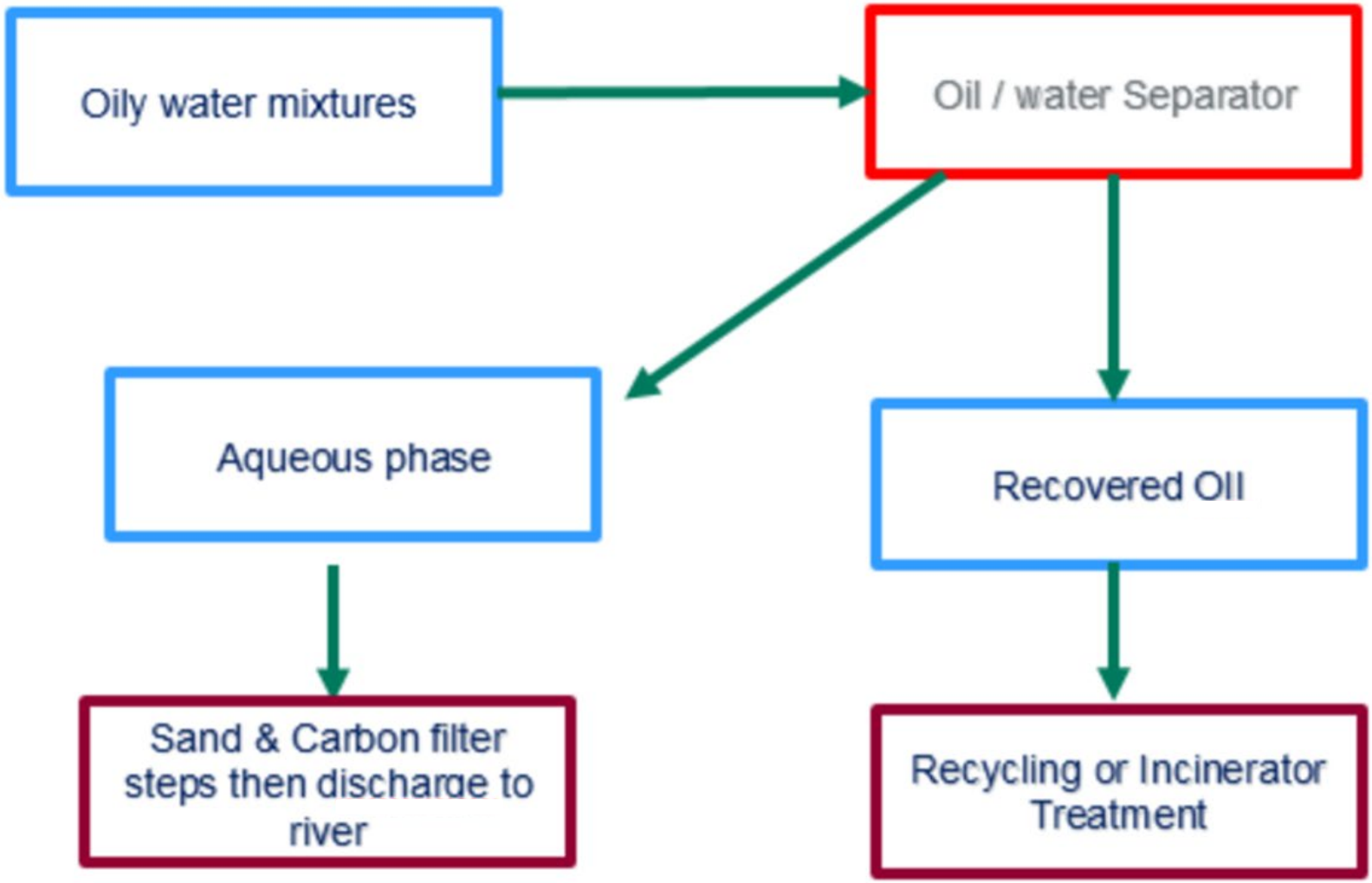
VIR Desorption Unit



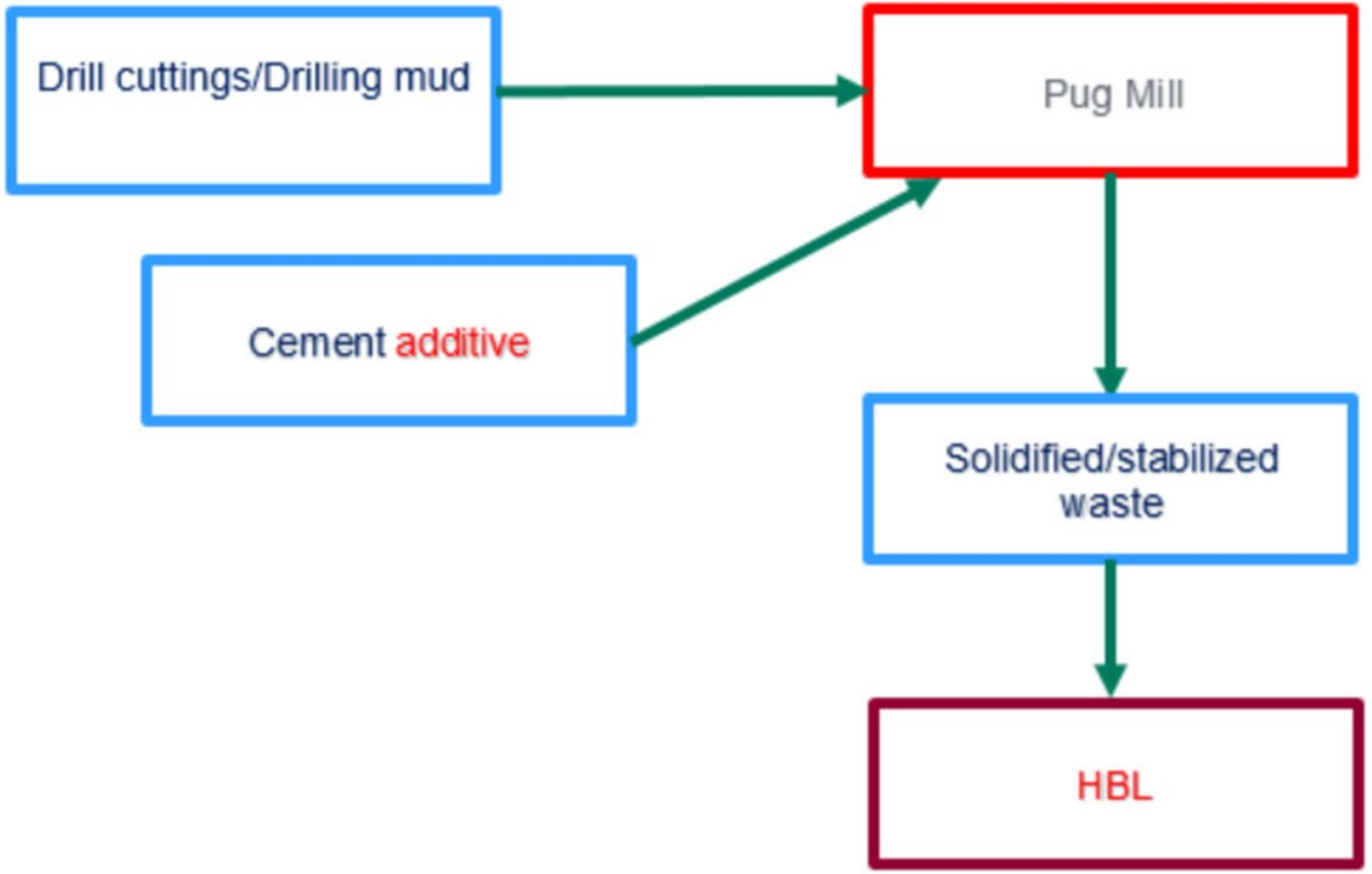
Incinerator



Oil/Water Separator

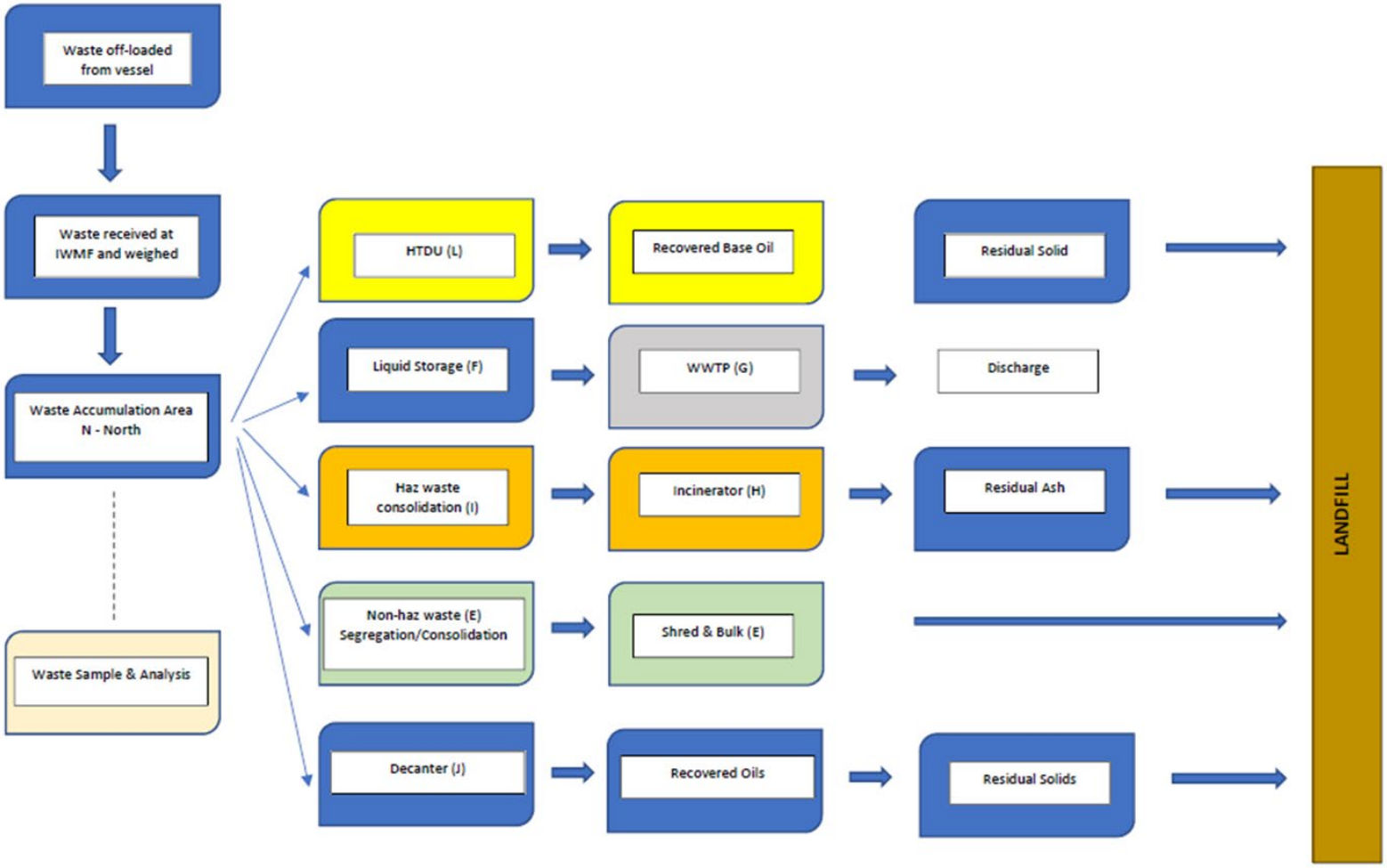


Solidification

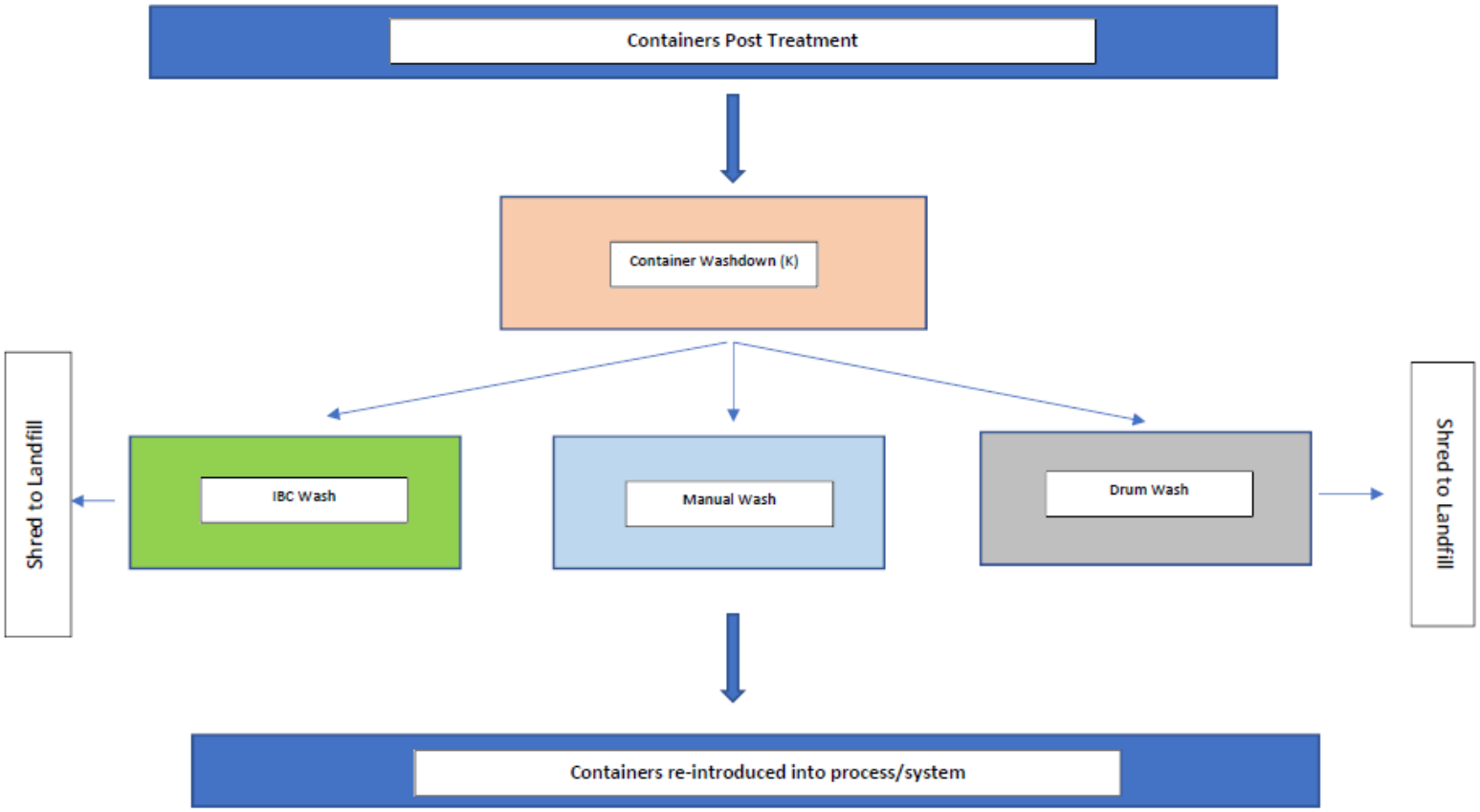


SES Waste Treatment Process Flow Diagrams

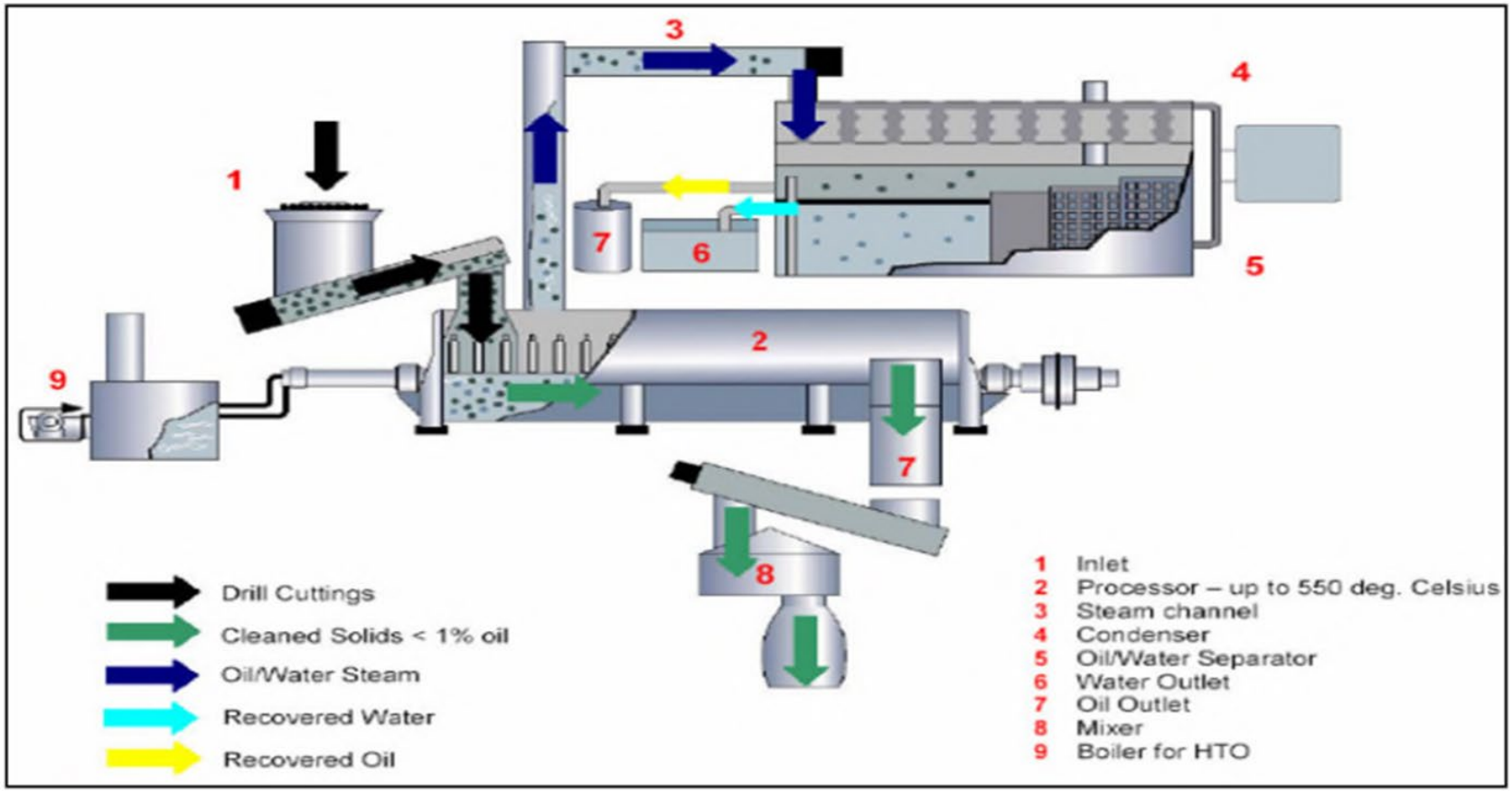
SES Integrated Waste Management Facility Flow Diagram (1)



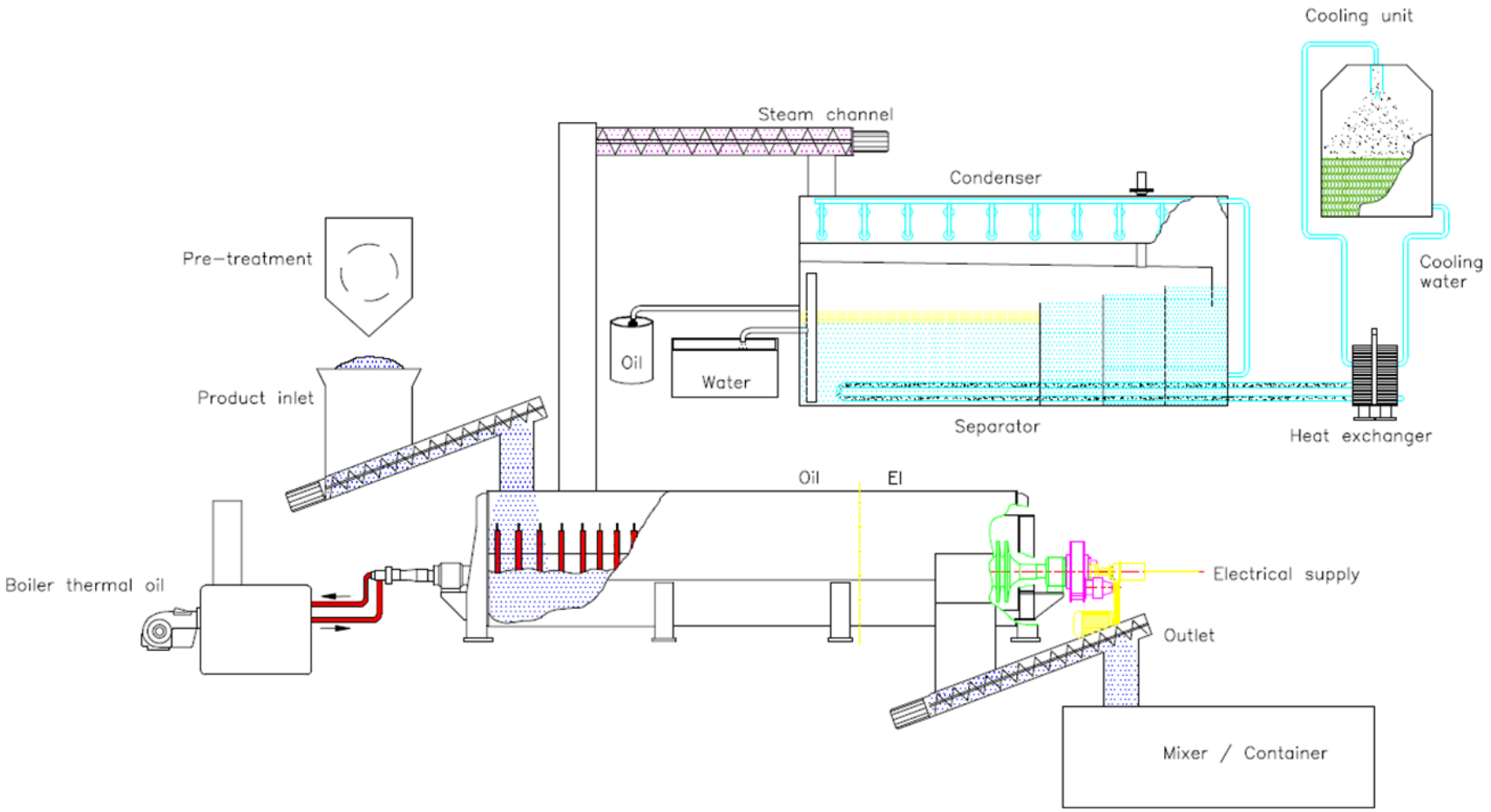
SES Integrated Waste Management Facility Flow Diagram (2)



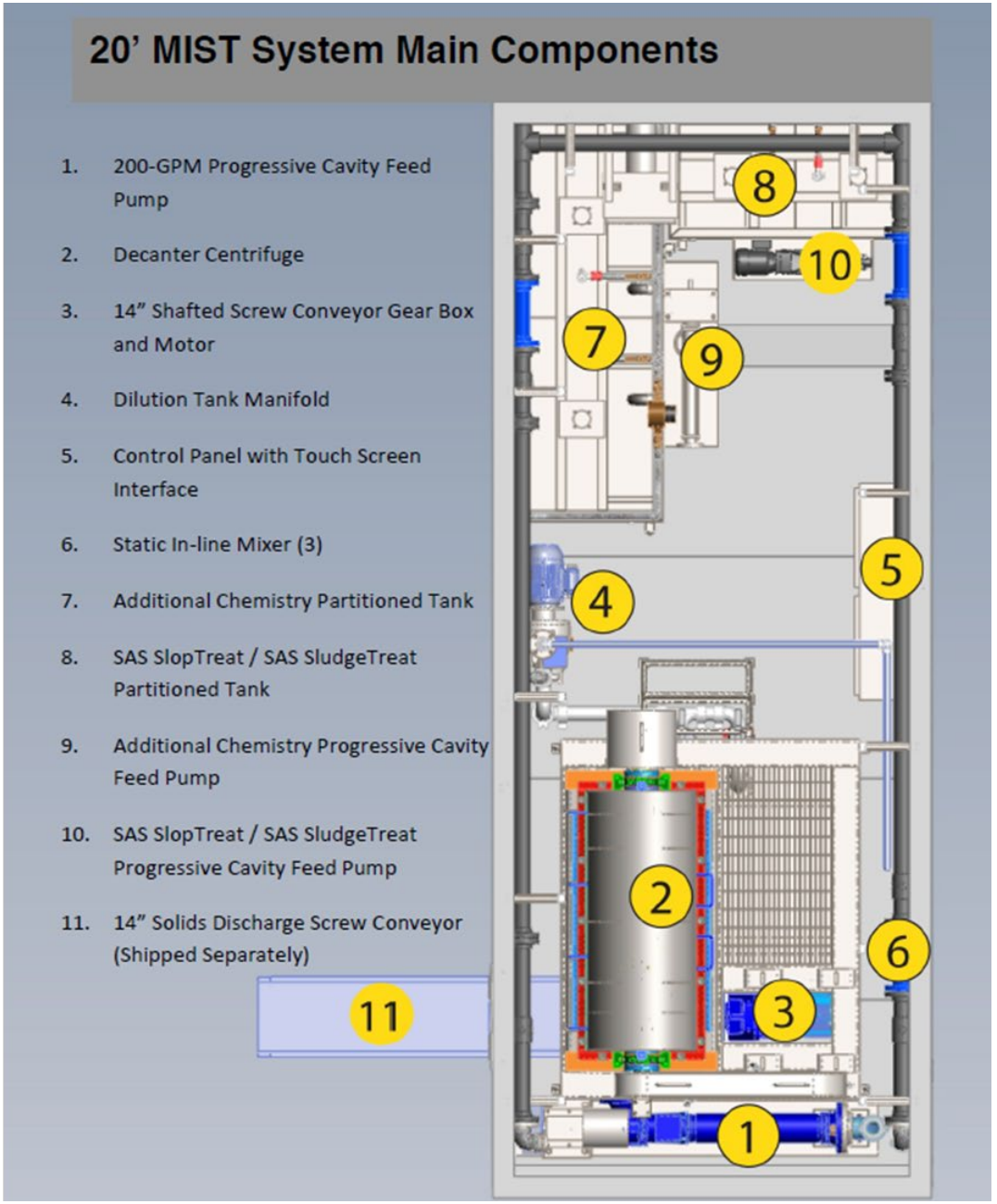
High Temperature Thermal Desorption



High Temperature Thermal Desorption



Microemulsion Injection & Separations Technology



Wastewater Treatment Plant (WWTP)

General

The water treatment unit for oil contaminated water is designed to treat the water which contains variable amounts of oil. The process is designed to adapt automatically according to the oil level in the inlet water and the oil which removed from the water can be recycled for other purposes.

Storage

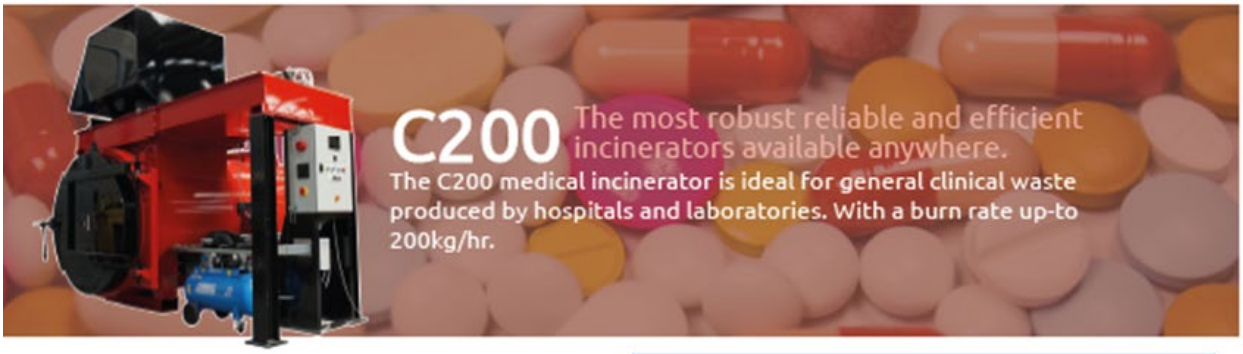
Above ground steel wastewater storage tanks will provide the buffer tank storage requirements for all wastewater received at the facility.

Process description

- In first phase a coarse screen is used for separating the mud and soil from inlet water stream.
- Second phase is the natural separation of the oil and water which will happen in inlet storage tank. On the bottom of the tank an industrial skimmer will skim the floating oil from the surface and this oil is discharged to the separation unit.
- In third phase the water is led to the two-phase flotation unit where the oil is separated in two different flotation units. During this process phase the pH is adjusted to match the optimal coagulation pH-value. The oil from the first flotation phase will be discharged to the oil/water separator.
- After the flotation unit the pH will be adjusted and the water is either discharged to the drain or to the nature or if the water contains salts, then the water is directed thru reverse osmosis unit.

Treatment

WWTP unit for oily waters will remove oil and other impurities from the water stream. After processing the heavy metals and salts are reduced to such levels that the water is acceptable to discharge to the nature or to the drain. After the treatment, the pH-level is adjusted between 6.5 to 9.



CHAS defra Approved ISO9001 2015 ISO 14001 2015

The C200 is a high capacity clinical incinerator, designed to handle waste such as hazardous, laboratory or pharmaceutical. Having a front-loading design, enabling a safe and easy method for continuous loading of waste.

Biosecurity is a growing concern for hospitals across the globe, the implementation of an Addfield C200 can improve your ability to safely destroy contaminated waste.

The following information details the many features, specifications and optional equipment associated with our C200 incinerator.

Machine Specification

External L x W x H (mm)	3750 x 4955 x 3800/7400
Internal L x W x H (mm)	3035 x 1353 Ø
Chamber Volume (m³)	4.35
Weight (approx tonnes)	12
Nominal Burn Rate	<200
Thermal Capacity (kW)	740
Power Supply 50/60 hz	220 - 250v
Door Aperture	1340 Ø
Control Panel	PLC
Fuel Types	Diesel, LPG, N-Gas
Fire Brick (Alumina)	42.5%
Insulation Fire Brick	Grade E23

*We reserve the right to change the specification, dimensions and quality of materials from time to time, so long as the alteration is minor or an improvement to the said product.

Primary Chamber

- Fully insulated internal refractory lining, constructed from high grade refractory brick ensuring a self-supporting, interlocking arrangement.
- Fully interlocked, manually operated, access door.
- Waste ignition burner, temperature controlled on-off, complete with internal air fans.
- Combustion burner, temperature controlled on-off, complete with internal air fans.
- Primary combustion burner air fans with automatically controlled distribution to their designated area.
- One temperature sensor mounting points.

Secondary Chamber

- Fully insulated internal refractory lining, constructed from low thermal mass insulation.
- Secondary chamber burnout burner, temperature controlled on-off, complete with internal air fans.
- Integrated combustion burner air fans with automatically controlled distribution to their designated area.
- All combustion fuel pipework.
- All electrical components.
- One temperature sensor mounting point at the base of the exit flue ensuring the chamber reaches the necessary 1100°C minimum.

Waste Type

	Clinical Waste	✓
	Treated Waste	✓
	Anatomical Waste	✓
	Cytotoxic & Cytostatic Waste	✓
	Offensive/Hygiene Waste	✓
	Medicinal Waste	✓
	Domestic (municipal) Waste	✓

addfield Incinerate • Cremate

Addfield Environmental Systems Limited
Unit 9 | Zone 4 | Burntwood Business Park
Staffordshire | WS7 3XD | United Kingdom

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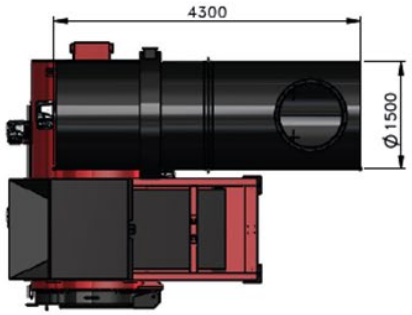
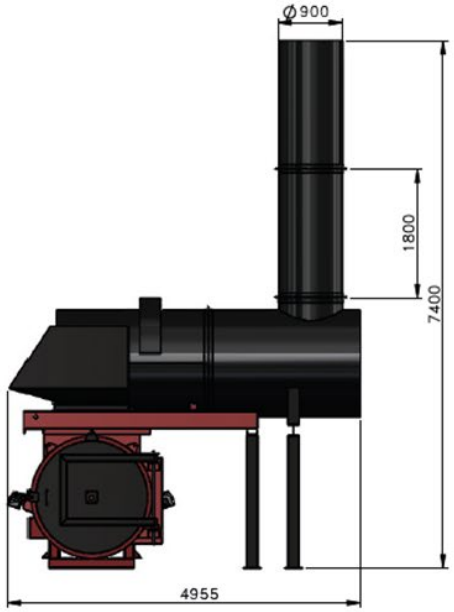
MADE IN BRITAIN

*SHOWN WITH OPTIONAL HOPPER

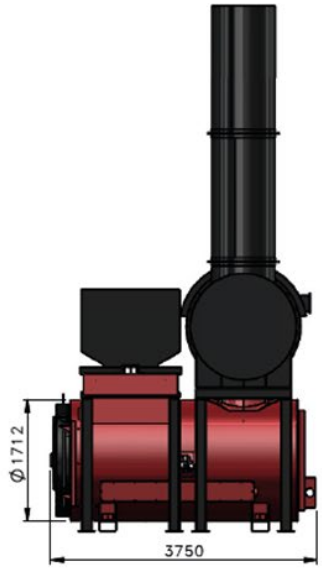


PLAN VIEW

ISOMETRIC VIEW



FRONT VIEW



SIDE VIEW

THIRD ANGLE PROJECTION
(UNLESS STATED OTHERWISE)

MATERIAL:
N/A

FINISH:
N/A

TOLERANCES
(UNLESS STATED OTHERWISE)
WHOLE NUMBERS ±1.00
1 DECIMAL PLACE ±0.10
2 DECIMAL PLACE ±0.05
ANGLES ±0.50°

WEIGHT:

addfield
Incinerate • Cremate

T: +44 (0)1543 571 280
F: +44 (0)1543 571 173
E: sales@addfield.com
www.addfield.com

Addfield Environmental Systems LT
Unit 9, Zone 4
Burntwood Business Park
Staffordshire
WS7 3XD

DRAWN BY: AS

DATE CREATED: 21/05/2019

PROJECT:

C200 WITH TOP LOADER

TITLE:

C200 WITH TOP LOADER
GA

APPENDIX C MARINE VESSELS TABLE

Vessel	Type
Roger White	PSV
Sanibel Island	PSV
Horn Island	PSV
Paradise Island	PSV
Robert Adams	PSV
Oryx	PSV
Clarence Triche	PSV
Kirt Chouest	PSV
Springbok	PSV
Emily D. McCall	FSV
Murray	PSV
Mixteca	PSV
Amazon	MPV
Russell Adams	PSV
Jack Edwards	PSV
Gary Rook	PSV
Congo	PSV
Nile	PSV
Charlie Comeaux	PSV
Holiday	PSV
FDS2	MPV
Constellation	MPV
C-installer	MPV
Guyana - Hero	MPV
Demerara	PSV
Murray	PSV
Michael Crombie McCall	FSV
Ted Smith	PSV
Russell Bouziga	MPV

FSV=fast support vessel; PSV=platform support vessel; MPV=multipurpose vessel. Collectively, these acronyms listed are commonly referred to as Logistics Vessels or Marine Supply Vessels.

APPENDIX D

- **Waste Profile Sheets**
- **Waste Profiles Table**
- **Disposal Criteria Tables**
- **Blank EPA Waste Profile**
- **Waste Profile Instructions**
- **Waste Manifest Form**
- **Waste Manifest Instructions**
- **Permitted Effluents Discharge Table**

Waste Profile Sheets

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	WASTE PROFILE NO. 20140506-001

1. GENERATORS NAME
Esso Exploration Production Guyana Limited

2. FACILITY's NAME & ADDRESS
GYSBI Shorebase, Georgetown, Guyana

3. TECHNICAL CONTACT	4. TITLE	5. PHONE
Jimmy Street	Waste Management Lead	623-1104

B. WASTE INFORMATION

		HAZARDOUS		NON-HAZARDOUS
			x	

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☐ N ☑

If "yes" then provide waste numbers

Is this a listed waste under Annex VIII of the Basel Convention? Y ☐ N ☑

If "yes" then provide all applicable waste numbers

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☐ N ☑

If "yes" then provide all applicable waste numbers

2. COMMON NAME OF WASTE
General Trash

3. SITE ID/LOCATION OF WASTE GENERATION
Drilling rigs, FPSO and Shore base

4. PROCESS GENERATING WASTE
Items and articles no longer used for their intended purpose (Domestic trash, galley/kitchen waste, food, plastic, cement sacks, insulation, dry bulk hoses, plastic packaging, paper, rubber, cardboard, metal)

5. PROJECTED ANNUAL VOLUME		6. WASTE RECEIVING FREQUENCY		WEEKLY		MONTHLY		ONE-TIME SHIPMENT		OTHER (SPECIFY)
900-1200 MT			X							
7. WASTE VOLUME		CUBIC METERS		GALLONS			X	TONNES		OTHER (SPECIFY)
8. WASTE CONTAINERS		BARRELS (42 GAL.)		DRUM (55 GAL.)				CUTTINGS BOX	Bag	OTHER (SPECIFY)

9. SPECIAL HANDLING REQUIREMENTS
No

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE (CHECK ONE)		SOLID		LIQUID		SEMI-SOLID		GAS		OTHER (SPECIFY)
	x									

COLOR	Multi	BOILING POINT (°C)	N/A
ODOR & STRENGTH	None/ Mild	pH	N/A
FLASH POINT (°C)	N/A	VISCOSITY	☐ Solid ☐ High ☐ Medium ☐ Low
BTUs	N/A	TOTAL CYNAIDES	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

NONE	X	OXIDIZER	
WATER REACTIVE		IGNITABLE	
SHOCK REACTIVE		MEDICAL/INFECT. WST	
AIR REACTIVE		DIOXINS	
EXPLOSIVE		PESTICIDE/HERBICIDE	
PYROPHORIC		POLYMERIZABLE	
REACTIVE CYANIDES		RADIOACTIVE	
REACTIVE SULFIDES		EXEMPT RAD	
PHENOLS		ASBESTOS	
ORGANIC PEROXIDE		THERMALLY UNSTABLE	

3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%)	CONCENTRATION (%)
	Trash, general waste	80 - 100	
	Wood, pallets	0 - 10	

KNOWLEDGE IS FROM		LAB ANALYSIS		MSDS		PROCESS/GENERATOR KNOWLEDGE
					X	

COMMENTS :

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE:	DATE: 03/18/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	WASTE PROFILE NO. 20140506-002
1. GENERATORS NAME Esso Exploration Production Guyana Limited	
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana	
3. TECHNICAL CONTACT Jimmy Street	4. TITLE Waste Management Lead 5. PHONE 623-1104

B. WASTE INFORMATION

1. WASTE CLASSIFICATION		HAZARDOUS		NON-HAZARDOUS
			x	

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☐ N ☑

If "yes" then provide waste numbers

Is this a listed waste under Annex VIII of the Basel Convention? Y ☐ N ☑

If "yes" then provide all applicable waste numbers

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☐ N ☑

If "yes" then provide all applicable waste numbers

2. COMMON NAME OF WASTE
Wood

3. SITE ID/LOCATION OF WASTE GENERATION
Drill rigs, FPSO and Shorebase

4. PROCESS GENERATING WASTE
Shorebase operations, offshore drilling/installation/production/logistics, packaging, pallets, crating, blocks, boards

5. PROJECTED ANNUAL VOLUME		6. WASTE RECEIVING FREQUENCY		WEEKLY		MONTHLY		ONE-TIME SHIPMENT		OTHER (SPECIFY)
400-700 MT			x							
7. WASTE VOLUME		CUBIC METERS		GALLONS		x	TONNES			OTHER (SPECIFY)
8. WASTE CONTAINERS		BARRELS (42 GAL.)		DRUM (55 GAL.)			CUTTINGS BOX		x	OTHER (BASKET)

9. SPECIAL HANDLING REQUIREMENTS
No

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE (CHECK ONE)		SOLID		LIQUID		SEMI-SOLID		GAS		OTHER (SPECIFY)
	x									

COLOR	Multi-Brown-Dark	BOLING POINT (°C)	N/A
ODOR & STRENGTH	None	pH	N/A
FLASH POINT (°C)	N/A	VISCOSITY	☐ Solid ☐ High ☐ Medium ☐ Low
BTUs	N/A	TOTAL CYNAIDES (ppm)	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

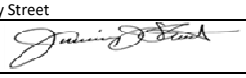
NONE	X	OXIDIZER	
WATER REACTIVE		IGNITABLE	
SHOCK REACTIVE		MEDICAL/INFECT. WST	
AIR REACTIVE		DIOXINS	
EXPLOSIVE		PESTICIDE/HERBICIDE	
PYROPHORIC		POLYMERIZABLE	
REACTIVE CYANIDES		RADIOACTIVE	
REACTIVE SULFIDES		EXEMPT RAD	
PHENOLS		ASBESTOS	
ORGANIC PEROXIDE		THERMALLY UNSTABLE	

3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%) - MUST BE EQUAL OR GREATER THAN 100% WHEN TOTALED	CONCENTRATION (ppm or mg/L)
	Wood	95 - 100	
	Paper, plastic, metal	0 - 5	

KNOWLEDGE IS FROM		LAB ANALYSIS		MSDS	x	PROCESS/GENERATOR KNOWLEDGE

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE: 	DATE: 03/18/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	WASTE PROFILE NO. 20140506-003
1. GENERATORS NAME Esso Exploration Production Guyana Limited	
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana	

3. TECHNICAL CONTACT	4. TITLE	5. PHONE
Jimmy Street	Waste Management Lead	623-1104

B. WASTE INFORMATION

1. WASTE CLASSIFICATION		HAZARDOUS		NON-HAZARDOUS
			x	

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☐ N ☑

If "yes" then provide waste numbers

Is this a listed waste under Annex VIII of the Basel Convention? Y ☐ N ☑

If "yes" then provide all applicable waste numbers

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☐ N ☑

If "yes" then provide all applicable waste numbers

2. COMMON NAME OF WASTE
Scrap Metal

3. SITE ID/LOCATION OF WASTE GENERATION
Drill rigs, FPSO and Shorebase

4. PROCESS GENERATING WASTE
Items and articles no longer used for their intended purpose (Scrap metal, steel, aluminum, crushed drums, tote frames, punctured aerosol cans, cables, straps, and various other metal items)

5. PROJECTED ANNUAL VOLUME	6. WASTE RECEIVING FREQUENCY		WEEKLY		MONTHLY		ONE-TIME SHIPMENT		OTHER (SPECIFY)
500 - 1000 MT		x							

7. WASTE VOLUME		CUBIC METERS		GALLONS		TONNES		OTHER (SPECIFY)
					x			

8. WASTE CONTAINERS		BARRELS (42 GAL.)		DRUM (55 GAL.)		CUTTINGS BOX		OTHER (SPECIFY)
							BINS	

9. SPECIAL HANDLING REQUIREMENTS
No

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE (CHECK ONE)		SOLID		LIQUID		SEMI-SOLID		GAS		OTHER (SPECIFY)
	x									

COLOR	Multi	BOILING POINT (°C)	N/A
ODOR & STRENGTH	None	pH	N/A
FLASH POINT (°C)	N/A	VISCOSITY	☐ Solid ☐ High ☐ Medium ☐ Low
BTUs	N/A	TOTAL CYNAIDES (ppm)	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

NONE	X	OXIDIZER	
WATER REACTIVE		IGNITABLE	
SHOCK REACTIVE		MEDICAL/INFECT. WST	
AIR REACTIVE		DIOXINS	
EXPLOSIVE		PESTICIDE/HERBICIDE	
PYROPHORIC		POLYMERIZABLE	
REACTIVE CYANIDES		RADIOACTIVE	
REACTIVE SULFIDES		EXEMPT RAD	
PHENOLS		ASBESTOS	
ORGANIC PEROXIDE		THERMALLY UNSTABLE	

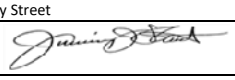
3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%) - MUST BE EQUAL OR GREATER THAN 100% WHEN TOTALED	CONCENTRATION (ppm or mg/L)
	Scrap metal	95 - 100	
	Paper, cardboard, plastic, rubber, wood	0 - 5	

KNOWLEDGE IS FROM		LAB ANALYSIS		MSDS		PROCESS/GENERATOR KNOWLEDGE
					x	

COMMENTS :

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE: 	DATE: 03/18/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	WASTE PROFILE NO. 20140506-004
1. GENERATORS NAME Esso Exploration Production Guyana Limited	
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana	
3. TECHNICAL CONTACT Jimmy Street	4. TITLE Waste Management Lead 5. PHONE 623-1104

B. WASTE INFORMATION

1. WASTE CLASSIFICATION		HAZARDOUS		NON-HAZARDOUS
			x	

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☐ N ☑

If "yes" then provide waste numbers

Is this a listed waste under Annex VIII of the Basel Convention? Y ☐ N ☑

If "yes" then provide all applicable waste numbers

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☐ N ☑

If "yes" then provide all applicable waste numbers

2. COMMON NAME OF WASTE
Plastic

3. SITE ID/LOCATION OF WASTE GENERATION
Drilling rigs, FPSO and Shorebase

4. PROCESS GENERATING WASTE
Scrap plastic, plastic bottles, recycle plastics, packaging, various other plastics non longer for used

5. PROJECTED ANNUAL VOLUME 50 - 100 MT	6. WASTE RECEIVING FREQUENCY		WEEKLY		MONTHLY		ONE-TIME SHIPMENT		OTHER (SPECIFY)
		x							

7. WASTE VOLUME		CUBIC METERS		GALLONS		TONNES		OTHER (SPECIFY)
					x			

8. WASTE CONTAINERS		BARRELS (42 GAL.)		DRUM (55 GAL.)		CUTTINGS BOX		OTHER (SPECIFY)
							BINS	

9. SPECIAL HANDLING REQUIREMENTS
No

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE (CHECK ONE)		SOLID		LIQUID		SEMI-SOLID		GAS		OTHER (SPECIFY)
	x									

COLOR	Multi	BOILING POINT (^{O}C)	N/A
ODOR & STRENGTH	None	pH	N/A
FLASH POINT (^{O}C)	N/A	VISCOSITY	☐ Solid ☐ High ☐ Medium ☐ Low
BTUs	N/A	TOTAL CYNAIDES	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

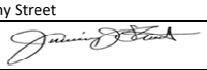
NONE	X	OXIDIZER	
WATER REACTIVE		IGNITABLE	
SHOCK REACTIVE		MEDICAL/INFECT. WST	
AIR REACTIVE		DIOXINS	
EXPLOSIVE		PESTICIDE/HERBICIDE	
PYROPHORIC		POLYMERIZABLE	
REACTIVE CYANIDES		RADIOACTIVE	
REACTIVE SULFIDES		EXEMPT RAD	
PHENOLS		ASBESTOS	
ORGANIC PEROXIDE		THERMALLY UNSTABLE	

3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%) - MUST BE EQUAL OR GREATER THAN 100% WHEN TOTALED	CONCENTRATION (ppm or mg/L)
	Plastics	95- 100	
	Paper, cardboard, metals, rubber, wood	0 - 5	

KNOWLEDGE IS FROM		LAB ANALYSIS		MSDS		PROCESS/GENERATOR KNOWLEDGE
					x	

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE: 	DATE: 03/18/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	WASTE PROFILE NO. 20140506-005
1. GENERATORS NAME Esso Exploration Production Guyana Limited	
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana	

3. TECHNICAL CONTACT	4. TITLE	5. PHONE
Jimmy Street	Waste Management Lead	623-1104

B. WASTE INFORMATION

1. WASTE CLASSIFICATION		HAZARDOUS		NON-HAZARDOUS
			x	

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☐ N ☑

If "yes" then provide waste numbers

Is this a listed waste under Annex VIII of the Basel Convention? Y ☐ N ☑

If "yes" then provide all applicable waste numbers

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☐ N ☑

If "yes" then provide all applicable waste numbers

2. COMMON NAME OF WASTE
Paper/Cardboard

3. SITE ID/LOCATION OF WASTE GENERATION
Drilling rigs, FPSO and Shorebase

4. PROCESS GENERATING WASTE
Items and articles no longer used for their intended purpose (Scrap cardboard, paper, packaging, various types)

5. PROJECTED ANNUAL VOLUME	6. WASTE RECEIVING FREQUENCY		WEEKLY		MONTHLY		ONE-TIME SHIPMENT		OTHER (SPECIFY)
70 - 100 MT		X							
7. WASTE VOLUME		CUBIC METERS		GALLONS		x	TONNES		OTHER (SPECIFY)
8. WASTE CONTAINERS		BARRELS (42 GAL.)		DRUM (55 GAL.)			CUTTINGS BOX	BINS	OTHER (SPECIFY)

9. SPECIAL HANDLING REQUIREMENTS
No

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE (CHECK ONE)		SOLID		LIQUID		SEMI-SOLID		GAS		OTHER (SPECIFY)
	x									

COLOR	Multi	BOILING POINT (^{O}C)	N/A
ODOR & STRENGTH	None	pH	N/A
FLASH POINT (^{O}C)	N/A	VISCOSITY	☐ Solid ☐ High ☐ Medium ☐ Low
BTUs	N/A	TOTAL CYNAIDES (ppm)	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

NONE	X	OXIDIZER	
WATER REACTIVE		IGNITABLE	
SHOCK REACTIVE		MEDICAL/INFECT. WST	
AIR REACTIVE		DIOXINS	
EXPLOSIVE		PESTICIDE/HERBICIDE	
PYROPHORIC		POLYMERIZABLE	
REACTIVE CYANIDES		RADIOACTIVE	
REACTIVE SULFIDES		EXEMPT RAD	
PHENOLS		ASBESTOS	
ORGANIC PEROXIDE		THERMALLY UNSTABLE	

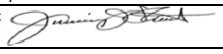
3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%) - MUST BE EQUAL OR GREATER THAN 100% WHEN TOTALED	CONCENTRATION (%)
	Paper/ Cardboard	0 - 100	
	Metals, rubber, wood	0 - 5	

KNOWLEDGE IS FROM		LAB ANALYSIS		MSDS		PROCESS/GENERATOR KNOWLEDGE
					x	

COMMENTS:

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE: 	DATE: 03/18/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	WASTE PROFILE NO. 20140506-006

1. GENERATORS NAME
Esso Exploration Production Guyana Limited

2. FACILITY's NAME & ADDRESS
GYSBI Shorebase, Georgetown, Guyana

3. TECHNICAL CONTACT	4. TITLE	5. PHONE
Jimmy Street	Waste Management Lead	623-1104

B. WASTE INFORMATION

1. WASTE CLASSIFICATION		HAZARDOUS	X	NON-HAZARDOUS

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☐ N ☑

If "yes" then provide waste numbers

Is this a listed waste under Annex VIII of the Basel Convention? Y ☐ N ☑

If "yes" then provide all applicable waste numbers

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☐ N ☑

If "yes" then provide all applicable waste numbers

2. COMMON NAME OF WASTE
Cooking oil

3. SITE ID/LOCATION OF WASTE GENERATION
Drilling rigs and FPSO

4. PROCESS GENERATING WASTE
Various used cooking oils (peanut, canola, corn, vegetable oil)

5. PROJECTED ANNUAL VOLUME		6. WASTE RECEIVING FREQUENCY		WEEKLY	x	MONTHLY		ONE-TIME SHIPMENT		OTHER (SPECIFY)
15-25 MT										
7. WASTE VOLUME		CUBIC METERS	x	GALLONS		TONNES				OTHER (SPECIFY)
8. WASTE CONTAINERS		BARRELS (42 GAL.)	x	DRUM (55 GAL.) Various		CUTTINGS BOX				OTHER (SPECIFY)

9. SPECIAL HANDLING REQUIREMENTS
No

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE (CHECK ONE)		SOLID	x	LIQUID		SEMI-SOLID		GAS		OTHER (SPECIFY)

COLOR	Multi	BOILING POINT (°C)	N/A
ODOR & STRENGTH	Mild	pH	N/A
FLASH POINT (°C)	N/A	VISCOSITY	☐ Solid ☐ High ☐ Medium ☐ Low
BTUs	N/A	TOTAL CYNAIDES (ppm)	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

NONE	X	OXIDIZER	
WATER REACTIVE		IGNITABLE	
SHOCK REACTIVE		MEDICAL/INFECT. WST	
AIR REACTIVE		DIOXINS	
EXPLOSIVE		PESTICIDE/HERBICIDE	
PYROPHORIC		POLYMERIZABLE	
REACTIVE CYANIDES		RADIOACTIVE	
REACTIVE SULFIDES		EXEMPT RAD	
PHENOLS		ASBESTOS	
ORGANIC PEROXIDE		THERMALLY UNSTABLE	

3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%) - MUST BE EQUAL OR GREATER THAN 100% WHEN TOTALED	CONCENTRATION (ppm or mg/L)
	Used cooking oils	0 - 100	
	Food, paper	0 - 5	

KNOWLEDGE IS FROM		LAB ANALYSIS		MSDS	x	PROCESS/GENERATOR KNOWLEDGE

COMMENTS : The frequency of receipt of cooking oil varies. The annual expected volume is estimated at 15-25 MT per year.

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE:	DATE: 03/18/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	WASTE PROFILE NO. 20140506-007
1. GENERATORS NAME Esso Exploration Production Guyana Limited	
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana	
3. TECHNICAL CONTACT Jimmy Street	4. TITLE Waste Management Lead
5. PHONE 623-1104	

B. WASTE INFORMATION

1. WASTE CLASSIFICATION		HAZARDOUS		NON-HAZARDOUS
			x	

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☐ N ☑

If "yes" then provide waste numbers

Is this a listed waste under Annex VIII of the Basel Convention? Y ☐ N ☑

If "yes" then provide all applicable waste numbers

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☐ N ☑

If "yes" then provide all applicable waste numbers

2. COMMON NAME OF WASTE
Glass

3. SITE ID/LOCATION OF WASTE GENERATION
Drilling rigs, FPSO and Shore base

4. PROCESS GENERATING WASTE
Various glass used and broken

5. PROJECTED ANNUAL VOLUME 2-5 MT		6. WASTE RECEIVING FREQUENCY		WEEKLY	x	MONTHLY		ONE-TIME SHIPMENT		OTHER (SPECIFY)
7. WASTE VOLUME		CUBIC METERS		GALLONS		x		TONNES		OTHER (SPECIFY)
8. WASTE CONTAINERS		BARRELS (42 GAL.)	x	DRUM (55 GAL.) Various				CUTTINGS BOX		OTHER (SPECIFY)

9. SPECIAL HANDLING REQUIREMENTS
No

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE (CHECK ONE)		SOLID		LIQUID		SEMI-SOLID		GAS		OTHER (SPECIFY)
	x									

COLOR	Multi	BOLING POINT (^{O}C)	N/A
ODOR & STRENGTH	None	pH	N/A
FLASH POINT (^{O}C)	N/A	VISCOSITY	☐ Solid ☐ High ☐ Medium ☐ Low
BTUs	N/A	TOTAL CYNAIDES (ppm)	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

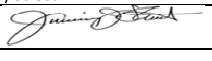
NONE	X	OXIDIZER	
WATER REACTIVE		IGNITABLE	
SHOCK REACTIVE		MEDICAL/INFECT. WST	
AIR REACTIVE		DIOXINS	
EXPLOSIVE		PESTICIDE/HERBICIDE	
PYROPHORIC		POLYMERIZABLE	
REACTIVE CYANIDES		RADIOACTIVE	
REACTIVE SULFIDES		EXEMPT RAD	
PHENOLS		ASBESTOS	
ORGANIC PEROXIDE		THERMALLY UNSTABLE	

3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%) - MUST BE EQUAL OR GREATER THAN 100% WHEN TOTALED	CONCENTRATION (ppm or mg/L)
	Glass (broken)	0 - 100	
	Paper, plastic, metal, lids, labels	0 - 5	

KNOWLEDGE IS FROM		LAB ANALYSIS		MSDS	x	PROCESS/GENERATOR KNOWLEDGE

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE: 	DATE: 03/18/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	WASTE PROFILE NO. 20140506-008
1. GENERATORS NAME Esso Exploration Production Guyana Limited	
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana	
3. TECHNICAL CONTACT Jimmy Street	4. TITLE Waste Management Lead 5. PHONE 623-1104

B. WASTE INFORMATION

1. WASTE CLASSIFICATION		HAZARDOUS		NON-HAZARDOUS
	x			

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☑ N ☐

If "yes" then provide waste numbers Y1

Is this a listed waste under Annex VIII of the Basel Convention? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Hazardous Waste A4020

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Guyana EPA AG.1 Hazardous Wastes Regulations Part VII, 36, (xiii) : Regulations do not apply

2. COMMON NAME OF WASTE
Medical Waste

3. SITE ID/LOCATION OF WASTE GENERATION
Drilling rigs, FPSO and Shore base

4. PROCESS GENERATING WASTE
Medical waste contaminated with blood or bodily fluids (bandages, needles, syringes, pads, wrappings, medicines, sharps)

5. PROJECTED ANNUAL VOLUME	6. WASTE RECEIVING FREQUENCY		WEEKLY		MONTHLY		ONE-TIME SHIPMENT		OTHER (SPECIFY)
0.5-1 MT				x					
7. WASTE VOLUME		CUBIC METERS		GALLONS		x	TONNES		OTHER (SPECIFY)
8. WASTE CONTAINERS		BARRELS (42 GAL.)		DRUM (55 GAL.)			CUTTINGS BOX	X	OTHER (Toolbox)

9. SPECIAL HANDLING REQUIREMENTS
Yes. Handling hazards should reflect Sharps and biological contact.

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE (CHECK ONE)		SOLID		LIQUID		SEMI-SOLID		GAS		OTHER (SPECIFY)
	x									

COLOR	Multi	BOILING POINT (^{O}C)	N/A
ODOR & STRENGTH	None	pH	N/A
FLASH POINT (^{O}C)	N/A	VISCOSITY	☐ Solid ☐ High ☐ Medium ☐ Low
BTUs	N/A	TOTAL CYNAIDES	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

NONE		OXIDIZER	
WATER REACTIVE		IGNITABLE	
SHOCK REACTIVE		MEDICAL/INFECT. WST	X
AIR REACTIVE		DIOXINS	
EXPLOSIVE		PESTICIDE/HERBICIDE	
PYROPHORIC		POLYMERIZABLE	
REACTIVE CYANIDES		RADIOACTIVE	
REACTIVE SULFIDES		EXEMPT RAD	
PHENOLS		ASBESTOS	
ORGANIC PEROXIDE		THERMALLY UNSTABLE	

3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%) - MUST BE EQUAL OR GREATER THAN 100% WHEN TOTALED	CONCENTRATION (ppm or mg/L)
	Medical waste (sharps, needles, bodily fluids, blood)	90 - 100	
	Paper, plastic, metal, lids, labels	5-10	

KNOWLEDGE IS FROM		LAB ANALYSIS		MSDS		PROCESS/GENERATOR KNOWLEDGE
					X	

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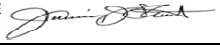
NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE 	DATE: 03/18/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	**WASTE PROFILE NO.** **20140506-009**
1. GENERATORS NAME Esso Exploration Production Guyana Limited	
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana	

3. TECHNICAL CONTACT	4. TITLE	5. PHONE
Jimmy Street	Waste Management Lead	623-1104

B. WASTE INFORMATION

1. WASTE CLASSIFICATION		HAZARDOUS		NON-HAZARDOUS
	x			

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☐ N ☑

If "yes" then provide waste numbers

Is this a listed waste under Annex VIII of the Basel Convention? Y ☑ N ☐

If "yes" then provide all applicable waste numbers A3020

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Guyana EPA AG.1 Hazardous Wastes Regulations Part VII, 36, (xvii) (xviii) : Regulations do not apply.

2. COMMON NAME OF WASTE
Drill cuttings/Mud slops

3. SITE ID/LOCATION OF WASTE GENERATION
Stena Carron, Noble Bob Douglas, Noble Don Taylor and Noble Tom Madden drill ships

4. PROCESS GENERATING WASTE
NAF Drill cuttings / mud slopes from well exploration and development

5. PROJECTED ANNUAL VOLUME		6. WASTE RECEIVING FREQUENCY		WEEKLY		MONTHLY		ONE-TIME SHIPMENT		OTHER (SPECIFY)
2600-3000 BBLS			x							
7. WASTE VOLUME		CUBIC METERS		GALLONS			TONNES		BBLS	OTHER (SPECIFY)
8. WASTE CONTAINERS		BARRELS (42 GAL.)		DRUM (55 GAL.)	x		CUTTINGS BOX			OTHER (SPECIFY)

9. SPECIAL HANDLING REQUIREMENTS
Yes

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE **(CHECK ONE)**		SOLID		LIQUID		SEMI-SOLID		GAS		OTHER (SPECIFY)
	x		x		x					

COLOR	Earthen with oil and water	BOILING POINT (^{O}C)	N/A
ODOR & STRENGTH	Mild	pH	Neutral
FLASH POINT (^{O}C)	N/A	VISCOSITY	☐ Solid ☐ High ☑ Medium ☐ Low
BTUs	N/A	TOTAL CYNAIDES (ppm)	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

NONE	X	OXIDIZER	
WATER REACTIVE		IGNITABLE	
SHOCK REACTIVE		MEDICAL/INFECT. WST	
AIR REACTIVE		DIOXINS	
EXPLOSIVE		PESTICIDE/HERBICIDE	
PYROPHORIC		POLYMERIZABLE	
REACTIVE CYANIDES		RADIOACTIVE	
REACTIVE SULFIDES		EXEMPT RAD	
PHENOLS		ASBESTOS	
ORGANIC PEROXIDE		THERMALLY UNSTABLE	

3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%) - MUST BE EQUAL OR GREATER THAN 100% WHEN TOTALED	CONCENTRATION (ppm or mg/L)
	Escaid 110	44	
	Water	14	
	Barite	32	
	Calcium Chloride	5	
	Lime		<1
	EMI 1926		<1
	RETHIK		<1
	VG PLUS	<2	
	ECOTROL RD		<1
	SUREMUL	<3	

KNOWLEDGE IS FROM		LAB ANALYSIS		MSDS		PROCESS/GENERATOR KNOWLEDGE
	x		x		x	

COMMENTS : Hazardous and chemical properties of Section 2 of the Waste Profile Sheet do not have regulatory limits using the Basel convention criteria. This waste stream is considered a mixture and the characteristics of this mixture doesn't appear to exhibit specific hazardous properties. Analytical received, the analysis has been added to this profile.

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

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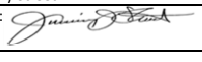
SIGNATURE: 	DATE: 06/26/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	WASTE PROFILE NO. 20140506-010
1. GENERATORS NAME Esso Exploration Production Guyana Limited	
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana	
3. TECHNICAL CONTACT Jimmy Street	4. TITLE Waste Management Lead 5. PHONE 623-1104

B. WASTE INFORMATION

1. WASTE CLASSIFICATION		HAZARDOUS		NON-HAZARDOUS
	x			

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☑ N ☐

If "yes" then provide waste numbers Y9

Is this a listed waste under Annex VIII of the Basel Convention? Y ☑ N ☐

If "yes" then provide all applicable waste numbers A4060

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Guyana EPA AG.1 Hazardous Wastes Regulations Part VII, 36, (viii) : Regulations do not apply

2. COMMON NAME OF WASTE
Oily Debris

3. SITE ID/LOCATION OF WASTE GENERATION
Exploration & Development Drilling, FPSO and Shorebase

4. PROCESS GENERATING WASTE
Various articles or other items that have crude oil or lubricating oil contamination and are no longer used for intended purpose

5. PROJECTED ANNUAL VOLUME		6. WASTE RECEIVING FREQUENCY		WEEKLY		MONTHLY		ONE-TIME SHIPMENT		OTHER (SPECIFY)
75-100 MT			X							
7. WASTE VOLUME		CUBIC METERS		GALLONS			x	TONNES		OTHER (SPECIFY)
8. WASTE CONTAINERS		BARRELS (42 GAL.)		DRUM (55 GAL.)			X	CUTTINGS BOX	X	OTHER (BAGS)

9. SPECIAL HANDLING REQUIREMENTS
No

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE (CHECK ONE)		SOLID		LIQUID		SEMI-SOLID		GAS		OTHER (SPECIFY)
	x									

COLOR	Multi colored	BOLING POINT (^{O}C)	N/A
ODOR & STRENGTH	Mild	pH	N/A
FLASH POINT (^{O}C)	N/A	VISCOSITY	☐ Solid ☐ High ☐ Medium ☐ Low
BTUs	N/A	TOTAL CYNAIDES (ppm)	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

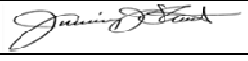
NONE	X	OXIDIZER	
WATER REACTIVE		IGNITABLE	
SHOCK REACTIVE		MEDICAL/INFECT. WST	
AIR REACTIVE		DIOXINS	
EXPLOSIVE		PESTICIDE/HERBICIDE	
PYROPHORIC		POLYMERIZABLE	
REACTIVE CYANIDES		RADIOACTIVE	
REACTIVE SULFIDES		EXEMPT RAD	
PHENOLS		ASBESTOS	
ORGANIC PEROXIDE		THERMALLY UNSTABLE	

3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%) - MUST BE EQUAL OR GREATER THAN 100% WHEN TOTALED	CONCENTRATION (ppm or mg/L)
	Oily absorbent pads, rags, filters, grease tubes, dope brushes, gloves, personnel protective equipment, paper, plastic and wood	0-100	

KNOWLEDGE IS FROM		LAB ANALYSIS		MSDS	x	PROCESS/GENERATOR KNOWLEDGE

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE: 	DATE: 03/18/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	WASTE PROFILE NO. 20140506-0011
1. GENERATORS NAME Esso Exploration Production Guyana Limited	
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana	

3. TECHNICAL CONTACT	4. TITLE	5. PHONE
Jimmy Street	Waste Management Lead	623-1104

B. WASTE INFORMATION

1. WASTE CLASSIFICATION		HAZARDOUS		NON-HAZARDOUS
	x			

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☐ N ☑

If "yes" then provide waste numbers

Is this a listed waste under Annex VIII of the Basel Convention? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Hazardous Waste A4130

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Guyana EPA AG.1 Hazardous Wastes Regulations Part VII, 36, (viii) : Excluded from Hazardous Waste

2. COMMON NAME OF WASTE
Chemical Sacks

3. SITE ID/LOCATION OF WASTE GENERATION
FEPGL Offshore Exploration, Development and Production

4. PROCESS GENERATING WASTE
Empty paper or plastic sacks who primary purpose was to hold chemicals.

5. PROJECTED ANNUAL VOLUME	6. WASTE RECEIVING FREQUENCY		WEEKLY		MONTHLY		ONE-TIME SHIPMENT		OTHER (SPECIFY)
20-30 MT				x					

7. WASTE VOLUME		CUBIC METERS		GALLONS		TONNES		OTHER (SPECIFY)
					x			

8. WASTE CONTAINERS		BARRELS (42 GAL.)		DRUM (55 GAL.)		CUTTINGS BOX		OTHER (SPECIFY)
							Pallet	

9. SPECIAL HANDLING REQUIREMENTS
No

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE (CHECK ONE)		SOLID		LIQUID		SEMI-SOLID		GAS		OTHER (SPECIFY)
	x									

COLOR	N/A	BOILING POINT (°C)	N/A
ODOR & STRENGTH	None/Mild	pH	N/A
FLASH POINT (°C)	N/A	VISCOSITY	☐ Solid ☐ High ☐ Medium ☐ Low
BTUs	N/A	TOTAL CYNAIDES (ppm)	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

NONE	X	OXIDIZER	
WATER REACTIVE		IGNITABLE	
SHOCK REACTIVE		MEDICAL/INFECT. WST	
AIR REACTIVE		DIOXINS	
EXPLOSIVE		PESTICIDE/HERBICIDE	
PYROPHORIC		POLYMERIZABLE	
REACTIVE CYANIDES		RADIOACTIVE	
REACTIVE SULFIDES		EXEMPT RAD	
PHENOLS		ASBESTOS	
ORGANIC PEROXIDE		THERMALLY UNSTABLE	

3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%) - MUST BE EQUAL OR GREATER THAN 100% WHEN TOTALED	CONCENTRATION (ppm or mg/L)
	Paper or plastic (empty sacks should be dry)	90-100	

KNOWLEDGE IS FROM		LAB ANALYSIS		MSDS		PROCESS/GENERATOR KNOWLEDGE
			X		X	

COMMENTS : (Section 2.) The characterization of this waste stream (Chemical Sacks) as hazardous waste is based on the Basel convention that doesn't identify the hazardous properties.

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

NAME: Jimmy Street	TITLE: Waste Mangament Lead
SIGNATURE:	DATE: 03/18/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION					WASTE PROFILE NO. 20140506-0012	
1. GENERATORS NAME Esso Exploration Production Guyana Limited						
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana						
3. TECHNICAL CONTACT Jimmy Street		4. TITLE Waste Management Lead		5. PHONE 623-1104		
B. WASTE INFORMATION						
1. WASTE CLASSIFICATION	x	HAZARDOUS		NON-HAZARDOUS		

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☐ N ☑

If "yes" then provide waste numbers

Is this a listed waste under Annex VIII of the Basel Convention? Y ☑ N ☐

If "yes" then provide all applicable waste numbers A4130

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Guyana EPA AG.1 Hazardous Waste Regulations Part VII, 36 (xxi): Regulations do not apply.

2. COMMON NAME OF WASTE
Casing protectors (unwashed)

3. SITE ID/LOCATION OF WASTE GENERATION
Stena Carron, Noble Bob Douglas, Noble Don Taylor and Noble Tom Madden drill ships

4. PROCESS GENERATING WASTE
Casing protectors and pipe end caps not for reused

5. PROJECTED ANNUAL VOLUME 150-200 MT		6. WASTE RECEIVING FREQUENCY		WEEKLY	x	MONTHLY		ONE-TIME SHIPMENT		OTHER (SPECIFY)
7. WASTE VOLUME		CUBIC METERS		GALLONS		x		TONNES		OTHER (SPECIFY)
8. WASTE CONTAINERS		BARRELS (42 GAL.)		DRUM (55 GAL.)				CUTTINGS BOX	BAGS	OTHER (SPECIFY)

9. SPECIAL HANDLING REQUIREMENTS
No

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE (CHECK ONE)	SOLID		LIQUID		SEMI-SOLID		GAS		OTHER (SPECIFY)
	x								

COLOR	Green, Black	BOLING POINT (°C)	N/A
ODOR & STRENGTH	N/A	pH	N/A
FLASH POINT (°C)	N/A	VISCOSITY	☐ Solid ☐ High ☐ Medium ☐ Low
BTUs	N/A	TOTAL CYNAIDES (ppm)	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

NONE	X	OXIDIZER	
WATER REACTIVE		IGNITABLE	
SHOCK REACTIVE		MEDICAL/INFECT. WST	
AIR REACTIVE		DIOXINS	
EXPLOSIVE		PESTICIDE/HERBICIDE	
PYROPHORIC		POLYMERIZABLE	
REACTIVE CYANIDES		RADIOACTIVE	
REACTIVE SULFIDES		EXEMPT RAD	
PHENOLS		ASBESTOS	
ORGANIC PEROXIDE		THERMALLY UNSTABLE	

3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%) - MUST BE EQUAL OR GREATER THAN 100% WHEN TOTALED	CONCENTRATION (ppm or mg/L)
	HDPE	70-100	
	Metal /Aluminium	0-30	
	Storage (Kendex) compounds / Running (Best O Life and Jet-Lube) compounds	0-1	

KNOWLEDGE IS FROM		LAB ANALYSIS	x	MSDS	x	PROCESS/GENERATOR KNOWLEDGE

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE:	DATE: 03/18/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	**WASTE PROFILE NO.** **20140506-0013**
1. GENERATORS NAME Esso Exploration Production Guyana Limited	
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana	

3. TECHNICAL CONTACT	4. TITLE	5. PHONE
Jimmy Street	Waste Management Lead	623-1104

B. WASTE INFORMATION

1. WASTE CLASSIFICATION		HAZARDOUS		NON-HAZARDOUS
	x			

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☐ N ☑

If "yes" then provide waste numbers

Is this a listed waste under Annex VIII of the Basel Convention? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Hazardous Waste A4130

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Guyana EPA AG.1 Hazardous Wastes Regulations Part VII, 36, (viii) : Regulations do not apply

2. COMMON NAME OF WASTE
IBC Tote Tanks/Empty

3. SITE ID/LOCATION OF WASTE GENERATION
Drilling rigs, FPSO and Shore base

4. PROCESS GENERATING WASTE
Empty IBC Tote Tanks who primary purpose was to hold neat or raw material (lube oils, chemicals, etc.). A container is considered empty if all material has been removed as possible using practices commonly employed to remove material (e.g., pouring, pumping, aspirating).

5. PROJECTED ANNUAL VOLUME 70-100 MT		6. WASTE RECEIVING FREQUENCY		WEEKLY		MONTHLY		ONE-TIME SHIPMENT		OTHER (SPECIFY)
					x					
7. WASTE VOLUME		CUBIC METERS		GALLONS			TONNES		OTHER (SPECIFY)	
					x					
8. WASTE CONTAINERS		BARRELS (42 GAL.)		DRUM (55 GAL.)		CUTTINGS BOX		Pallet	OTHER (SPECIFY)	

9. SPECIAL HANDLING REQUIREMENTS
No

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE **(CHECK ONE)**		SOLID		LIQUID		SEMI-SOLID		GAS		OTHER (SPECIFY)
	x									

COLOR	N/A	BOILING POINT (^{O}C)	N/A
ODOR & STRENGTH	N/A	pH	N/A
FLASH POINT (^{O}C)	N/A	VISCOSITY	☐ Solid ☐ High ☐ Medium ☐ Low
BTUs	N/A	TOTAL CYNAIDES (ppm)	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

NONE	X	OXIDIZER	
WATER REACTIVE		IGNITABLE	
SHOCK REACTIVE		MEDICAL/INFECT. WST	
AIR REACTIVE		DIOXINS	
EXPLOSIVE		PESTICIDE/HERBICIDE	
PYROPHORIC		POLYMERIZABLE	
REACTIVE CYANIDES		RADIOACTIVE	
REACTIVE SULFIDES		EXEMPT RAD	
PHENOLS		ASBESTOS	
ORGANIC PEROXIDE		THERMALLY UNSTABLE	

3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%) - MUST BE EQUAL OR GREATER THAN 100% WHEN TOTALED	CONCENTRATION (ppm or mg/L)
	Plastic	20-30	
	Aluminium	20-30	
	Metal	40-60	

KNOWLEDGE IS FROM		LAB ANALYSIS		MSDS		PROCESS/GENERATOR KNOWLEDGE
					x	

COMMENTS : The characterization of this waste stream (Empty IBC tote tanks) as hazardous is based on the Basel Convention, which does not identify the hazardous properties. In cases where totes are empty, the classification and chemical properties as NONE are appropriate. EEPGL prefers to have one Waste Profile Sheet for IBC Totes that covers both empty totes and totes with residues.

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE:	DATE: 06/26/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	WASTE PROFILE NO. 20140506-0014
1. GENERATORS NAME Esso Exploration Production Guyana Limited	
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana	

3. TECHNICAL CONTACT	4. TITLE	5. PHONE
Jimmy Street	Waste Management Lead	623-1104

B. WASTE INFORMATION

1. WASTE CLASSIFICATION		HAZARDOUS		NON-HAZARDOUS
	x			

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☐ N ☑

If "yes" then provide waste numbers

Is this a listed waste under Annex VIII of the Basel Convention? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Hazardous Waste A4130

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Guyana EPA AG.1 Hazardous Wastes Regulations Part VII, 36, (viii) : Regulations do not apply.

2. COMMON NAME OF WASTE
Empty metal drums
3. SITE ID/LOCATION OF WASTE GENERATION Exploration & Development Drilling, FPSO and Shorebase
4. PROCESS GENERATING WASTE Empty metal containers and drums

5. PROJECTED ANNUAL VOLUME		6. WASTE RECEIVING FREQUENCY		WEEKLY		MONTHLY		ONE-TIME SHIPMENT		OTHER (SPECIFY)
20-30 MT			X							
7. WASTE VOLUME		CUBIC METERS		GALLONS			X	TONNES		OTHER (SPECIFY)
8. WASTE CONTAINERS		BARRELS (42 GAL.)		DRUM (55 GAL.)				CUTTINGS BOX	X	OTHER (Pallet

9. SPECIAL HANDLING REQUIREMENTS
No

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE (CHECK ONE)		SOLID		LIQUID		SEMI-SOLID		GAS		OTHER (SPECIFY)
	x									

COLOR	N/A	BOLING POINT (^{O}C)	N/A
ODOR & STRENGTH	N/A	pH	N/A
FLASH POINT (^{O}C)	N/A	VISCOSITY	☐ Solid ☐ High ☐ Medium ☐ Low
BTUs	N/A	TOTAL CYNAIDES (ppm)	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

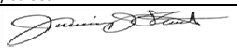
NONE	X	OXIDIZER	
WATER REACTIVE		IGNITABLE	
SHOCK REACTIVE		MEDICAL/INFECT. WST	
AIR REACTIVE		DIOXINS	
EXPLOSIVE		PESTICIDE/HERBICIDE	
PYROPHORIC		POLYMERIZABLE	
REACTIVE CYANIDES		RADIOACTIVE	
REACTIVE SULFIDES		EXEMPT RAD	
PHENOLS		ASBESTOS	
ORGANIC PEROXIDE		THERMALLY UNSTABLE	

3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%) - MUST BE EQUAL OR GREATER THAN 100% WHEN TOTALED	CONCENTRATION (ppm or mg/L)
	Metal (Open top / tight lid/ bung top) made of steel or other metal alloys	100	

KNOWLEDGE IS FROM		LAB ANALYSIS		MSDS		PROCESS/GENERATOR KNOWLEDGE
					x	

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE: 	DATE: 03/18/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	WASTE PROFILE NO. 20140506-0015
1. GENERATORS NAME Esso Exploration Production Guyana Limited	
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana	

3. TECHNICAL CONTACT	4. TITLE	5. PHONE
Jimmy Street	Waste Management Lead	623-1104

B. WASTE INFORMATION

1. WASTE CLASSIFICATION		HAZARDOUS		NON-HAZARDOUS
	x			

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☑ N ☐
If "yes" then provide waste numbers Y34
Is this a listed waste under Annex VIII of the Basel Convention? Y ☑ N ☐
If "yes" then provide all applicable waste numbers A4090
Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☑ N ☐
If "yes" then provide all applicable waste numbers Guyana EPA AG.1 Hazardous Wastes Regulations : Hazardous Waste

2. COMMON NAME OF WASTE
Acid solutions

3. SITE ID/LOCATION OF WASTE GENERATION (if different than facility address above)
Development & Exploration Drilling. Various wells

4. PROCESS GENERATING WASTE
Contaminated or excess acid solutions in support of wells

5. PROJECTED ANNUAL VOLUME		6. WASTE RECEIVING FREQUENCY		WEEKLY		MONTHLY		ONE-TIME SHIPMENT		OTHER (As needed)
2-10 MT									x	
7. WASTE VOLUME		CUBIC METERS		GALLONS		TONNES		BBLS		OTHER (SPECIFY)
8. WASTE CONTAINERS		BARRELS (42 GAL.)		DRUM (55 GAL.)		CUTTINGS BOX		TANK		OTHER (SPECIFY)

9. SPECIAL HANDLING REQUIREMENTS
Yes. Corrosive acid and caustic streams managed separately.

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE (CHECK ONE)		SOLID		LIQUID		SEMI-SOLID		GAS		OTHER (SPECIFY)
			x							

COLOR	Water clear to slight greenish	BOILING POINT (^{O}C)	N/A
ODOR & STRENGTH	None/Strong	pH	0-2 (Acidic)
FLASH POINT (^{O}C)	N/A	VISCOSITY	☐ Solid ☐ High ☐ Medium ☐ Low
BTUs	N/A	TOTAL CYNAIDES (ppm)	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

NONE	X	OXIDIZER	
WATER REACTIVE		IGNITABLE	
SHOCK REACTIVE		MEDICAL/INFECT. WST	
AIR REACTIVE		DIOXINS	
EXPLOSIVE		PESTICIDE/HERBICIDE	
PYROPHORIC		POLYMERIZABLE	
REACTIVE CYANIDES		RADIOACTIVE	
REACTIVE SULFIDES		EXEMPT RAD	
PHENOLS		ASBESTOS	
ORGANIC PEROXIDE		THERMALLY UNSTABLE	

3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%) - MUST BE EQUAL OR GREATER THAN 100%	CONCENTRATION (ppm or mg/L)
	HCL solution	25-50	
	Water	60-80	

KNOWLEDGE IS FROM		LAB ANALYSIS		MSDS		PROCESS/GENERATOR KNOWLEDGE
			x		x	

COMMENTS : The corrosivity hazard is related to the pH as identified in Section 1 of EPA's Waste Profile Sheet form. Corrosivity and Toxicity are not options that are available in Section 2 of EPA's Waste Profile Sheet form. EEPGL is unaware of a standard for toxicity characterization.

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE:	DATE: 06/26/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	WASTE PROFILE NO. 20140506-0016
1. GENERATORS NAME Esso Exploration Production Guyana Limited	
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana	

3. TECHNICAL CONTACT	4. TITLE	5. PHONE
Jimmy Street	Waste Management Lead	623-1104

B. WASTE INFORMATION

1. WASTE CLASSIFICATION	☑	HAZARDOUS	☐	NON-HAZARDOUS

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☐ N ☑

If "yes" then provide waste numbers

Is this a listed waste under Annex VIII of the Basel Convention? Y ☑ N ☐

If "yes" then provide all applicable waste numbers: Hazardous Waste A4130

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☑ N ☐

If "yes" then provide all applicable waste numbers: Guyana EPA AG.1 Hazardous Wastes Regulations : Hazardous Waste

2. COMMON NAME OF WASTE
Aerosol Cans

3. SITE ID/LOCATION OF WASTE GENERATION
Exploration & Development Drilling, FPSO and Shorebase

4. PROCESS GENERATING WASTE
Aerosol Cans not punctured for disposal (paints, lubricants, degreaser etc…)

5. PROJECTED ANNUAL VOLUME	6. WASTE RECEIVING FREQUENCY							
0.1-0.2 MT	☐	WEEKLY	☑	MONTHLY	☐	ONE-TIME SHIPMENT	☐	OTHER (SPECIFY)
7. WASTE VOLUME ☐	CUBIC METERS	☐	GALLONS	☐	TONNES		☑	OTHER (LBS)
8. WASTE CONTAINERS ☐	BARRELS (42 GAL.)	☑	DRUM (55 GAL.)	☐	CUTTINGS BOX		☐	OTHER (SPECIFY)

9. SPECIAL HANDLING REQUIREMENTS
Yes

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE (CHECK ONE)	☑	SOLID	☑	LIQUID	☐	SEMI-SOLID	☐	GAS	☐	OTHER (SPECIFY)

COLOR	N/A	BOILING POINT (°C)	N/A
ODOR & STRENGTH	N/A	pH	N/A
FLASH POINT (°C)	<60	VISCOSITY	☐ Solid ☐ High ☐ Medium ☐ Low
BTUs	N/A	TOTAL CYNAIDES (ppm)	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

NONE	☐	OXIDIZER	☐
WATER REACTIVE	☐	IGNITABLE	☑
SHOCK REACTIVE	☐	MEDICAL/INFECT. WST	☐
AIR REACTIVE	☐	DIOXINS	☐
EXPLOSIVE	☐	PESTICIDE/HERBICIDE	☐
PYROPHORIC	☐	POLYMERIZABLE	☐
REACTIVE CYANIDES	☐	RADIOACTIVE	☐
REACTIVE SULFIDES	☐	EXEMPT RAD	☐
PHENOLS	☐	ASBESTOS	☐
ORGANIC PEROXIDE	☐	THERMALLY UNSTABLE	☐

3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%) - MUST BE EQUAL OR GREATER THAN 100% WHEN TOTALED	CONCENTRATION (ppm or mg/L)
	Metal aerosol cans, solvents, degreaser, paint	80-100	
	Wood, paper, cardboard, plastic cap	0-5	

KNOWLEDGE IS FROM	☐	LAB ANALYSIS	☑	MSDS	☑	PROCESS/GENERATOR KNOWLEDGE

COMMENTS : The ignitibility characteristic in Section 2 of the Waste Profile Sheet form is the primary hazard. The SDS for WD40 is representative of several types of empty aerosol cans (not punctured).

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE:	DATE: 06/26/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	**WASTE PROFILE NO.** 20140506-0017
1. GENERATORS NAME Esso Exploration Production Guyana Limited	
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana	

3. TECHNICAL CONTACT	4. TITLE	5. PHONE
Jimmy Street	Waste Management Lead	623-1104

B. WASTE INFORMATION

1. WASTE CLASSIFICATION		HAZARDOUS		NON-HAZARDOUS
	x			

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☑ N ☐

If "yes" then provide waste numbers Y45

Is this a listed waste under Annex VIII of the Basel Convention? Y ☑ N ☐

If "yes" then provide all applicable waste numbers A4140

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☐ N ☑

If "yes" then provide all applicable waste numbers

2. COMMON NAME OF WASTE
Fire Fighting Foam (or AFFF - Aqueous Film Forming Foam)

3. SITE ID/LOCATION OF WASTE GENERATION
Drilling rigs, FPSO and Shorebase

4. PROCESS GENERATING WASTE
Outdated firefighting foam (time-expired)

5. PROJECTED ANNUAL VOLUME 0.1-0.5 MT	6. WASTE RECEIVING FREQUENCY		WEEKLY		MONTHLY		ONE-TIME SHIPMENT	x	OTHER (As needed)
7. WASTE VOLUME	x	CUBIC METERS		GALLONS		TONNES			OTHER (SPECIFY)
8. WASTE CONTAINERS		BARRELS (42 GAL.)	x	DRUM (55 GAL.)		CUTTINGS BOX			OTHER (SPECIFY)

9. SPECIAL HANDLING REQUIREMENTS
No

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE **(CHECK ONE)**		SOLID	x	LIQUID		SEMI-SOLID		GAS		OTHER (SPECIFY)

COLOR	Light yellow	BOILING POINT (^{O}C)	N/A
ODOR & STRENGTH	None	pH	8.5
FLASH POINT (^{O}C)	N/A	VISCOSITY	VISCOSITY ☐ Solid ☐ High ☒ Medium ☐ Low
BTUs	N/A	TOTAL CYNAIDES (ppm)	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

NONE	X	OXIDIZER	
WATER REACTIVE		IGNITABLE	
SHOCK REACTIVE		MEDICAL/INFECT. WST	
AIR REACTIVE		DIOXINS	
EXPLOSIVE		PESTICIDE/HERBICIDE	
PYROPHORIC		POLYMERIZABLE	
REACTIVE CYANIDES		RADIOACTIVE	
REACTIVE SULFIDES		EXEMPT RAD	
PHENOLS		ASBESTOS	
ORGANIC PEROXIDE		THERMALLY UNSTABLE	

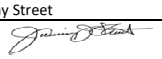
3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%) - MUST BE EQUAL OR GREATER THAN 100% WHEN TOTALED	CONCENTRATION (ppm or mg/L)
	Ansulite 1 % AFFF	10-40	
	Water	60-80	

KNOWLEDGE IS FROM		LAB ANALYSIS	x	MSDS	x	PROCESS/GENERATOR KNOWLEDGE

COMMENTS : Regulations regarding AFFF are changing based on new data. The current SDS doesn't reflect the hazardous and chemical properties listed in section 2.

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE: 	DATE: 06/26/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	WASTE PROFILE NO. 20140506-0018
1. GENERATORS NAME Esso Exploration Production Guyana Limited	
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana	
3. TECHNICAL CONTACT Jimmy Street	4. TITLE Waste Management Lead 5. PHONE 623-1104

B. WASTE INFORMATION

1. WASTE CLASSIFICATION		HAZARDOUS		NON-HAZARDOUS
	x			

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☑ N ☐

If "yes" then provide waste numbers Y26, Y31, Y34

Is this a listed waste under Annex VIII of the Basel Convention? Y ☑ N ☐

If "yes" then provide all applicable waste numbers A1160/A1170

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Guyana EPA AG.1 Hazardous Waste Regulations : Hazardous Waste

2. COMMON NAME OF WASTE
Batteries (All types of batteries)

3. SITE ID/LOCATION OF WASTE GENERATION
Development & Exploration Drilling, FPSO and Shorebase

4. PROCESS GENERATING WASTE
Batteries damaged or no longer for use.

5. PROJECTED ANNUAL VOLUME		6. WASTE RECEIVING FREQUENCY		WEEKLY		MONTHLY		ONE-TIME SHIPMENT		OTHER (SPECIFY)
15-25 MT				x						
7. WASTE VOLUME		CUBIC METERS		GALLONS		x	TONNES			OTHER (SPECIFY)
8. WASTE CONTAINERS		BARRELS (42 GAL.)		DRUM (55 GAL.)			CUTTINGS BOX	x		OTHER (PALLET)

9. SPECIAL HANDLING REQUIREMENTS
No

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE (CHECK ONE)		SOLID		LIQUID		SEMI-SOLID		GAS		OTHER (SPECIFY)
	X		X							

COLOR	N/A	BOILING POINT (^{O}C)	N/A
ODOR & STRENGTH	None/Mild	pH	< 2
FLASH POINT (^{O}C)	N/A	VISCOSITY	☐ Solid ☐ High ☐ Medium ☐ Low
BTUs	N/A	TOTAL CYNAIDES (ppm)	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

NONE	X	OXIDIZER	
WATER REACTIVE		IGNITABLE	
SHOCK REACTIVE		MEDICAL/INFECT. WST	
AIR REACTIVE		DIOXINS	
EXPLOSIVE		PESTICIDE/HERBICIDE	
PYROPHORIC		POLYMERIZABLE	
REACTIVE CYANIDES		RADIOACTIVE	
REACTIVE SULFIDES		EXEMPT RAD	
PHENOLS		ASBESTOS	
ORGANIC PEROXIDE		THERMALLY UNSTABLE	

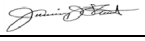
3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%) - MUST BE EQUAL OR GREATER THAN 100% WHEN TOTALED	CONCENTRATION (ppm or mg/L)
	Lead acid, Ni-Cad, Lithium and Non-Toxic Alkali	90-100	
	Wood pallets	0-10	
	Card board	0-5	

KNOWLEDGE IS FROM		LAB ANALYSIS		MSDS		PROCESS/GENERATOR KNOWLEDGE
			X		x	

COMMENTS : The Waste Profile Sheet has been edited to include the Basel Convention code (Y26). Acidic hazard for batteries is identified in Section 1 as pH < 2. The Basel Convention does not address the hazard of toxicity related to heavy metals. Batteries should be recycled. Battery recycler will address corrosivity and toxicity related to metals during the recycling process.

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE: 	DATE: 06/26/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	WASTE PROFILE NO. 20140506-0019
1. GENERATORS NAME Esso Exploration Production Guyana Limited	
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana	
3. TECHNICAL CONTACT Jimmy Street	4. TITLE Waste Management Lead 5. PHONE 623-1104

B. WASTE INFORMATION

1. WASTE CLASSIFICATION		HAZARDOUS		NON-HAZARDOUS
	x			

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☑ N ☐

If "yes" then provide waste numbers Y9

Is this a listed waste under Annex VIII of the Basel Convention? Y ☑ N ☐

If "yes" then provide all applicable waste numbers A4060

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Guyana EPA AG.1 Hazardous Waste Regulations Part VII, 36, (xviii) : Regulations do not apply

2. COMMON NAME OF WASTE
Brine (Oil/solids contaminated brine)

3. SITE ID/LOCATION OF WASTE GENERATION
Exploration & Development Drilling operations.

4. PROCESS GENERATING WASTE
Wells Completion and Workover. Flowback fluids with hydrocarbon or solids contamination.

5. PROJECTED ANNUAL 100-150 CUBIC METERS		6. WASTE RECEIVING FREQUENCY		WEEKLY		MONTHLY		ONE-TIME SHIPMENT	X	OTHER (As
7. WASTE VOLUME		CUBIC METERS		GALLONS		TONNES		BBLS		OTHER (SPECIFY)
8. WASTE CONTAINERS		BARRELS (42 GAL.)		DRUM (55 GAL.)		CUTTINGS BOX		TANKS		OTHER (SPECIFY)

9. SPECIAL HANDLING REQUIREMENTS
Yes

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE (CHECK ONE)		SOLID	X	LIQUID		SEMI-SOLID		OTHER (SPECIFY)
COLOR	Grey - Dark			BOILING POINT (°C)				
ODOR & STRENGTH	Mild			pH				
FLASH POINT (°C)	N/A			VISCOSITY		☐ Solid ☐ High ☐ Medium ☐ Low		
BTUs	N/A					N/A		
PCBs (ppm)	N/A				(ppm)	N/A		

INACTIVE

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHE

NONE	X	OXIDIZER	
WATER REACTIVE		IGNITABLE	
SHOCK REACTIVE		MEDICAL/INFECT. WST	
AIR REACTIVE		DIOXINS	
EXPLOSIVE		PESTICIDE/HERBICIDE	
PYROPHORIC		POLYMERIZABLE	
REACTIVE CYANIDES		RADIOACTIVE	
REACTIVE SULFIDES		EXEMPT RAD	
PHENOLS		ASBESTOS	
ORGANIC PEROXIDE		THERMALLY UNSTABLE	

3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%) - MUST BE EQUAL OR GREATER THAN 100% WHEN TOTALED	CONCENTRATION (ppm or mg/L)
	Brine	40-60	
	NADF (see below) :	40-60	
	Escaid 110	44	
	Water	14	
	Barite	32	
	Calcium Chloride	5	
	Lime		<1
	EMI 1926		<1
	RETHIK		<1
	VG PLUS	<2	
	ECOTROL RD		<1
	SUREMUL	<3	

KNOWLEDGE IS FROM		LAB ANALYSIS	X	MSDS	X	PROCESS/GENERATOR KNOWLEDGE

Comments : The Contaminated Brine Waste Profile Sheet (ID 019) has been combined with Completion Fluids (ID 021) Waste Profile Sheet. The SDS are located in Waste Profile Sheet (ID 021). This stream is generated through the transition of fluids of the wells. Large variation of percentage of waste streams is due to completion of wells with Brine, Crude Oil and NADF in container.

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE:	DATE: 06/26/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	**WASTE PROFILE NO.** 20140506-0020
1. GENERATORS NAME Esso Exploration Production Guyana Limited	
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana	

3. TECHNICAL CONTACT	4. TITLE	5. PHONE
Jimmy Street	Waste Management Lead	623-1104

B. WASTE INFORMATION

1. WASTE CLASSIFICATION		HAZARDOUS		NON-HAZARDOUS
	x			

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☑ N ☐

If "yes" then provide waste numbers Y9

Is this a listed waste under Annex VIII of the Basel Convention? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Hazardous Waste A4060

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Guyana EPA AG.1 Hazardous Waste Regulations Part VII, 36, (xviii) : Regulations do not apply

2. COMMON NAME OF WASTE
Chemical Contaminated Water

3. SITE ID/LOCATION OF WASTE GENERATION
Drilling rigs, FPSO and support vessels

4. PROCESS GENERATING WASTE
Chemical contaminated water that does not meet effluent discharge limits

5. PROJECTED ANNUAL VOLUME	6. WASTE RECEIVING FREQUENCY		WEEKLY		MONTHLY		ONE-TIME SHIPMENT		OTHER (As needed)
1-2 MT								X	

7. WASTE VOLUME		CUBIC METERS		GALLONS		TONNES		OTHER (SPECIFY)
			X					

8. WASTE CONTAINERS		BARRELS (42 GAL.)		DRUM (55 GAL.)		CUTTINGS BOX		OTHER (SPECIFY)
			X					

9. SPECIAL HANDLING REQUIREMENTS
No

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE (CHECK ONE)		SOLID		LIQUID		SEMI-SOLID		GAS		OTHER (SPECIFY)
			x							

COLOR	N/A	BOILING POINT (^{O}C)	N/A
ODOR & STRENGTH	Mild to Strong	pH	N/A
FLASH POINT (^{O}C)	N/A	VISCOSITY	☐ Solid ☐ High ☐ Medium ☐ Low
BTUs	N/A	TOTAL CYNAIDES (ppm)	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

NONE	X	OXIDIZER	
WATER REACTIVE		IGNITABLE	
SHOCK REACTIVE		MEDICAL/INFECT. WST	
AIR REACTIVE		DIOXINS	
EXPLOSIVE		PESTICIDE/HERBICIDE	
PYROPHORIC		POLYMERIZABLE	
REACTIVE CYANIDES		RADIOACTIVE	
REACTIVE SULFIDES		EXEMPT RAD	
PHENOLS		ASBESTOS	
ORGANIC PEROXIDE		THERMALLY UNSTABLE	

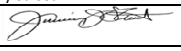
3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%) - MUST BE EQUAL OR GREATER THAN 100% WHEN TOTALED	CONCENTRATION (ppm or mg/L)
	Water	50-80	
	Various chemicals (see MSDS)	10-20	

KNOWLEDGE IS FROM		LAB ANALYSIS		MSDS		PROCESS/GENERATOR KNOWLEDGE
			X		X	

COMMENTS : Specific characteristics are not available as mixture will be primarily water. MSDS attached are examples of potential waste streams.

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE: 	DATE: 18/03/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	WASTE PROFILE NO. 20140506-0021
1. GENERATORS NAME Esso Exploration Production Guyana Limited	
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana	

3. TECHNICAL CONTACT	4. TITLE	5. PHONE
Jimmy Street	Waste Management Lead	623-1104

B. WASTE INFORMATION

1. WASTE CLASSIFICATION		HAZARDOUS		NON-HAZARDOUS
	x			

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☑ N ☐

If "yes" then provide waste numbers Y9

Is this a listed waste under Annex VIII of the Basel Convention? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Hazardous Waste A4060

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Guyana EPA AG.1 Hazardous Waste Regulations Part VII, 36, (xviii) : Regulations do not apply.

2. COMMON NAME OF WASTE
Completion Fluids / Contaminated Brine

3. SITE ID/LOCATION OF WASTE GENERATION
Drilling operations, Installation and Hook-Up supporting FPSO.

4. PROCESS GENERATING WASTE
Wells Completion and Workover. Flowback fluids with hydrocarbon or solids contamination.

5. PROJECTED ANNUAL VOLUME 200-250 CUBIC METERS		6. WASTE RECEIVING FREQUENCY		WEEKLY		MONTHLY	x	ONE-TIME SHIPMENT	x	OTHER (As generated)
7. WASTE VOLUME		CUBIC METERS		GALLONS		TONNES		BBLS		OTHER (SPECIFY)
8. WASTE CONTAINERS		BARRELS (42 GAL.)		DRUM (55 GAL.)		CUTTINGS BOX		TANKS		OTHER (SPECIFY)

9. SPECIAL HANDLING REQUIREMENTS
Yes

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE (CHECK ONE)		SOLID	x	LIQUID		SEMI-SOLID		GAS		OTHER (SPECIFY)

COLOR	Tan - Dark	BOILING POINT (^{O}C)	N/A
ODOR & STRENGTH	Mild	pH	8
FLASH POINT (^{O}C)	99	VISCOSITY	☐ Solid ☐ High ☐ Medium ☒ Low
BTUs	N/A	TOTAL CYNAIDES (ppm)	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

NONE	X	OXIDIZER	
WATER REACTIVE		IGNITABLE	
SHOCK REACTIVE		MEDICAL/INFECT. WST	
AIR REACTIVE		DIOXINS	
EXPLOSIVE		PESTICIDE/HERBICIDE	
PYROPHORIC		POLYMERIZABLE	
REACTIVE CYANIDES		RADIOACTIVE	
REACTIVE SULFIDES		EXEMPT RAD	
PHENOLS		ASBESTOS	
ORGANIC PEROXIDE		THERMALLY UNSTABLE	

3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%) - MUST BE EQUAL OR GREATER THAN 100% WHEN TOTALED	CONCENTRATION (ppm or mg/L)
	Brine	10-95	
	Crude oil	10-50	
	Non Aqeous Drilling Fluids (compositon of NADF see below) :	10-95	
	Escaid 110	44	
	Water	14	
	Barite	32	
	Calcium Chloride	5	
	Lime		<1
	EMI 1926		<1
	RETHIK		<1
	VG PLUS	<2	
	ECOTROL RD		<1
	SUREMUL	<3	

KNOWLEDGE IS FROM		LAB ANALYSIS		MSDS		PROCESS/GENERATOR KNOWLEDGE
	x		x		x	

COMMENTS : The Contaminated Brine Waste Profile Sheet (ID 019) has been combined with the Completion Fluids (ID 021) Waste Profile Sheet. The ID Number for the combined waste streams is 021. This stream is generated through the transition of fluids of the wells. Large variation of percentage of waste streams is due to completion of wells with Brine, Crude Oil and NADF in container.

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE:	DATE: 06/26/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	WASTE PROFILE NO. 20140506-0023
1. GENERATORS NAME Esso Exploration Production Guyana Limited	
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana	
3. TECHNICAL CONTACT Jimmy Street	4. TITLE Waste Management Lead 5. PHONE 623-1104

B. WASTE INFORMATION

1. WASTE CLASSIFICATION		HAZARDOUS		NON-HAZARDOUS
	x			

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☑ N ☐

If "yes" then provide waste numbers Y29

Is this a listed waste under Annex VIII of the Basel Convention? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Hazardous Waste A1030, A1180

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Guyana EPA AG.1 Hazardous Waste Regulations : Hazardous Waste

2. COMMON NAME OF WASTE
Fluorescent Bulbs

3. SITE ID/LOCATION OF WASTE GENERATION
Drill rigs, FPSO, Shore base

4. PROCESS GENERATING WASTE
Lamps include fluorescent tubes and bulbs, incandescent lamps that exhibit a characteristic of a hazardous waste.

5. PROJECTED ANNUAL VOLUME 0-0.5 MT		6. WASTE RECEIVING FREQUENCY		WEEKLY		MONTHLY		ONE-TIME SHIPMENT		OTHER (SPECIFY)
					x					
7. WASTE VOLUME		CUBIC METERS		GALLONS			x	TONNES		OTHER (SPECIFY)
8. WASTE CONTAINERS		BARRELS (42 GAL.)		DRUM (55 GAL.)				CUTTINGS BOX		OTHER (Pallet Box)
									X	

9. SPECIAL HANDLING REQUIREMENTS
No

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE (CHECK ONE)		SOLID		LIQUID		SEMI-SOLID		GAS		OTHER (SPECIFY)
	x									

COLOR	N/A	BOILING POINT (^{O}C)	N/A
ODOR & STRENGTH	N/A	pH	N/A
FLASH POINT (^{O}C)	N/A	VISCOSITY	☐ Solid ☐ High ☐ Medium ☐ Low
BTUs	N/A	TOTAL CYNAIDES (ppm)	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

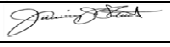
NONE	X	OXIDIZER	
WATER REACTIVE		IGNITABLE	
SHOCK REACTIVE		MEDICAL/INFECT. WST	
AIR REACTIVE		DIOXINS	
EXPLOSIVE		PESTICIDE/HERBICIDE	
PYROPHORIC		POLYMERIZABLE	
REACTIVE CYANIDES		RADIOACTIVE	
REACTIVE SULFIDES		EXEMPT RAD	
PHENOLS		ASBESTOS	
ORGANIC PEROXIDE		THERMALLY UNSTABLE	

3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%) - MUST BE EQUAL OR GREATER THAN 100% WHEN TOTALED	CONCENTRATION (ppm or mg/L)
	Fluorescent Bulbs (Glass, Phosphor powder etc...)	80-100	
	Cardboard	0-10	

KNOWLEDGE IS FROM		LAB ANALYSIS		MSDS		PROCESS/GENERATOR KNOWLEDGE
			X		X	

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE: 	DATE: 03/18/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	WASTE PROFILE NO. 20140506-0024
1. GENERATORS NAME Esso Exploration Production Guyana Limited	
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana	
3. TECHNICAL CONTACT Jimmy Street	4. TITLE Waste Management Lead 5. PHONE 623-1104

B. WASTE INFORMATION

1. WASTE CLASSIFICATION		HAZARDOUS		NON-HAZARDOUS
	x			

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☑ N ☐

If "yes" then provide waste numbers Y9

Is this a listed waste under Annex VIII of the Basel Convention? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Hazardous Waste A4060

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Guyana EPA AG.1 Hazardous Wastes Regulations Part VII, 36, (xiii) : Regulations do not apply

2. COMMON NAME OF WASTE
Fuel (contaminated)

3. SITE ID/LOCATION OF WASTE GENERATION
Drilling rigs, FPSO and Shore base

4. PROCESS GENERATING WASTE
Contaminated diesel from heavy equipment and heli fuel from helicopter operations with water

5. PROJECTED ANNUAL VOLUME 8-10 MT		6. WASTE RECEIVING FREQUENCY		WEEKLY	x	MONTHLY		ONE-TIME SHIPMENT		OTHER (SPECIFY)
7. WASTE VOLUME		CUBIC METERS	x	GALLONS		TONNES				OTHER (SPECIFY)
8. WASTE CONTAINERS		BARRELS (42 GAL.)		DRUM (55 GAL.)		CUTTINGS BOX			X	OTHER (TOTES)

9. SPECIAL HANDLING REQUIREMENTS
No

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE (CHECK ONE)		SOLID	x	LIQUID		SEMI-SOLID		GAS		OTHER (SPECIFY)

COLOR	Brown / Dark	BOLING POINT (^{O}C)	N/A
ODOR & STRENGTH	Petroleum odor	pH	N/A
FLASH POINT (^{O}C)	38	VISCOSITY	☐ Solid ☐ High ☐ Medium ☐ Low
BTUs	N/A	TOTAL CYNAIDES (ppm)	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

NONE		OXIDIZER	
WATER REACTIVE		IGNITABLE	X
SHOCK REACTIVE		MEDICAL/INFECT. WST	
AIR REACTIVE		DIOXINS	
EXPLOSIVE		PESTICIDE/HERBICIDE	
PYROPHORIC		POLYMERIZABLE	
REACTIVE CYANIDES		RADIOACTIVE	
REACTIVE SULFIDES		EXEMPT RAD	
PHENOLS		ASBESTOS	
ORGANIC PEROXIDE		THERMALLY UNSTABLE	

3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%) - MUST BE EQUAL OR GREATER THAN 100% WHEN TOTALED	CONCENTRATION (ppm or mg/L)
	Contaminated helifuel / diesel	75-95	
	Water	5-25	

KNOWLEDGE IS FROM		LAB ANALYSIS	X	MSDS	X	PROCESS/GENERATOR KNOWLEDGE

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE:	DATE: 03/18/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	WASTE PROFILE NO. 20140506-0025
1. GENERATORS NAME Esso Exploration Production Guyana Limited	
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana	
3. TECHNICAL CONTACT Jimmy Street	4. TITLE Waste Management Lead 5. PHONE 623-1104

B. WASTE INFORMATION

1. WASTE CLASSIFICATION		HAZARDOUS		NON-HAZARDOUS
	x			

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☑ N ☐

If "yes" then provide waste numbers Y9

Is this a listed waste under Annex VIII of the Basel Convention? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Hazardous Waste A4060

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Guyana EPA AG.1 Hazardous Wastes Regulations Part VII, 36, (xiii) : Regulations do not apply

2. COMMON NAME OF WASTE
Lube Oil

3. SITE ID/LOCATION OF WASTE GENERATION
Drilling rigs, FPSO and Shore base

4. PROCESS GENERATING WASTE
Used motor/engine oil from maintenance activities associated with Drilling rigs, FPSO and Shore base activities.

5. PROJECTED ANNUAL VOLUME 20-50 MT		6. WASTE RECEIVING FREQUENCY		WEEKLY		MONTHLY		ONE-TIME SHIPMENT		OTHER (SPECIFY)
					x					
7. WASTE VOLUME		CUBIC METERS		GALLONS		TONNES				OTHER (SPECIFY)
					x					
8. WASTE CONTAINERS		BARRELS (42 GAL.)		DRUM (55 GAL.)		CUTTINGS BOX				OTHER (SPECIFY)
			x							

9. SPECIAL HANDLING REQUIREMENTS
No

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE (CHECK ONE)		SOLID		LIQUID		SEMI-SOLID		GAS		OTHER (SPECIFY)
			x							

COLOR	Brown	BOILING POINT (^{O}C)	N/A
ODOR & STRENGTH	N/A	pH	N/A
FLASH POINT (^{O}C)	N/A	VISCOSITY	☐ Solid ☐ High ☐ Medium ☐ Low
BTUs	N/A	TOTAL CYNAIDES (ppm)	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

NONE	X	OXIDIZER	
WATER REACTIVE		IGNITABLE	
SHOCK REACTIVE		MEDICAL/INFECT. WST	
AIR REACTIVE		DIOXINS	
EXPLOSIVE		PESTICIDE/HERBICIDE	
PYROPHORIC		POLYMERIZABLE	
REACTIVE CYANIDES		RADIOACTIVE	
REACTIVE SULFIDES		EXEMPT RAD	
PHENOLS		ASBESTOS	
ORGANIC PEROXIDE		THERMALLY UNSTABLE	

3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%) - MUST BE EQUAL OR GREATER THAN 100% WHEN TOTALED	CONCENTRATION (ppm or mg/L)
	Used lubricating engine oil with impurities include dirt, dust and soot.	90-100	
	Water	0-10	

KNOWLEDGE IS FROM		LAB ANALYSIS		MSDS		PROCESS/GENERATOR KNOWLEDGE
			X		X	

COMMENTS : The Waste Profile Sheet has been edited to include Annex I code Y9. Section 3 has been adjusted to reflect lube oil constituents: "Used lubricating engine oil with impurities include dirt, dust and soot." EEPGL will conduct a sample analysis of Lube Oil for RCRA 8 Metals. The analysis will be added to the Waste Profile Sheet.

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE:	DATE: 06/26/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	**WASTE PROFILE NO.** 20140506-0027
1. GENERATORS NAME Esso Exploration Production Guyana Limited	
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana	

3. TECHNICAL CONTACT	4. TITLE	5. PHONE
Jimmy Street	Waste Management Lead	623-1104

B. WASTE INFORMATION

1. WASTE CLASSIFICATION		HAZARDOUS		NON-HAZARDOUS
	x			

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☑ N ☐

If "yes" then provide waste numbers Y9

Is this a listed waste under Annex VIII of the Basel Convention? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Hazardous Waste A4060

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Guyana EPA AG.1 Hazardous Wastes Regulations Part VII, 36, (xvii) (xviii) : Regulations do not apply.

2. COMMON NAME OF WASTE
Oily Water

3. SITE ID/LOCATION OF WASTE GENERATION
Drilling operations, installation activities and FPSO

4. PROCESS GENERATING WASTE
Oil & Water separator, deck wash, sump water and effluents in excess of discharge limits

5. PROJECTED ANNUAL VOLUME		6. WASTE RECEIVING FREQUENCY		WEEKLY		MONTHLY		ONE-TIME SHIPMENT		OTHER (SPECIFY)
500-1000 MT					x		x			
7. WASTE VOLUME		CUBIC METERS		GALLONS			x	TONNES	BBLS	OTHER (SPECIFY)
8. WASTE CONTAINERS		BARRELS (42 GAL.)		DRUM (55 GAL.)				CUTTINGS BOX	Tanks	OTHER (SPECIFY)

9. SPECIAL HANDLING REQUIREMENTS
No

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE (CHECK ONE)		SOLID	x	LIQUID		SEMI-SOLID		GAS		OTHER (SPECIFY)

COLOR	Brown	BOILING POINT (^{O}C)	N/A
ODOR & STRENGTH	Mild	pH	8-9
FLASH POINT (^{O}C)	87-96	VISCOSITY	☐ Solid ☐ High ☐ Medium ☐ Low
BTUs	N/A	TOTAL CYNAIDES (ppm)	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

NONE	X	OXIDIZER	
WATER REACTIVE		IGNITABLE	
SHOCK REACTIVE		MEDICAL/INFECT. WST	
AIR REACTIVE		DIOXINS	
EXPLOSIVE		PESTICIDE/HERBICIDE	
PYROPHORIC		POLYMERIZABLE	
REACTIVE CYANIDES		RADIOACTIVE	
REACTIVE SULFIDES		EXEMPT RAD	
PHENOLS		ASBESTOS	
ORGANIC PEROXIDE		THERMALLY UNSTABLE	

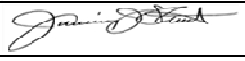
3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%) - MUST BE EQUAL OR GREATER THAN 100% WHEN TOTALED	CONCENTRATION (ppm or mg/L)
	Water	10-90	
	Hydrocarbons	3-90	
	Sediment	0-5	

KNOWLEDGE IS FROM		LAB ANALYSIS		MSDS		PROCESS/GENERATOR KNOWLEDGE
	x		x		x	

COMMENTS : The Waste Profile Sheet has been edited to include the flashpoint and the pH from analytical data. The ignitibility characteristic is not representative for a mixture of oil and water based on two analyses conducted on representative oily water samples. These analytical results have been attached to the Waste Profile Sheet.

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE: 	DATE: 06/26/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	**WASTE PROFILE NO.** **20140506-0028**
1. GENERATORS NAME Esso Exploration Production Guyana Limited	
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana	

3. TECHNICAL CONTACT	4. TITLE	5. PHONE
Jimmy Street	Waste Management Lead	623-1104

B. WASTE INFORMATION

1. WASTE CLASSIFICATION		HAZARDOUS		NON-HAZARDOUS
	x			

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☑ N ☐

If "yes" then provide waste numbers Y12

Is this a listed waste under Annex VIII of the Basel Convention? Y ☐ N ☑

If "yes" then provide all applicable waste numbers

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Guyana EPA AG.1 Hazardous Wastes Regulations : Hazardous Waste

2. COMMON NAME OF WASTE
Paint/Paint Consumables

3. SITE ID/LOCATION OF WASTE GENERATION
Drilling rigs, FPSO and Shorebase

4. PROCESS GENERATING WASTE
Maintenance painting and cleaning activities associated with operations or equipments

5. PROJECTED ANNUAL VOLUME		6. WASTE RECEIVING FREQUENCY		WEEKLY		MONTHLY		ONE-TIME SHIPMENT		OTHER (SPECIFY)
10-15 MT					x					
7. WASTE VOLUME		CUBIC METERS		GALLONS		TONNES				OTHER (SPECIFY)
					x					
8. WASTE CONTAINERS		BARRELS (42 GAL.)		DRUM (55 GAL.)		CUTTINGS BOX				OTHER (SPECIFY)
			x							

9. SPECIAL HANDLING REQUIREMENTS
No

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE **(CHECK ONE)**		SOLID		LIQUID		SEMI-SOLID		GAS		OTHER (SPECIFY)
	x									

COLOR	N/A	BOILING POINT (^{O}C)	N/A
ODOR & STRENGTH	Mild	pH	N/A
FLASH POINT (^{O}C)	27	VISCOSITY	☐ Solid ☐ High ☐ Medium ☐ Low
BTUs	N/A	TOTAL CYNAIDES (ppm)	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

NONE		OXIDIZER	
WATER REACTIVE		IGNITABLE	X
SHOCK REACTIVE		MEDICAL/INFECT. WST	
AIR REACTIVE		DIOXINS	
EXPLOSIVE		PESTICIDE/HERBICIDE	
PYROPHORIC		POLYMERIZABLE	
REACTIVE CYANIDES		RADIOACTIVE	
REACTIVE SULFIDES		EXEMPT RAD	
PHENOLS		ASBESTOS	
ORGANIC PEROXIDE		THERMALLY UNSTABLE	

3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%) - MUST BE EQUAL OR GREATER THAN 100% WHEN TOTALED	CONCENTRATION (ppm or mg/L)
	Paint/Paint Consumables (brushes, rollers, paint chips, etc..)	70-90	
	Solvents consumables (rags, rollers, etc…)	60-90	

KNOWLEDGE IS FROM		LAB ANALYSIS		MSDS		PROCESS/GENERATOR KNOWLEDGE
			x		x	

COMMENTS : The primary hazard associated with paints in a liquid form is ignitability. Ignitability is now checked in Section 2 of the Waste Profile Sheet.

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE:	DATE: 06/26/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	WASTE PROFILE NO. 20140506-0029
1. GENERATORS NAME Esso Exploration Production Guyana Limited	
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana	
3. TECHNICAL CONTACT Jimmy Street	4. TITLE Waste Management Lead 5. PHONE 623-1104

B. WASTE INFORMATION

1. WASTE CLASSIFICATION		HAZARDOUS		NON-HAZARDOUS
	x			

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☐ N ☑

If "yes" then provide waste numbers

Is this a listed waste under Annex VIII of the Basel Convention? Y ☑ N ☐

If "yes" then provide all applicable waste numbers A4130

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Guyana EPA AG.1 Hazardous Wastes Regulations Part VII, 36, (viii) : Regulations do not apply

2. COMMON NAME OF WASTE
Plastic Buckets, Kegs

3. SITE ID/LOCATION OF WASTE GENERATION
Drilling rigs, FPSO and Shorebase

4. PROCESS GENERATING WASTE
Empty buckets or kegs who primary purpose was to hold neat or raw material (lube oils, chemicals, etc.). A container is considered empty if all material has been removed as possible using practices commonly employed to remove material (e.g., pouring, pumping, aspirating).

5. PROJECTED ANNUAL VOLUME 2-4 MT		6. WASTE RECEIVING FREQUENCY		WEEKLY		MONTHLY		ONE-TIME SHIPMENT		OTHER (SPECIFY)
				x						
7. WASTE VOLUME		CUBIC METERS		GALLONS		x	TONNES			OTHER (SPECIFY)
8. WASTE CONTAINERS		BARRELS (42 GAL.)		DRUM (55 GAL.)			CUTTINGS BOX	Pallet		OTHER (SPECIFY)
9. SPECIAL HANDLING REQUIREMENTS No										

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE (CHECK ONE)		SOLID		LIQUID		SEMI-SOLID		GAS		OTHER (SPECIFY)
	x									

COLOR	N/A	BOILING POINT (°C)	N/A
ODOR & STRENGTH	N/A	pH	N/A
FLASH POINT (°C)	N/A	VISCOSITY	☐ Solid ☐ High ☐ Medium ☐ Low
BTUs	N/A	TOTAL CYNAIDES (ppm)	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

NONE	X	OXIDIZER	
WATER REACTIVE		IGNITABLE	
SHOCK REACTIVE		MEDICAL/INFECT. WST	
AIR REACTIVE		DIOXINS	
EXPLOSIVE		PESTICIDE/HERBICIDE	
PYROPHORIC		POLYMERIZABLE	
REACTIVE CYANIDES		RADIOACTIVE	
REACTIVE SULFIDES		EXEMPT RAD	
PHENOLS		ASBESTOS	
ORGANIC PEROXIDE		THERMALLY UNSTABLE	

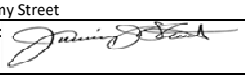
3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%)	CONCENTRATION (%)
	Empty plastic buckets and kegs	95-100	
	Wood, paper	0-5	

KNOWLEDGE IS FROM		LAB ANALYSIS		MSDS		PROCESS/GENERATOR KNOWLEDGE
				x		

COMMENTS : (Section 2.) The characterization of this waste stream (Empty Plastic Buckets / Kegs) as hazardous waste is based on the Basel convention that doesn't identify the hazardous properties.

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE: 	DATE: 03/18/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	**WASTE PROFILE NO.** 20140506-0030
1. GENERATORS NAME Esso Exploration Production Guyana Limited	
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana	

3. TECHNICAL CONTACT	4. TITLE	5. PHONE
Jimmy Street	Waste Management Lead	623-1104

B. WASTE INFORMATION

1. WASTE CLASSIFICATION		HAZARDOUS		NON-HAZARDOUS
	x			

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☐ N ☑

If "yes" then provide waste numbers

Is this a listed waste under Annex VIII of the Basel Convention? Y ☑ N ☐

If "yes" then provide all applicable waste numbers A4130

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Guyana EPA AG.1 Hazardous Wastes Regulations Part VII, 36, (viii) : Regulations do not apply

2. COMMON NAME OF WASTE
Plastic drums / Empty

3. SITE ID/LOCATION OF WASTE GENERATION
Drilling rigs, FPSO and Shorebase

4. PROCESS GENERATING WASTE
Empty plastic drums no longer for use.

5. PROJECTED ANNUAL VOLUME		6. WASTE RECEIVING FREQUENCY		WEEKLY		MONTHLY		ONE-TIME SHIPMENT		OTHER (SPECIFY)
2-3 MT					x					
7. WASTE VOLUME		CUBIC METERS		GALLONS			TONNES			OTHER (SPECIFY)
					x					
8. WASTE CONTAINERS		BARRELS (42 GAL.)		DRUM (55 GAL.)		CUTTINGS BOX		Pallet Box		OTHER (SPECIFY)

9. SPECIAL HANDLING REQUIREMENTS
No

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE (CHECK ONE)		SOLID		LIQUID		SEMI-SOLID		GAS		OTHER (SPECIFY)
	x									

COLOR	N/A	BOILING POINT (^{O}C)	N/A
ODOR & STRENGTH	N/A	pH	N/A
FLASH POINT (^{O}C)	N/A	VISCOSITY	☐ Solid ☐ High ☐ Medium ☐ Low
BTUs	N/A	TOTAL CYNAIDES (ppm)	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

NONE	X	OXIDIZER	
WATER REACTIVE		IGNITABLE	
SHOCK REACTIVE		MEDICAL/INFECT. WST	
AIR REACTIVE		DIOXINS	
EXPLOSIVE		PESTICIDE/HERBICIDE	
PYROPHORIC		POLYMERIZABLE	
REACTIVE CYANIDES		RADIOACTIVE	
REACTIVE SULFIDES		EXEMPT RAD	
PHENOLS		ASBESTOS	
ORGANIC PEROXIDE		THERMALLY UNSTABLE	

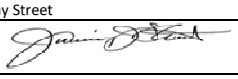
3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%) - MUST BE EQUAL OR GREATER THAN 100% WHEN TOTALED	CONCENTRATION (ppm or mg/L)
	Empty Drums or containers (plastic)	95-100	
	Wood, paper	0-5	

KNOWLEDGE IS FROM		LAB ANALYSIS		MSDS		PROCESS/GENERATOR KNOWLEDGE
					X	

COMMENTS : **(Section 2.)** The characterization of this waste stream (Empty Plastic Drums) as hazardous waste is based on the Basel convention that doesn't identify the hazardous properties.

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE: 	DATE: 03/18/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	WASTE PROFILE NO. 20140506-0031
1. GENERATORS NAME Esso Exploration Production Guyana Limited	
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana	

3. TECHNICAL CONTACT	4. TITLE	5. PHONE
Jimmy Street	Waste Management Lead	623-1104

B. WASTE INFORMATION

1. WASTE CLASSIFICATION		HAZARDOUS		NON-HAZARDOUS
	x			

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☑ N ☐

If "yes" then provide waste numbers Y9

Is this a listed waste under Annex VIII of the Basel Convention? Y ☑ N ☐

If "yes" then provide all applicable waste numbers A4060

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Guyana EPA AG.1 Hazardous Wastes Regulations Part VII, 36, (viii) : Regulations do not apply

2. COMMON NAME OF WASTE
Produced Solids

3. SITE ID/LOCATION OF WASTE GENERATION
FPSO

4. PROCESS GENERATING WASTE
Hydrocarbon contaminated solids/sand from production processes

5. PROJECTED ANNUAL VOLUME	6. WASTE RECEIVING FREQUENCY		WEEKLY		MONTHLY		ONE-TIME SHIPMENT	x	OTHER (As
5-10 MT									
7. WASTE VOLUME		CUBIC METERS		GALLONS	x	TONNES			OTHER (SPECIFY)
8. WASTE CONTAINERS		BARRELS (42 GAL.)		DRUM (55 GAL.)	x	CUTTINGS BOX			OTHER (SPECIFY)

9. SPECIAL HANDLING REQUIREMENTS
Yes

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE (CHECK ONE)		SOLID		LIQUID		SEMI-SOLID		GAS		OTHER (SPECIFY)
	x									

COLOR	Dark	BOILING POINT (°C)	N/A
ODOR & STRENGTH	Medium	pH	N/A
FLASH POINT (°C)	N/A	VISCOSITY	☐ Solid ☐ High ☐ Medium ☐ Low
BTUs	N/A	TOTAL CYNAIDES (ppm)	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

NONE	X	OXIDIZER	
WATER REACTIVE		IGNITABLE	
SHOCK REACTIVE		MEDICAL/INFECT. WST	
AIR REACTIVE		DIOXINS	
EXPLOSIVE		PESTICIDE/HERBICIDE	
PYROPHORIC		POLYMERIZABLE	
REACTIVE CYANIDES		RADIOACTIVE	
REACTIVE SULFIDES		EXEMPT RAD	
PHENOLS		ASBESTOS	
ORGANIC PEROXIDE		THERMALLY UNSTABLE	

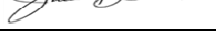
3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%) - MUST BE EQUAL OR GREATER THAN 100% WHEN TOTALED	CONCENTRATION (ppm or mg/L)
	Filtered and decanted sand with hydrocarbons	80-90	
	Sediment	5-15	
	Crude oil	1-10	

KNOWLEDGE IS FROM		LAB ANALYSIS		MSDS		PROCESS/GENERATOR KNOWLEDGE
	X		X		X	

COMMENTS : Analytical received, the analysis has been added to the Waste Profile Sheet in Appendix J (Produced Sand).

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE: 	DATE: 06/26/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	WASTE PROFILE NO. 20140506-0034
1. GENERATORS NAME Esso Exploration Production Guyana Limited	
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana	

3. TECHNICAL CONTACT	4. TITLE	5. PHONE
Jimmy Street	Waste Management Lead	623-1104

B. WASTE INFORMATION

1. WASTE CLASSIFICATION		HAZARDOUS		NON-HAZARDOUS
	x			

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☐ N ☑

If "yes" then provide waste numbers

Is this a listed waste under Annex VIII of the Basel Convention? Y ☑ N ☐

If "yes" then provide all applicable waste numbers A4130

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Guyana EPA AG.1 Hazardous Wastes Regulations Part VII, 36, (viii) : Regulations do not apply

2. COMMON NAME OF WASTE
Rubber hoses

3. SITE ID/LOCATION OF WASTE GENERATION
Drill rigs, FPSO and Shorebase

4. PROCESS GENERATING WASTE
Rubber hoses used in material transfer for well drilling and FPSO production operations

5. PROJECTED ANNUAL VOLUME		6. WASTE RECEIVING FREQUENCY		WEEKLY		MONTHLY		ONE-TIME SHIPMENT		OTHER (SPECIFY)
25-35 MT					x					
7. WASTE VOLUME		CUBIC METERS		GALLONS			x	TONNES		OTHER (SPECIFY)
8. WASTE CONTAINERS		BARRELS (42 GAL.)		DRUM (55 GAL.)		CUTTINGS BOX			x	OTHER (BASKETS)

9. SPECIAL HANDLING REQUIREMENTS
No

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE (CHECK ONE)		SOLID		LIQUID		SEMI-SOLID		GAS		OTHER (SPECIFY)
	x									

COLOR	N/A	BOLING POINT (^{O}C)	N/A
ODOR & STRENGTH	N/A	pH	N/A
FLASH POINT (^{O}C)	N/A	VISCOSITY	☐ Solid ☐ High ☐ Medium ☐ Low
BTUs	N/A	TOTAL CYNAIDES (ppm)	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

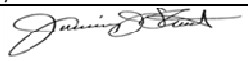
NONE	X	OXIDIZER	
WATER REACTIVE		IGNITABLE	
SHOCK REACTIVE		MEDICAL/INFECT. WST	
AIR REACTIVE		DIOXINS	
EXPLOSIVE		PESTICIDE/HERBICIDE	
PYROPHORIC		POLYMERIZABLE	
REACTIVE CYANIDES		RADIOACTIVE	
REACTIVE SULFIDES		EXEMPT RAD	
PHENOLS		ASBESTOS	
ORGANIC PEROXIDE		THERMALLY UNSTABLE	

CONCENTRATION (ppm or mg/L)

CAS #	CONSTITUENTS	RANGE (%) - MUST BE EQUAL OR GREATER THAN 100% WHEN TOTALED	CONCENTRATION (ppm or mg/L)
	Rubber	70-90	
	Metal (fittings or clamps)	10-30	

KNOWLEDGE IS FROM		LAB ANALYSIS		MSDS		PROCESS/GENERATOR KNOWLEDGE
					x	

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE: 	DATE: 03/18/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	WASTE PROFILE NO. 20140506-0036
1. GENERATORS NAME Esso Exploration Production Guyana Limited	
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana	
3. TECHNICAL CONTACT Jimmy Street	4. TITLE Waste Management Lead 5. PHONE 623-1104

B. WASTE INFORMATION

1. WASTE CLASSIFICATION		HAZARDOUS		NON-HAZARDOUS
	x			

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☑ N ☐

If "yes" then provide waste numbers Y9

Is this a listed waste under Annex VIII of the Basel Convention? Y ☑ N ☐

If "yes" then provide all applicable waste numbers A4060

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☐ N ☑

If "yes" then provide all applicable waste numbers

2. COMMON NAME OF WASTE
Hydraulic Oil / Glycol

3. SITE ID/LOCATION OF WASTE GENERATION
Drilling rigs, FPSO and Shore base

4. PROCESS GENERATING WASTE
Used hydraulic/transmission oil from maintenance activities associated with Drilling rigs, FPSO and Shore base

5. PROJECTED ANNUAL VOLUME 2-4 MT	6. WASTE RECEIVING FREQUENCY		WEEKLY		MONTHLY		ONE-TIME SHIPMENT		OTHER (SPECIFY)
				x					
7. WASTE VOLUME		CUBIC METERS		GALLONS		x	TONNES		OTHER (SPECIFY)
8. WASTE CONTAINERS		BARRELS (42 GAL.)	x	DRUM (55 GAL.)			CUTTINGS BOX		OTHER (SPECIFY)

9. SPECIAL HANDLING REQUIREMENTS
No

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE (CHECK ONE)		SOLID	x	LIQUID		SEMI-SOLID		GAS		OTHER (SPECIFY)
COLOR	Amber - Brown - Dark Brown -			BOILING POINT (^{O}C)		N/A				
ODOR & STRENGTH	Mild			pH		N/A				
FLASH POINT (^{O}C)	≥ 200 Celsius			VISCOSITY		☐ Solid ☐ High ☐ Medium ☐ Low				
BTUs	N/A			TOTAL CYNAIDES (ppm)		N/A				
PCBs (ppm)	N/A			TOTAL SULFIDES (ppm)		N/A				

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

NONE	X	OXIDIZER	
WATER REACTIVE		IGNITABLE	
SHOCK REACTIVE		MEDICAL/INFECT. WST	
AIR REACTIVE		DIOXINS	
EXPLOSIVE		PESTICIDE/HERBICIDE	
PYROPHORIC		POLYMERIZABLE	
REACTIVE CYANIDES		RADIOACTIVE	
REACTIVE SULFIDES		EXEMPT RAD	
PHENOLS		ASBESTOS	
ORGANIC PEROXIDE		THERMALLY UNSTABLE	

3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%) - MUST BE EQUAL OR GREATER THAN 100% WHEN TOTALED	CONCENTRATION (ppm or mg/L)
	Used or spent glycol/hydraulic oil	90-100	
	Water	0-10	

KNOWLEDGE IS FROM		LAB ANALYSIS		MSDS		PROCESS/GENERATOR KNOWLEDGE
			x		x	

COMMENTS: Used oils are typically recycled or used in alternative fuels. Hydraulic Oil SDS does not reflect any hazardous characteristic that classified this waste stream as hazardous. Two SDS for Glycol have been added to this waste stream. EEPGL will sample RCRA 8 heavy metals for this waste stream and the results will be included in the Waste Profile Sheet.

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE	DATE: 06/26/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	WASTE PROFILE NO. 20140506-0037
1. GENERATORS NAME Esso Exploration Production Guyana Limited	
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana	
3. TECHNICAL CONTACT Jimmy Street	4. TITLE Waste Management Lead 5. PHONE 623-1104

B. WASTE INFORMATION

1. WASTE CLASSIFICATION		HAZARDOUS		NON-HAZARDOUS
	x			

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☑ N ☐

If "yes" then provide waste numbers Y20; Y21; Y23; Y26 ; Y29; Y31

Is this a listed waste under Annex VIII of the Basel Convention? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Hazardous Waste A1180

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Guyana EPA AG.1 Hazardous Wastes Regulations : Hazardous Waste

2. COMMON NAME OF WASTE
Electronics

3. SITE ID/LOCATION OF WASTE GENERATION
Drill rigs, FPSO and Shorebase

4. PROCESS GENERATING WASTE
Broken or not working electronics, computers, phones, circuit boards and other miscelleanous electronics

5. PROJECTED ANNUAL VOLUME 4-7 MT		6. WASTE RECEIVING FREQUENCY		WEEKLY		MONTHLY		ONE-TIME SHIPMENT		OTHER (SPECIFY)
					x					
7. WASTE VOLUME		CUBIC METERS		GALLONS		TONNES				OTHER (SPECIFY)
					x					
8. WASTE CONTAINERS		BARRELS (42 GAL.)		DRUM (55 GAL.)		CUTTINGS BOX			x	OTHER (PALLET

9. SPECIAL HANDLING REQUIREMENTS
No

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE (CHECK ONE)		SOLID		LIQUID		SEMI-SOLID		GAS		OTHER (SPECIFY)
	x									

COLOR	N/A	BOILING POINT (^{o}C)	N/A
ODOR & STRENGTH	N/A	pH	N/A
FLASH POINT (^{o}C)	N/A	VISCOSITY	☐ Solid ☐ High ☐ Medium ☐ Low
BTUs	N/A	TOTAL CYNAIDES (ppm)	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

NONE	X	OXIDIZER	
WATER REACTIVE		IGNITABLE	
SHOCK REACTIVE		MEDICAL/INFECT. WST	
AIR REACTIVE		DIOXINS	
EXPLOSIVE		PESTICIDE/HERBICIDE	
PYROPHORIC		POLYMERIZABLE	
REACTIVE CYANIDES		RADIOACTIVE	
REACTIVE SULFIDES		EXEMPT RAD	
PHENOLS		ASBESTOS	
ORGANIC PEROXIDE		THERMALLY UNSTABLE	

3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%)	CONCENTRATION (%)
	Electronics (Metals, plastics, wires, lead solder, capacitors, glass, phones, computers, circuit boards, monitor screens)	95-100	
	Wood, paper, plastic, metal	0-5	

KNOWLEDGE IS FROM		LAB ANALYSIS		MSDS		PROCESS/GENERATOR KNOWLEDGE
					x	

COMMENTS : The characterization of this waste stream (Electronics) as hazardous waste is based on the Basel Convention, which doesn't identify the hazardous properties. Electronics as a waste stream are generally regulated for heavy metal content, Section 2 (Chemical and Hazardous properties) doesn't address these characteristics.

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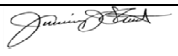
NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE: 	DATE: 06/26/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION			WASTE PROFILE NO. 20140506-0038		
1. GENERATORS NAME Esso Exploration Production Guyana Limited					
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana					
3. TECHNICAL CONTACT Jimmy Street		4. TITLE Waste Management Lead		5. PHONE 623-1104	
B. WASTE INFORMATION					
1. WASTE CLASSIFICATION	☑	HAZARDOUS	☐	NON-HAZARDOUS	

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☑ N ☐

If "yes" then provide waste numbers Hazardous waste Y8

Is this a listed waste under Annex VIII of the Basel Convention? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Hazardous Waste A3020

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Guyana EPA AG.1 Hazardous Wastes Regulations Part VII, 36, (xiii) : Regulations do not apply

2. COMMON NAME OF WASTE

Waste Mineral Oil

4. PROCESS GENERATING WASTE

Excess Mineral Oil from offshore drilling operations.

5. PROJECTED ANNUAL VOLUME 2- to 12 drums		6. WASTE RECEIVING FREQUENCY	☐	WEEKLY	☐	MONTHLY	☐	ONE-TIME SHIPMENT	☑	OTHER (SPECIFY)
7. WASTE VOLUME	☐	CUBIC METERS	☐	GALLONS	☐	TONNES			☑	OTHER (bbls)
8. WASTE CONTAINERS	☐	BARRELS (42 GAL.)	☑	DRUM (55 GAL.)	☐	CUTTINGS BOX			☐	OTHER (SPECIFY)

9. SPECIAL HANDLING REQUIREMENTS

Yes

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE (CHECK ONE)	☐	SOLID	☑	LIQUID	☐	SEMI-SOLID	☐	GAS	☐	OTHER (SPECIFY)

COLOR	Yellowish	BOILING POINT (°C)	301-427◦C
ODOR & STRENGTH	Mild	pH	N/A
FLASH POINT (°C)	185◦C	VISCOSITY	☐ Solid ☑ High ☐ Medium ☐ Low
BTUs	N/A	TOTAL CYNAIDES (ppm)	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

NONE	☐	OXIDIZER	☑
WATER REACTIVE	☐	IGNITABLE	☐
SHOCK REACTIVE	☐	MEDICAL/INFECT. WST	☐
AIR REACTIVE	☐	DIOXINS	☐
EXPLOSIVE	☐	PESTICIDE/HERBICIDE	☐
PYROPHORIC	☐	POLYMERIZABLE	☐
REACTIVE CYANIDES	☐	RADIOACTIVE	☐
REACTIVE SULFIDES	☐	EXEMPT RAD	☐
PHENOLS	☐	ASBESTOS	☐
ORGANIC PEROXIDE	☐	THERMALLY UNSTABLE	☐

3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%)	CONCENTRATION (ppm or mg/L)
	Highly refined mineral oil	30-60%	
	water	0-25%	
	proprietry ingredients	10-20%	

KNOWLEDGE IS FROM	☐	LAB ANALYSIS	☑	MSDS	☑	PROCESS/GENERATOR KNOWLEDGE

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NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE:	DATE: 05/18/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	WASTE PROFILE NO. 20140506-0039
1. GENERATORS NAME Esso Exploration Production Guyana Limited	
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana	

3. TECHNICAL CONTACT	4. TITLE	5. PHONE
Jimmy Street	Waste Management Lead	623-1104

B. WASTE INFORMATION

1. WASTE CLASSIFICATION	☑	HAZARDOUS	☐	NON-HAZARDOUS

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☑ N ☐

If "yes" then provide waste numbers Y41

Is this a listed waste under Annex VIII of the Basel Convention? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Hazardous Waste A4130

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Guyana EPA AG.1 Hazardous Wastes Regulations : Hazardous Waste

2. COMMON NAME OF WASTE
Refrigerants

3. SITE ID/LOCATION OF WASTE GENERATION
Exploration & Development Drilling and FPSO

4. PROCESS GENERATING WASTE
Used in various cooling systems. Refrigerants that need to be replaced

5. PROJECTED ANNUAL VOLUME 0.09-0.1 MT	6. WASTE RECEIVING FREQUENCY	☐	WEEKLY	☐	MONTHLY	☐	ONE-TIME SHIPMENT	☑	OTHER (SPECIFY)
7. WASTE VOLUME	☐	CUBIC METERS	☐	GALLONS	☐	TONNES		☑	OTHER (lbs)
8. WASTE CONTAINERS	☐	BARRELS (42 GAL.)	☐	DRUM (55 GAL.)	☐	CUTTINGS BOX		☑	OTHER (Drum rack)

9. SPECIAL HANDLING REQUIREMENTS
Keep valves tightly closed. Store in cool dry well ventilated place.

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE (CHECK ONE)	☐	SOLID	☐	LIQUID	☐	SEMI-SOLID	☐	GAS	☑	OTHER (Liquefied gas under pressure)

COLOR	Clear colourless liquid and vapour	BOILING POINT (°C)	-26.2°C
ODOR & STRENGTH	Slight , ether-like.	pH	N/A
FLASH POINT (°C)	N/A	VISCOSITY	☐ Solid ☐ High ☐ Medium ☑ Low
BTUs	N/A	TOTAL CYNAIDES (ppm)	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

NONE	☑	OXIDIZER	☐
WATER REACTIVE	☐	IGNITABLE	☐
SHOCK REACTIVE	☐	MEDICAL/INFECT. WST	☐
AIR REACTIVE	☐	DIOXINS	☐
EXPLOSIVE	☐	PESTICIDE/HERBICIDE	☐
PYROPHORIC	☐	POLYMERIZABLE	☐
REACTIVE CYANIDES	☐	RADIOACTIVE	☐
REACTIVE SULFIDES	☐	EXEMPT RAD	☐
PHENOLS	☐	ASBESTOS	☐
ORGANIC PEROXIDE	☐	THERMALLY UNSTABLE	☐

3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%) - MUST BE EQUAL OR GREATER THAN 100% WHEN TOTALED	CONCENTRATION (ppm or mg/L)
	Tetrafluoroethane	99.9%	

KNOWLEDGE IS FROM	☐	LAB ANALYSIS	☑	MSDS	☑	PROCESS/GENERATOR KNOWLEDGE

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

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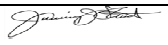
SIGNATURE: 	DATE: 05/20/2021

WASTE PROFILE SHEET

Part I

A. GENERAL INFORMATION	WASTE PROFILE NO. 20140506-0040
1. GENERATORS NAME Esso Exploration Production Guyana Limited	
2. FACILITY's NAME & ADDRESS GYSBI Shorebase, Georgetown, Guyana	

3. TECHNICAL CONTACT	4. TITLE	5. PHONE
Jimmy Street	Waste Management Lead	623-1104

B. WASTE INFORMATION

1. WASTE CLASSIFICATION		HAZARDOUS		NON-HAZARDOUS
	x			

1A. LISTED HAZARDOUS WASTES

Is this a listed waste under Annex I of the Basel Convention? Y ☑ N ☐

If "yes" then provide waste numbers Y35

Is this a listed waste under Annex VIII of the Basel Convention? Y ☑ N ☐

If "yes" then provide all applicable waste numbers A4090

Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations? Y ☑ N ☐

If "yes" then provide all applicable waste numbers Guyana EPA AG.1 Hazardous Wastes Regulations : Hazardous Waste

2. COMMON NAME OF WASTE
Caustic solutions

3. SITE ID/LOCATION OF WASTE GENERATION
Development & Exploration Drilling. Various wells

4. PROCESS GENERATING WASTE
Contaminated or excess caustic solutions in support of wells

5. PROJECTED ANNUAL VOLUME	6. WASTE RECEIVING FREQUENCY		WEEKLY		MONTHLY		ONE-TIME SHIPMENT		OTHER (As needed)
2-10 MT								x	

7. WASTE VOLUME		CUBIC METERS		GALLONS		TONNES		OTHER (SPECIFY)
							BBLS	

8. WASTE CONTAINERS		BARRELS (42 GAL.)		DRUM (55 GAL.)		CUTTINGS BOX		OTHER (SPECIFY)
							TANK	

9. SPECIAL HANDLING REQUIREMENTS
Yes. Corrosive acid and caustic streams managed separately.

PART II

1. PHYSICAL CHARACTERISTICS

PHYSICAL STATE (CHECK ONE)		SOLID		LIQUID		SEMI-SOLID		GAS		OTHER (SPECIFY)
			x							

COLOR	Water clear to slight greenish	BOILING POINT (^{O}C)	N/A
ODOR & STRENGTH	None/Strong (Chlorine)	pH	11-14 (Caustic)
FLASH POINT (^{O}C)	N/A	VISCOSITY	☐ Solid ☐ High ☐ Medium ☐ Low
BTUs	N/A	TOTAL CYNAIDES (ppm)	N/A
PCBs (ppm)	N/A	TOTAL SULFIDES (ppm)	N/A

2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)

NONE		OXIDIZER	X
WATER REACTIVE		IGNITABLE	
SHOCK REACTIVE		MEDICAL/INFECT. WST	
AIR REACTIVE		DIOXINS	
EXPLOSIVE		PESTICIDE/HERBICIDE	
PYROPHORIC		POLYMERIZABLE	
REACTIVE CYANIDES		RADIOACTIVE	
REACTIVE SULFIDES		EXEMPT RAD	
PHENOLS		ASBESTOS	
ORGANIC PEROXIDE		THERMALLY UNSTABLE	

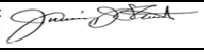
3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)

CAS #	CONSTITUENTS	RANGE (%) - MUST BE EQUAL OR GREATER THAN 100% WHEN TOTALED	CONCENTRATION (ppm or mg/L)
	Lime or Calcium hydroxide solution	50-80	
	Sodium Hypochlorite solution	50-80	
	Water	20-50	

KNOWLEDGE IS FROM		LAB ANALYSIS		MSDS		PROCESS/GENERATOR KNOWLEDGE
			x		x	

COMMENTS : The Waste Profile Sheet ID number for Acids (ID 015) was kept. Caustic was assigned Waste Profile Sheet ID Number 040. Hazard is related to the pH as identified in Section 1 of the Waste Profile sheet.

GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS

NAME: Jimmy Street	TITLE: Waste Management Lead
SIGNATURE: 	DATE: 06/26/2021

Waste Profiles Table

Guyana EPA Waste Profile No.	Individual Waste Stream Profile	Description (profile)	Guyana EPA Classification (AG.1 Hazardous Wastes Regulations)	US EPA RCRA Classification	Basel Convention (Annexes I, II, VIII) Classification Standard	Best Available Technology (BAT)	Comments
20140506-001	General Trash	General / domestic trash. All uncontaminated solids other than recycleables. Includes non-macerated galley waste, cement sacks, insulation, dry bulk hoses.	Non-hazardous	Non-hazardous	N/A	Consolidation/Bulking and direct Landfill	
20140506-002	Wood	Scrap wood, pallets, crating, etc. (pallets intended for reuse are not to be manifested as waste)	Non-hazardous	Non-hazardous	N/A	Consolidation/Bulking and direct Landfill	
20140506-003	Scrap metals	Uncontaminated scrap metal. Slings and straps.	Non-hazardous	Non-hazardous Scrap Metal exemption	N/A	Consolidation/Bulking and Recycling	
20140506-004	Plastic	Scrap plastic (uncontaminated)	Non-hazardous	Non-hazardous	N/A	Consolidation/Bulking and direct Landfill	
20140506-005	Paper	Scrap cardboard, paper	Non-hazardous	Non-hazardous	N/A	Consolidation/Bulking and direct Landfill	
20140506-006	Cooking Oil	Used cooking oil	Non-hazardous	Non-hazardous	N/A	Recycle or solidfy and Landfill	
20140506-007	Glass	Glass (crushed), fiberglass	Non-hazardous	Non-hazardous	N/A	Consolidation/Bulking and direct Landfill	
20140506-008	Medical Wastes	Medical/biological waste	Hazardous (Regulations do not apply)	Biohazardous	Hazardous Waste Annex VIII (A4020) ; Annex I (Y1)	Incineration	
20140506-009	Drill Cuttings	NAF drill cuttings / mud slops	Hazardous (Regulations do not apply)	Hazardous (Exempt)	Hazardous Waste Annex VIII (A3020)	Stabilzation/Thermal Desorption	Analytical received, the analysis has been added to the Waste Profile Sheet (Drill Cuttings/Mud Slops)
20140506-010	Oily Debris	Used absorbent pads, rags, filters, grease tubes, dope brushes, filters, etc.	Hazardous (Regulations do not apply)	Used Oil	Hazardous Waste Annex VIII (A4060) ; Annex I (Y9)	Incineration	
20140506-011	Chemical Sacks	Empty chemical sacks (cement sacks to be disposed of as General Trash)	Hazardous (Regulations do not apply)	Hazardous (Exempt) RCRA Empty	Hazardous Waste Annex VIII (A4130)	Verify empty, direct Landfill	
20140506-012	Casing Protectors	Casing protectors (unwashed)	Hazardous (Regulations do not apply)	Hazardous (Exempt) RCRA Empty	Hazardous Waste Annex VIII (A4130),	Rinse and direct Landfill/ Rinsate WWTP	
20140506-013	IBC Tote Tanks	Empty IBC totes	Hazardous (Regulations do not apply)	Hazardous (Exempt) RCRA Empty	Hazardous Waste Annex VIII (A4130)	Rinse and direct Landfill/ Rinsate WWTP	
20140506-014	Metal Drums	Empty metal drums	Hazardous (Regulations do not apply)	Hazardous (Exempt) RCRA Empty	Hazardous Waste Annex VIII (A4130)	Rinse and direct Landfill/ Rinsate WWTP	

Guyana EPA Waste Profile No.	Individual Waste Stream Profile	Description (profile)	Guyana EPA Classification (AG.1 Hazardous Wastes Regulations)	US EPA RCRA Classification	Basel Convention (Annexes I, II, VIII) Classification Standard	Best Available Technology (BAT)	Comments
20140506-015	Acids	Contaminated acid chemicals (not to be neutralized offshore)	Hazardous	Hazardous (Exempt) D002	Hazardous Waste Annex VIII (A4090); Annex I (Y34)	Neutralize/WWTP	
20140506-016	Aerosol Cans	Aerosol Cans/Not Punctured	Hazardous	Hazardous Waste D001	Hazardous Waste Annex VIII (A4130)	Puncture/Recycle/liquids Incinerated	
20140506-017	AFFF	Fire fighting foam	Non-hazardous	Non-hazardous	Hazardous Waste Annex VIII (A4140); Annex I (Y45)	Stabilization/Landfill	
20140506-018	Batteries	All types of batteries	Hazardous	Universal waste D002-D008	Hazardous Waste Annex VIII (A1160, A1170), Annex I (Y26/Y31/Y34)	Recycle	
20140506-019 (Profil Inactive)	Contaminated Brine	Oil/solids contaminated brine	Hazardous (Regulations do not apply)	Hazardous (Exempt)	Hazardous Waste (A4060); Annex I (Y9)	N/A	The Contaminated Brine Waste Profile Sheet (ID 019) has been combined with Completion Fluids (ID 021) Waste Profile Sheet.
20140506-020	Chemical Contaminated Water	Chemical contaminated water that does not meet effluent discharge limits	Hazardous (Regulations do not apply)	Hazardous (Exempt)	Hazardous Waste (A4060); Annex I (Y9)	Composite sample/WWTP/Incineration/ Thermal Desorption	
20140506-021	Completion Fluids /Contaminated Brine	Flowback fluids, w/hydrocarbon/brine/solids contamination	Hazardous (Regulations do not apply)	Hazardous (Exempt) D018	Hazardous Waste (A4060); Annex I (Y9)	Stabilization/Thermal Desorption	Analytical received, the analysis has been added to the Waste Profile Sheet.
20140506-023	Fluorescent Bulbs	Fluorescent Bulbs	Hazardous Waste	Universal D009	Hazardous Waste Annex VIII (A1030/A1180); Annex I (Y29)	Stabilization	
20140506-024	Fuel	Contaminated diesel, heli-fuel	Hazardous (Regulations do not apply)	Hazardous D001- D018	Hazardous Waste (A4060); Annex I (Y9)	Incineration/Fuel Blend	
200140506-025	Lube Oil	Used motor/engine oil	Hazardous (Regulations do not apply)	Used Oil Regulations	Hazardous Waste Annex VIII (A4060); Annex I (Y9)	Fuel Blend/Recycle	Analytical for RCRA 8 has been sent to the lab.
20140506-026 (Profile on hold)	Mercury (equipment)	Equipment that contains mercury	Hazardous	D009	Annex I (Y29)	TBD	No Waste Profile Sheet. Waste stream that is not generated yet.
20140506-027	Oily Water	Oil contaminated water that does not meet effluent discharge limits. Contains less than 30% oil. Sump water.	Hazardous (Regulations do not apply)	Hazardous (Exempt) D018	Hazardous Waste Annex VIII (A4060); Annex I (Y9)	WWTP, Fuel Blend/Recycle	Analytical received, the analyses have been added to the Waste Profile Sheet.
20140506-028	Paint/Paint Consumables	Paint and paint consumables (brushes, rollers, etc.). Solvents.	Hazardous Waste	D001	Hazardous Waste Annex I (Y12)	Incineration	
20140506-029	Plastic Buckets/Kegs	Empty chemical contaminated plastic buckets, kegs	Hazardous (Regulations do not apply)	Hazardous (Exempt) RCRA Empty	Hazardous Waste Annex VIII (A4130)	Rinse and direct Landfill/Rinsate WWTP	

Guyana EPA Waste Profile No.	Individual Waste Stream Profile	Description (profile)	Guyana EPA Classification (AG.1 Hazardous Wastes Regulations)	US EPA RCRA Classification	Basel Convention (Annexes I, II, VIII) Classification Standard	Best Available Technology (BAT)	Comments
20140506-030	Plastic Drums/Empty	Empty plastic drums	Hazardous (Regulations do not apply)	Hazardous (Exempt) RCRA Empty	Hazardous Waste Annex VIII (A4130)	Rinse and direct Landfill/Rinsate WWTP	
20140506-031	Produced Solids	Hydrocarbon contaminated solids/sand from production processes	Hazardous (Regulations do not apply)	Hazardous (Exempt) D018	Hazardous Waste Annex VIII (A4060); Annex I (Y9)	Thermal Desorption or Incinerate	Analytical received, the analysis has been added to the Waste Profile Sheet (Produced Sand)
20140506-032 (No Profile Sheet)	Pyrotechnics	Expired flares	Hazardous	D003	Annex I (Y15) or Annex A4080	Deactivate	Donated to Guyana Defence Force for training
20140506-033 (No Profile Sheet)	Radioactive (NORM)	NORM contaminated solids/liquids or equipment	Hazardous (Regulations do not apply)	NORM	TBD	Blend and landfill	Waste stream that is not generated
20140506-034	Rubber Hoses	Contaminated fuel/mud hoses (dry bulk hoses to be disposed of as General Trash)	Hazardous (Regulations do not apply)	Hazardous (Exempt) RCRA Empty	Hazardous Waste Annex VIII (A4130)	Rinse and direct Landfill/Rinsate WWTP	
20140506-035 (No Profile Sheet)	Sludge (tank bottoms)	Sludge from tank bottoms - mostly solid	Hazardous (Regulations do not apply)	Hazardous (Exempt) D018	Hazardous Waste Annex VIII (A4060)	Thermal Desorption or Incinerate	Waste stream that is not generated (suspended until further information).
20140506-036	Hydraulic Oil / Glycol	Used hydraulic oil / transmission oil / Glycol	Hazardous (Regulations do not apply)	Used Oil Regulations	Hazardous Waste Annex VIII (A4060); Annex I (Y9)	Fuel Blend or Recycle	EEPGL will sample RCRA 8 for this waste stream and the results will be included in the Waste Profile Sheet.
20140506-037	Electronics	Computers, printers, TVs, etc	Hazardous	Universal D008	Hazardous Waste Annex VIII (A1180); Annex I (Y20, Y21, Y23, Y26, Y29, Y31)	Recycle	
20140506-038	Mineral Oil	Drilling mud additive	Hazardous (Regulations do not apply)	Hazardous	Hazardous Waste Annex VIII (A3020); Annex I (Y8)	Thermal Desorption/Pug Mill/Fuel Blend	
20140506-039	Refrigerant	Cooling agent	Hazardous	Hazardous	Hazardous Waste Annex VIII (A4130); Annex I (Y41)	Recycle	Donation to Ministry of Agriculture
20140506-040	Caustic	Contaminated caustic chemicals (not to be neutralized offshore)	Hazardous	Hazardous (Exempt) D002	Hazardous Waste Annex VIII (A4090); Annex I (Y35)	Neutralize/WWTU	

Disposal Criteria Tables

Treatment Processes	**Treatment Disposal Limits**	
Empty Container Rinsing	**RCRA Metals**	**Limits**
Rinse container and collect rinsate then wastewater treatment	Arsenic	5.0 mg/l (100 mg/kg)
Wastewater Treatment	Barium	100 mg/l (2000 mg/kg)
pH, Total Suspended Solid (TSS), Total Petroleum Hydrocarbon (TPH), BOD/COD, Total Fecal Coliforms	Cadmium	1.0 mg/l (20 mg/kg)
Aerosol Can Unit	Chromium	5.0 mg/l (100 mg/kg)
Puncture and recycled can	Lead	5.0 mg/l (100 mg/kg)
Collect liquids and incinerate	Mercury	0.2 mg/l (4 mg/kg)
Incineration	Selenium	1.0 mg/l (20 mg/kg)
RCRA 8 Metals	Silver	5.0 mg/l (100 mg/kg)
Thermal Desorption	**Organic Compounds** (Benzene)	0.5 mg/l (20 mg/kg)
RCRA 8 Metals and TPH	**TPH (Solids)**	<10,000 mg/kg
Pug Mill / Stabilization	**pH**	5.0-9.0
RCRA 8 Metals and TPH	**TSS**	< 100 mg/l
Bulb Crush Unit	**TPH (wastewater)**	< 40 mg/l
Crushed bulbs	**Temperature**	< 40 C
Stabilized drums content with cement and landfill	**BOD/COD**	< 50 mg/l
RCRA 8 Metals	**Total Fecal Coliforms**	< 400 MPN per 100 ml

Blank EPA Waste Profile

WASTE PROFILE SHEET											
Part I											
A. GENERAL INFORMATION					**WASTE PROFILE NO.**						
1. GENERATORS NAME											
2. FACILITY's NAME & ADDRESS											
3. TECHNICAL CONTACT			4. TITLE			5. PHONE					
B. WASTE INFORMATION											
1. WASTE CLASSIFICATION		☐	HAZARDOUS		☐	NON-HAZARDOUS					
1A. LISTED HAZARDOUS WASTES											
Is this a listed waste under Annex I of the Basel Convention?		Y ☐	N ☐								
If "yes" then provide waste numbers											
Is this a listed waste under Annex VIII of the Basel Convention?		Y ☐	N ☐								
If "yes" then provide all applicable waste numbers											
Is this a listed waste under Environmental Protection Hazardous Waste Management Regulations?							Y ☐	N ☐			
If "yes" then provide all applicable waste numbers											
2. COMMON NAME OF WASTE											
3. SITE ID/LOCATION OF WASTE GENERATION (if different than facility address above)											
4. PROCESS GENERATING WASTE											
5. PROJECTED ANNUAL VOLUME		6. WASTE RECEIVING FREQUENCY	☐	WEEKLY	☐	MONTHLY	☐	ONE-TIME SHIPMENT	☐	OTHER (SPECIFY)	
7. WASTE VOLUME	☐	CUBIC METERS	☐	GALLONS	☐	TONNES	☐	OTHER (SPECIFY)			
8. WASTE CONTAINERS	☐	BARRELS (42 GAL.)	☐	DRUM (55 GAL.)	☐	CUTTINGS BOX	☐	OTHER (SPECIFY)			
9. SPECIAL HANDLING REQUIREMENTS											
PART II											
1. PHYSICAL CHARACTERISTICS (Fill where applicable)											
PHYSICAL STATE **(CHECK ONE)**	☐	SOLID	☐	LIQUID	☐	SEMI-SOLID	☐	GAS	☐	OTHER (SPECIFY)	
COLOR				BOLING POINT (^{O}C)							
ODOR & STRENGTH				pH							
FLASH POINT (^{O}C)				VISCOSITY		☐ Solid ☐ High ☐ Medium ☐ Low					
BTUs				TOTAL CYNAIDES (ppm)							
PCBs (ppm)				TOTAL SULFIDES (ppm)							
2. HAZARDOUS AND CHEMICAL PROPERTIES (CHECK BOX)											
NONE	☐			OXIDIZER	☐						
WATER REACTIVE	☐			IGNITABLE	☐						
SHOCK REACTIVE	☐			MEDICAL/INFECT. WST	☐						
AIR REACTIVE	☐			DIOXINS	☐						
EXPLOSIVE	☐			PESTICIDE/HERBICIDE	☐						
PYROPHORIC	☐			POLYMERIZABLE	☐						
REACTIVE CYANIDES	☐			RADIOACTIVE	☐						
REACTIVE SULFIDES	☐			EXEMPT RAD	☐						
PHENOLS	☐			ASBESTOS	☐						
ORGANIC PEROXIDE	☐			THERMALLY UNSTABLE	☐						
3. CHEMICAL / MATERIAL COMPOSITION (LIST ALL HAZARDOUS AND NON-HAZARDOUS CONSTITUENTS)											
CAS #	CONSTITUENTS			RANGE (%) - MUST BE EQUAL OR GREATER THAN 100%				CONCENTRATION (ppm or mg/L)			
KNOWLEDGE IS FROM (check all that apply)	☐	LAB ANALYSIS	☐	MSDS	☐	PROCESS/GENERATOR KNOWLEDGE					
GENERATOR CERTIFICATION: I HEREBY CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE ABOVE AND ATTACHED DESCRIPTION. TO THE BEST OF MY KNOWLEDGE IT IS COMPLETE AND ACCURATE. NO DELIBERATE OR WILLFUL OMISSION OF COMPOSITION OR PROPERTIES EXISTS AND ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.											
NAME:				TITLE:							
SIGNATURE:				DATE:							

Waste Profile Instructions

INSTRUCTIONS FOR COMPLETING WASTE PROFILE SHEET

PART I

A. GENERAL INFORMATION

WASTE PROFILE NUMBER – A unique number assigned to this waste stream for future reference. The preferred format is Generator's Permit Reference Number + three digit profile number assigned by either the Generator or the EPA for this specific waste stream. Any variation from this format must be approved by the EPA.

Waste Stream	Description	EPA assigned Profile Number
General Trash	General/domestic trash. All uncontaminated solids other than recycleables. Includes non-macerated galley waste, cement sacks, insulation, and dry bulk hoses, etc.	001
Wood	Scrap wood, pallets, crating, etc. (pallets intended for reuse are not to be manifested as waste).	002
Scrap Metal	Uncontaminated scrap metal. Slings and straps.	003
Plastic	Scrap plastic (uncontaminated)	004
Cardboard/Paper	Scrap cardboard, paper, etc.	005
Cooking Oil	Used cooking oil	006
Glass	Glass (crushed), fiberglass, etc.	007
Medical	Medical/biological waste	008
Drill Cuttings/Mud Slops	NAF drill cuttings/mud slops	009
Oily Debris	Used absorbent pads, rags, filters, grease tubes, dope brushes, filters, etc.	010
Chemical Sacks	Empty chemical sacks	011
Casting Protectors	Casing protectors (unwashed)	012
IBC Tote Tanks	Empty IBC totes	013
Metal Drums	Empty metal drums	014
Acids/Caustic	Contaminated acid/caustic chemicals (not to be neutralized offshore)	015
Aerosol Cans	Empty aerosol cans (not punctured)	016
Fire Fighting Foams	Fire Fighting Foam	017
Batteries	All types of batteries	018
Brine	Oil/solids contaminated brine	019
Chemical Contaminated Water	Chemical contaminated water that does not meet effluent discharge limits	020
Completion Fluids	Flowback fluids with hydrocarbon or solids contamination	021
Electronics	Computers, printers, TVs, etc.	022
Fluorescent Bulbs	Fluorescent Bulbs	023
Fuel	Contaminated Diesel, gasoline, kerosene, heli-fuel, etc.	024
Lube Oil	Used motor/engine oil	025
Mercury Equipment	Equipment that contains mercury	026
Oily Water	Oil contaminated water that does not meet effluent discharge limits, sump water, etc.	027
Paint/Paint Consumables	Paint and paint consumables (brushes, rollers, etc.). Solvents.	028

Plastic Buckets, Kegs	Empty chemical contaminated plastic buckets, kegs, etc.	029
Plastic Drums	Empty plastic drums	030
Produced Solids	Hydrocarbon contaminated solids/sand from production or exploration processes	031
Pyrotechnics	Expired flares	032
Radioactive Materials	Solids/liquids or equipment contaminated by any radioactive source (including NORM)	033
Rubber Hoses	Contaminated fuel/mud hoses	034
Sludge	Sludge from tank bottoms - mostly solid	035
Transmission/Hydraulic Oil	Used hydraulic/transmission oil	036

1. GENERATOR NAME – Enter the name of the generator. (Should match official name associated with the EPA records).
2. FACILITY'S NAME & ADDRESS – Enter the name and address of generating facility.
3. TECHNICAL CONTACT – Enter the name of the person to contact for more information about this waste.
4. TITLE – Enter the Technical Contact's official title (e.g. Manager).
5. PHONE – Enter the Technical Contact's telephone number.

B. WASTE INFORMATION

1. WASTE CLASIFICATION – Enter classification of waste as described in the Environmental Protection (Hazardous Waste Management) Regulations or the BASEL Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal.
2. COMMON NAME OF WASTE – Enter a name that is generally descriptive of this waste (e.g., drill cuttings, paint wastes, oil-water separator sludge, PCB-contaminated dirt, etc.).
3. PROCESS GENERATING WASTE – List the specific process/operation or source that generates this waste (e.g., paint-booth spray, PCB spill, metal-plating operation, etc.).
4. PROJECTED ANNUAL GENERATIONS – The quantity of waste projected for treatment annually.
5. WASTE RECEIVING FREQUENCY – The frequency at which waste is treated/sent for treatment.
6. WASTE VOLUME – The quantity/volume of waste to be treated.
7. WASTE CONTAINERS – The container(s) is which waste is transported to Waste Treatment Plant.
8. SPECIAL HANDLING REQUIREMENTS – Any special/extra considerations to be taken when handling or transporting the waste.

PART II

1. PHYSICAL CHARACTERISTICS

1. PHYSICAL STATE - If the four boxes do not apply, a description should be entered after "Other".
2. COLOR – Describe the color of the waste (e.g., blue, clear, varies, etc.).
3. BOILING POINT – For liquids, list the boiling point.
4. pH – List the pH reading/value of the waste.
5. FLASH POINT – For liquids, list the flash point, regardless of whether the waste is Ignitable or not.
6. VISCOSITY – List the viscosity of the waste.

7. BTU– This entry may be required if you request that this waste be used as a fuel substitute or if the waste is a contaminated fuel to be incinerated.
8. PCBs - Content can be expressed as either a weight percentage, or dry-weight concentration (mg/kg)
9. TOTAL CYNAIDE – Content can be expressed as either a weight percentage, or dry-weight concentration (mg/kg).
10. TOTAL SULFIDES – Content can be expressed as either a weight percentage, or dry-weight concentration (mg/kg).

2. HAZARDOUS & CHEMICAL PROPERTIES

Check the applicable box or boxes. Evidence must be provided to support answer(s).

3. CHEMICAL/MATERIAL COMPOSITION

1. CAS # - Chemical Abstract Number.
2. CONSTITUENTS – List all chemical *and material* components and contaminants.

- *Examples of chemical components and contaminants:*
- PCB's, methanol, oil, sodium chloride, napthalene, gasoline, solvents, applicable Underlying Hazardous Constituents (UHCs), etc.

- *Examples of material components and contaminants: water, dirt, sand, paint sludge, rags, etc.*

3. CONCENTRATION – Use this column for constituents of concern which do not exceed 10,000 ppm (1%). Indicate the concentration level in ppm or mg/L.
4. RANGE – For components comprising greater than or equal to 1% of the total waste stream, estimate the range (in percent) in which the component is present. The total maximum values of the components must be greater than, or equal to 100%, including chemical and material components.

LAB ANALYSIS – Attach a copy, if applicable (see Note below). Analysis must be done by an approved and certified laboratory. Laboratory approval(s) and certification(s) must be submitted with lab analysis along with the internationally recognized methodology use to conduct the analysis.

USER KNOWLEDGE - User knowledge is appropriate when it can be documented (e.g., in-out logs, published information, MSDS, process production information, etc.). There is room provided to explain "what' and "why" user knowledge is used in lieu of analysis.

CERTIFICATION - Include the PRINTED NAME of the person providing the Certification.

SIGNATURE - An authorized representative of the generator must sign and date this certification on the completed Waste Profile Sheet.

DATE – Date signed by Certifier*.

*** This Waste Profile Sheet (WPS) may be used for subsequent submissions of the same waste stream, for a period of one year. If a submission date is more than a year past the Certification Date listed, the generator must either re-certify the WPS, or provide a new WPS, with the current date.**

Waste profiles must be verified by the Waste Treatment Facility to determine treatment compatibility, especially if any operational changes occur that would materially change the waste profile.

Waste Manifest Form

Generator Information		Transporter Information:	
Generator:	Esso Exploration & Production Guyana Ltd.	**Transporter:**	Vessel
Address:	99 New Market St., Georgetown GY	**Contact:**	Captain Name
Contact:	Jimmy J. Street	**Position:**	Captain
Position:	Waste Management Lead	**Phone:**	xxx-xxx-xxx
Phone:	+592-623-1104	**Email:**	xxx.xxxxx@xxxx.com
Email:	jimmy.j.street@exxonmobil.com		
EPA Region:	Region 4		
Regist. #:	TBD		
Originator Information		**Receiving Facility Information**	
Originator:	Noble Bob Douglas	**Facility:**	Tiger Rentals Guyana
Manifest #:	**225-LIZ_4P13-OX**	**Regist. #:**	20140506-TTTUL
Well:	LIZ_4P13	**Location:**	LOT A, East Bank Public Rd. Houston GY
Date:	12-Jul-20	**Contact:**	Shane Singh
Contact:	Joshua Lepp	**Position**	General Manager
Phone:	+1-713-422-5982	**Phone:**	+592-501-0620
Email:	josh.lepp@exxonmobil.com	**Email:**	ssingh@tigerrentalsguyana.com

CCU #	Waste Stream	Comment	Verified Quantity	Unit	GY Classification	GY Characteristic	Physical Characteristic	Chemical Characteristic
	General Trash			lbs				
	Wood			lbs				
	Fuel			m3				
	Produced Solids			m3				

ORIGINATOR: _____ _____ _____
GENERATOR: _____ _____ _____
TRANSPORTER: _____ _____ _____
RECEIVING FACILITY: _____ _____ _____
Print Sign Date

Waste Manifest Instructions

29	1	EA	697154		6x6 Pallet Box	STC: See Attached Waste Form		MI SWACO	MI SWACO	2.1
	2	EA								
30	1	EA	100693-9		6x6 Pallet Box	STC: See Attached Waste Form		MI SWACO	MI SWACO	1.6
	1	EA								
31	1	EA	805884-9		Trash Skip	STC: See Attached Waste Form		Tiger Tanks	Tiger Tanks	2.8
	1	EA								

On shipping manifest

ESSO EXPLORATION PRODUCTION GUYANA LTD.
WASTE MANIFEST FORM

Generator Information		Transporter Information:	
Generator:	Esso Exploration & Production Guyana Ltd.	**Transporter:**	Paradise Islnd
Address:	99 New Market St., Georgetown GY	**Contact:**	John Jacob
Contact:	Jimmy J. Street	**Position:**	Captain
Position:	Waste Management Lead	**Phone:**	xxx-xxx-xxx
Phone:	+592-623-1104	**Email:**	xxx.xxxxx@xxxx.com
Email:	jimmy.j.street@exxonmobil.com		
EPA Region:	Region 4		
Regist. #:	TBD		
Originator Information		**Receiving Facility Information**	
Originator:	Noble Tom Madden	**Facility:**	Tiger Rentals Guyana
Manifest #:	120-LIZ_2W2-SMT	**Regist. #:**	20140506-TTTUL
Well:	LIZ_2W2	**Location:**	LOT A, East Bank Public Rd. Houston GY
Date:	21-Jul-20	**Contact:**	Shane Singh
Contact:	Company Man	**Position**	General Manager
Phone:	xxx-xxx-xxx	**Phone:**	+592-501-0620
Email:	xxxxxx.x.xxx@exxonmobil.com	**Email:**	ssingh@tigerrentalsguyana.com

CCU #	Waste Stream	Comment	Verified Quantity	Unit	GY Classification	GY Characteristic	Physical Characteristic	Chemical Characteristic
M-260-50	Lube Oil	Engine Maint.	7.2	m3	Exempt			
4LDR-44	Cooking oil	2bbl	0.12	m3	Exempt			
4LDR-44	Batteries	1bbl	0.08	MT	Hazardous	Corrosive	Solid	Inorganic
4LDR-44	Pyrotechnics	1bbl	0.1	MT	Hazardous	Explosive	Solid	Inorganic

CCU #	Waste Stream	Comment	Verified Quantity	Unit	GY Classification	GY Characteristic	Physical Characteristic	Chemical Characteristic
M-260-50	Lube Oil	Engine Maint.	7.2	m3	Exempt			
4LDR-44	Cooking oil	2bbl	0.12	m3	Exempt			
4LDR-44	Batteries	1bbl	0.08	MT	Hazardous	Corrosiv		
4LDR-44	Pyrotechnics	1bbl	0.1	MT	Hazardous	Explosiv		
DNVBS0001	Wood		1.5	MT	Non-hazardous			
DNVBS0002	General Trash		1.8	MT	Non-hazardous			
PB 319	IBC Tote Tanks/Empty	2 empty	0.145	MT	Non-hazardous			
PB 320	Metal drums	4 empty	0.08	MT	Non-hazardous			
PB 320	Chemical sacks		0.235	MT				anic
25256	Drill Cuttings/Mud Slops		3.2	m3				
TB209	Oily Debris		1.2	MT				
696789	IBC Tote Tanks/Empty	Do not dispose drilling tool	0.145	MT	N			

This information will be filled out when the waste is received and measured at the waste facility. You will receive a scanned copies once finalized on a monthly basis for your own record keeping

Add a comment to indicate quantity of waste. Use piece count only (i.e. 2 drums, 5

If CCU contains multiple waste streams, use seperate line items it capture this

Always use comment to indicate if the CCU also contains an item that is NOT to be disposed of

Refer to "Waste Streams" tab for description of each waste stream. If the waste being sent in does not conform to any of the streams in the dropdown - email/call J.Street (contact details for Generator)

Sign the Form

ORIGINATOR:			
GENERATOR:			
TRANSPORTER:			
RECEIVING FACILITY:			
	Print	Sign	Date

Permitted Effluents Discharge

Permitted Effluent Discharges Offshore					
Name	**Physical State**	**Discharge Frequency**	**Process Comments**	**Location**	**Annual Amounts (m3)**
Water-Base Mud	Liquid	Intermittent	Drilling fluids used to cool and lubricate the drill bit, clean the hole bottom and carry cuttings to the surface.	Liza Development Drilling Discharges	65,000 - 70,000
Water-Base and NAF Mud Drill Cuttings	Solid	Intermittent	Drill cuttings are solids removed from the borehole. NAF Mud drill cutting are separated from the mud and discharged.	Liza Development Drilling Discharges	15,000 - 20,000
Seawater Discharged	Liquid	Continuous	Seawater used to discharge drill cuttings to sea.	Liza Production and Development Drilling Discharges	3,500,000 - 4,000,000
Freshwater Discharged	Liquid	Continuous	A portion of the treated seawater is treated through a reverse osmosis system to make fresh water.	Liza Production and Development Drilling Discharges	45,000 - 50,000
Waste Water from Drains / Discharges Off Oil-Water Separators	Liquid	Intermittent	Drain fluids (e.g., rainwater) from non-hydrocarbon areas of the vessel which are collected and routed overboard. No visible oil sheen test prior to discharge.	Liza Production and Development Drilling Discharges	15,000 - 20,000
Cement Mix Water / Drilled Cement	Liquid	Intermittent	Cement slurry returns only occur during the cementing of the first casing string for each development well. Excess cement is discharged to the sea.	Liza Development Drilling Discharges	240 - 270
Sub Sea Blowout Preventer (BOP) Fluid	Liquid	Intermittent	Exhaust Fluids from the BOP discharged to sea	Liza Development Drilling Discharges	650 - 750

Permitted Effluent Discharges Offshore					
Name	**Physical State**	**Discharge Frequency**	**Process Comments**	**Location**	**Annual Amounts (m3)**
Sanitary Waste Water (Black and Grey water)	Liquid	Intermittent	Black and Grey water is sanitary (sewage) water from the Vessels	Liza Production and Development Drilling Discharges	320,000 - 350,000
Surface Cleaning Spacer, Displacement Interface/Pills & Gravel Pack Fluids	Liquid	Intermittent		Liza Development Drilling Discharges	4,000 - 5,000
Brines	Liquid	Continuous	- Brine effluent generated from the seawater treatment processes to produce low sulfate and potable water. - Completion brine fluids are used as a well-control fluids during well operations.	Liza Production and Development Drilling Discharges	1,100,000 - 1,500,000
Produced Water	Liquid	Continuous	Oil in Water content limit apply	Liza Production and Development Drilling Discharges	240,000 - 280,000
Ballast Water	Liquid	Intermittent	Ballast water is sea water used by the vessels to maintain position. No visible oil sheen test performed prior to discharge.	Liza Production and Development Drilling Discharges	70,000 - 80,000
Cooling Water	Liquid	Continuous	No visible oil sheen test performed prior to discharge.	Liza Production and Development Drilling Discharges	5,000,000 - 6,000,000
Food Waste Discharged Overboard	Solid	Intermittent	Macerated to <25 mm diameter prior to discharge.	Liza Production and Development Drilling Discharges	100 - 200

APPENDIX E TRG'S WASTE MANAGEMENT / WASTE ACCEPTANCE CRITERIA

Document Verifications:

Authorized by	
Name: Denis Latiff	**Position:** General Manager
Date:	**Signature :**
Responsible Persons	
Name: Shane Singh	**Position:** General Manager
Date:	**Signature**
Name: Aidan Latiff	**Position:** Operations Manager
Date:	**Signature**
Name: Sharmin Joseph	**Position:** HSE Coordinator
Date:	**Signature**
Name: Jeremiah Hercules	**Position:** Technical Services Coordinator
Date:	**Signature**
Name:	**Position:**
Date:	**Signature**
Name:	**Position:**
Date:	**Signature**

Revision History	Revision #	Revision Date	Review Date	Next Review Date
	1.0	26th February, 2021		

1.0 PURPOSE

The purpose of this procedure is to ensure all incoming waste can be accepted, stored, treated, and disposed at the Tiger Rentals Guyana Inc. Facility.

2.0 SCOPE

This procedure applies to management of all waste management activities required by TRG at main and external sites.

3.0 RESPONSIBILITIES

The General Manager has the overall responsibility and authority to ensure that there is an established process for control.

The Operations Manager, Technical Services Coordinator, HSE Coordinator/ Representative are directly responsible for ensuring that waste is properly segregated, appropriately stored and treated according the to correct treatment technologies.

4.0 ACRONYMS

SDS- Safety Data sheet
WGI - Waste Generator Information Form
CCU –Cargo Carrying Unit
WMF - Waste Manifest Form
TRG – Tiger Rentals Guyana
TT- Tiger Tanks
WVF - Waste verification Form
EPA - Environmental Protection Agency
WAP – Waste Analysis Plan
SWP – Safe Work Procedure

5.0 HAZARDOUS WASTE STREAMS

According to the **Basel Convention**, **Hazardous waste** is defined as:

Wastes that belong to any category contained in Annex I, unless they do not possess any of the characteristics contained in Annex III; and Wastes that are not covered under paragraph (a) but are defined as, or are considered to be, hazardous wastes by the domestic legislation of the Party of export, import or transit.

According to the **Environmental Protection (Hazardous Waste) Regulations 2000**, **Hazardous Waste** is defined as:

Waste or combination of wastes which, because of its quantity, concentration or physical, chemical, or infectious characteristics, may pose a substantial hazard to human health and belong to any category contained in Schedule I unless they do not contain any of characteristics contained in Schedule II and includes waste that is:

- hazardous industrial waste
- acute hazardous waste chemical
- hazardous waste chemical
- severely toxic waste
- flammable waste
- corrosive waste
- reactive waste
- radioactive waste
- clinical waste; or
- leachate toxic waste, or polychlorinated biphenyl waste,

and includes a mixture of acute hazardous waste chemical, hazardous waste chemical, pathological waste, radioactive waste or severely toxic wastes and any other waste or hazardous material.

An **existing** waste stream is defined as a waste stream, through process of generation, maintaining parameters and concentrations of hazardous components. A **new** waste stream is defined as a waste stream that was never received at TRG facility. A **modified** waste stream is defined as a waste stream that will have different levels of the same hazardous components.

Table 1: Grouped waste Categories, as per the Basel Convention & Environmental Protection (Hazardous Waste) Regulation's definition of Hazardous and Non-Hazardous Wastes, which are accepted, stored, treated, and disposed at TRG waste Treatment facility. Furthermore, the table details disposal option for each waste group.

Waste Type	Waste Classification	Disposal Option
General and domestic waste Trash, non- recyclable	Non-Hazardous	Landfill
General and domestic waste Trash, recyclable (wood, glass, paper, cardboard, aluminum cans)	Non-Hazardous	Recycle, Reuse, Landfill
Scrap Metal	Hazardous	Recycle
Incinerator Ash and residue	Non-Hazardous	Landfill
Lube oil/ motor oil	Hazardous waste	Recycle
Contaminated hydrocarbons	Hazardous waste	Thermal Destruction (VIR)/ Waste Stabilization (Pugmill)
Oily water	Hazardous waste	Thermal Destruction/ Filtration (VIR)

Drilling Slops	Hazardous waste	Thermal Destruction (VIR)/ Waste Stabilization (Pugmill)
Vessel Clean out liquid	Hazardous waste	Thermal Destruction (VIR)/ Waste Stabilization (Pugmill)
Treatment Chemicals	Hazardous waste	Thermal Destruction (VIR)
Paint waste (liquid)	Hazardous waste	Thermal Destruction (Incinerator)
Drum/ container rinse	Hazardous waste	Thermal Destruction (VIR)
Acid and caustic solution	Hazardous waste	Thermal Destruction (VIR)
Tank Sludge	Hazardous waste	Thermal Destruction (VIR)/ Waste Stabilization (Pugmill)
Oily Trash	Hazardous waste	Thermal Destruction/ Waste destruction (Incineration)
Oily Filters	Hazardous waste	Thermal destruction (Incineration)
Empty Drums/containers	Hazardous waste	Triple rinse and crushed
Medical/Biological Waste	Hazardous waste	Thermal/ Waste Destruction (Incineration)
Wash Water	Hazardous Waste	Filtration (Oil-Water Separator)
Batteries	Hazardous waste	Recycle
Fluorescent Tubes	Hazardous waste	Bulb Crusher

All incoming waste must be accompanied by a Form A/A1 and waste profile sheet generated by the client (waste generator). All waste is characterized via inspection as per Waste Analysis Plan. Non-Hazardous Waste streams are verified visually and supported by gas testing (CO2, H2S, VOCs).

For hazardous waste, classification is done pre-receipt via SDS review and once confirmed, the waste will then be delivered to the facility. Upon receipt, waste will be verified and characterized in accordance with the WAP.

Table 2: Waste components, both hazardous and non-hazardous, accepted, stored, treated, and disposed at TRG waste treatment facility.

Waste Type	Characteristic
Domestic/ food waste	Non-Hazardous
Barite	Hazardous
Silica Cement	Non-Hazardous
Cement Sacks	Non-Hazardous
Fibre Glass Grating	Non-Hazardous
Scrap Wood	Non-Hazardous

Scrap Metal	Hazardous
Cardboard	Non-Hazardous
Plastic	Non-Hazardous
Glass	Non-Hazardous
Paper	Non-Hazardous
Cement	Non-Hazardous
Hoses	Non-Hazardous
Insulation	Non-Hazardous
Rope	Non-Hazardous
Wire Rope Slings	Non-Hazardous
Nylon Rope Slings	Non-Hazardous
Sump Liquid	Hazardous
Drilling Mud (Solid)	Hazardous
Drilling Mud (Liquid)	Hazardous
Oily Water	Hazardous
Oil Based Mud	Hazardous
Cement Slops	Hazardous
Cooking Oil	Non-Hazardous
Waste Oil	Hazardous
Crude Oil	Hazardous
Hydraulic Oil	Hazardous
Heli-Fuel	Hazardous
Acid Blend	Hazardous
Chemical Sacks	Hazardous
Casing Protectors	Hazardous
Paint (Solid)	Hazardous
Paint (Liquid)	Hazardous
Filters	Hazardous

Oily Rags	Hazardous
Metal Drums	Non-Hazardous
Plastic Drums	Non-Hazardous
Aerosol Cans	Hazardous
Batteries	Hazardous
Medical Waste	Hazardous
Bulbs	Hazardous
Electronic Waste	Hazardous

6.0 PROCEDURES

6.1. Pre- Waste Receiving

1. Client (waste generator) contacts a TRG representative.

2. TRG representative notifies the Operations Manager/Environmental representative. The team reviews the WGI (non-contractual waste receipts) or contract document and proposed destructed methods identified in the Proposals/ Quotations generated from Handling Customer Enquires- OP8.1/1.

3. The Environmental and Operations Department makes the necessary arrangements to receive the waste or dispatch to a third-party disposer.

4. If no SDS is provided, the client must state process by which waste was generated and any other relevant information. Unknown waste types, new generators or high-risk waste types will require pre-sampling. Post analytical testing will be conducted by the client based on parameters identified by TRG. Client can also request TRG to conduct pre-analytical, however, this will be done before the waste is delivered to TRG.

5. The Environmental Technician records the information on the Waste Log. Records a brief description of client and project for data base.

6. The Environmental Representative fills out section #2, waste disposal, of the form based on recommendations.

TRG requires all clients to submit a waste generator information sheet prior to sending waste to our facility. TRG would review and advise client on whether TRG can accept and treat the waste. TRG would not accept waste without a completed Waste Generator Information Form. **See appendix 1 for TRG pre-receipt documentation.**

6.2. Waste Transportation

1. The generator of hazardous waste is responsible for ensuring that waste is secured and appropriately packaged during transport. If waste is transported by TRG, representative ensures the following:
    - labels on storage mediums are visible.
    - Storage mediums are adequate i.e., can withstand corrosiveness, volume, lining or seals adequate, etc.
    - SDS/ sufficient information is obtained from the generator regarding characteristics of wastes particularly in terms of being corrosive, reactive, ignitable, or toxic is provided on the label.
    - Waste manifest document (must be signed by the generator).

2. TRG must **not** accept any hazardous waste unless a completed and detailed waste manifest document is provided. **See attached appendix 9 – TRG journey management procedure.**

3. The transporter must ensure:
    - journey management
    - the waste/ materials are transported to designated point.
    - materials are stored in closed containers at all times.
    - emergency response measures are established prior to transportation of waste.

6.3. Waste Receipt

TRG's Facility:

1. If waste is directed to TRG's site, client's manifest must be provided to show custody transfer from generator to transporter.

2. Environmental Representative receiving the waste signs the Client Manifest or Waste manifest document and verifies quantity and waste type and completes the Waste Verification Form.

3. The Environmental Representative completes the Waste Verification Form within 24 hours of receipt. For waste received after normal working hours or weekends, the Environmental Representative ensures the verification is completed within the next business day. The waste receipt section which shows custody transfer from transporter to TRG.

4. Waste with discrepancies must be identified and segregated. Environmental Representative forwards the completed Waste Verification Form to the client.

5. Environmental Representative completes chain of custody form and submits to the laboratory for analytical profiling if required.

6. Environmental Representative completes Waste Log with pertinent information such as location of waste, type of containment unit and serial numbers will be recorded.

7. Waste labels are then inserted based on waste log and waste is then transported to relevant storage area.

3rd party disposal (special disposal)

The Environmental Technician ensures the third-party disposer is notified of waste receipts (waste type, client, quantity). The third-party disposer is responsible for verifying waste receipts at the disposal location. The waste documents (waste manifest, cargo manifest, disposal/ destruction certificates) are forwarded to the Environmental Technician.

6.4 Waste Verification

1. For **hazardous** waste streams, TRG Environmental Representative gathers the necessary WGI and SDS and contacts client representative to accompany TRG technician in measuring and verifying incoming waste against manifest or WGI.

2. For **liquid hazardous** waste, TRG Environmental Representative provides dipping stick to measure incoming waste. Client representative verifies the readings and sends approval via email.

3. For **solid hazardous** waste, TRG Environmental Representative weighs incoming waste with calibrated scale onsite and this is verified by client representative. Confirmation of values are sent to TRG via email.

4. For **nonhazardous solid** waste, TRG Environmental Representative weighs incoming waste and verifies against WGI and manifest. For weights beyond TRG measuring capacity, weights from approved incoming manifest and WGI form are utilized.

Waste with discrepancies must be identified and segregated. Environmental Representative forwards the completed Waste Verification Form and send to the client within 24hrs of waste collection.

6.5 Waste Characterization/ Screening

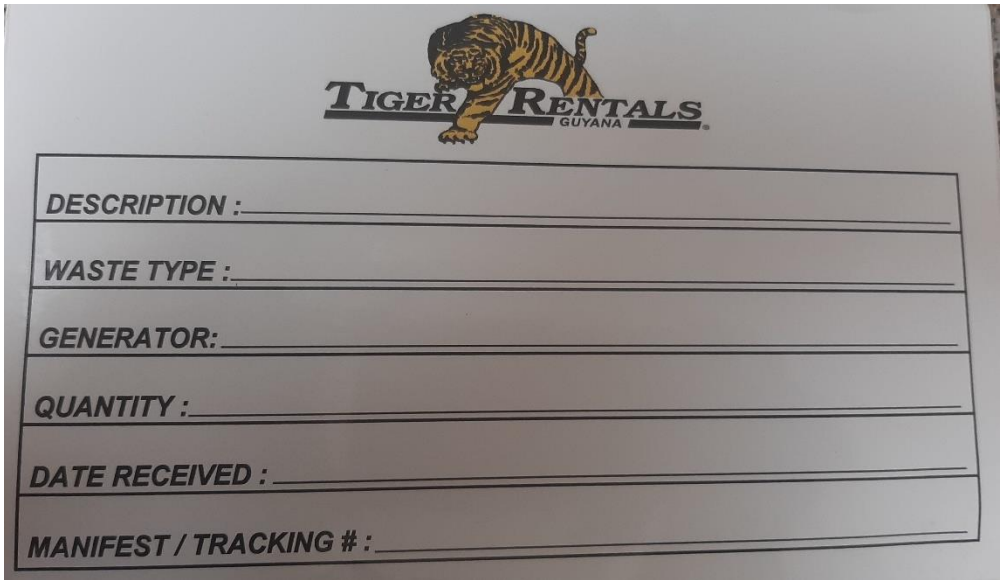
With the use of documentation, clients identify and provide further information on the waste slated for treatment and disposal at TRG. Clients are responsible for identifying the waste generator, the generation process, hazardous characteristics of waste (with the use of Safety Data Sheets), quantity, etc. Reference TRG Waste Generator Information form, Waste Information Data Sheet, and Waste Verification form. Upon receipt, waste is inspected visually and weighed before being accepted into the facility. In the event that TRG has reason to believe waste being sent does not correspond with the information provided by the client, samples are taken and tested for hazardous properties by certified laboratories.

6.6 Labelling Wastes (Waste Identification)

Wastes are labelled upon receipt and verification to allow for identification and placement in designated storage/staging area. Labels possess the following information:

1 Source of waste (generator, generation process)
2 Physical description (solid, liquid)
3 Chemical characteristic/properties (acidic, flammable, corrosive, etc.)
4 Hazardous waste characterization code in accordance with the Basel Convention, and
5 Hazard symbols in accordance with the Globally Harmonized System for Classifying Hazardous Chemicals.

6.7 Figure 1: Waste Storage Container Label



6.8 Waste Storage

If waste is pending verification, the Environmental Representative allocates a designated area, and clearly identifies the storage mediums/ waste as **"WASTE PENDING VERIFICATION".** All relevant personnel are notified.

On completion of the receipt and verification process, the Environmental Representative will identify storage/ staging locations for the waste by considering the following:

- waste type
- waste treatment option
- waste verification/ waste manifest to reference hazardous properties
- accessibility (newer products least accessible)
- compatibility/ reactivity with other chemicals

Waste is appropriately labelled with the following:

- waste type
- hazardous properties
- date of receipt
- client
- waste volume
- expiration date (where applicable)

NB: TOXIC CHEMICALS (used products) or HAZARDOUS WASTE must be labelled as such.

The Environmental Representative ensures the waste is appropriately staged, for example, filled storage mediums must **not** be stacked. The storage location of the waste on the facility will be recorded on Waste Log with all the relevant descriptions including container serial number and waste type.

Flammable and combustible liquids shall be stored in glass, metal, or plastic containers. If more than 10 gallons of flammable and combustible liquids, it shall be stored in an approved well-ventilated area on site designated for storage of flammable material/waste.

Lab waste or highly reactive materials like oxidizing agents, reducing agent from acids, and combustibles **must** be segregated. These must be stored in trays large enough to hold the contents of the bottles, away from heat and light. Materials that react vigorously with water **must** be stored away from possible contact with water.

Bulk waste must be stored appropriately in storage mediums, such as IBCs, frac tanks, cuttings boxes. To avoid spillage, storage mediums must **not** be filled to capacity or stacked when filled. Storage units must be constructed of or lined with material that is compatible with the waste to be placed within and has sufficient strength and thickness to prevent failure due to pressure gradients, including static head and external hydrological forces, physical contact with the wastes to which they are exposed, climatic conditions, and daily operations, including stress from nearby vehicular traffic. Storage mediums containing hazardous liquids must be stored within appropriate bunds capable to contain **110%** of the capacity of the largest tank within its boundary.

6.9 Waste Handling

The Operations Manager and Environmental Representative must ensure all workers/employees are fitted with the appropriate personal protective equipment (PPE) and safety equipment as recommended by the safety data sheet (SDS).

TRG PPE and Safety Equipment include:

- Coveralls
- Steel Toed Safety Shoes
- High Visibility Vests
- Rubber boots
- Full & half face Respirators and Cartridges

- Hard Hat
- Safety Glasses and Goggles
- Workmen's Gloves/ Fire Retardant Gloves
- Rubber/Latex gloves
- Harnesses and Self Retracting Lanyards
- Spill kits
- First Aid Kits

6.10 Waste Processing

Waste Processing Documentation

D. Log

1. Waste for destruction will be selected based on BTU Value. Waste with high BTU Values will be blended with waste with lower BTU Values to optimize the thermal destruction process.

2. The waste volumes can be selected from multiple generators.

3. The Primary Client will be documented under Client along with the Project #.

4. Once waste types, volumes to be blended and the generator(s) are identified, the information is entered on the D. Log under Client 1 or Client 2. If more than two (2) Clients waste are being blended, a sub heading under Client will be created to identify the additional Clients (Client 3, Client 4, etc.)

5. The Total Quantity of waste is documented under Feedstock Quantity. In addition, the process to be used for disposal will be documented under Disposal Type.

6. The operator conducting the blending exercise will sign off on the D. Log as confirmation of completing the process.

7. An **End-of-Life Certificate** is issued to the client with the relevant supporting documents.

See appendix 1 for copy of TRG D Log.

S. Log

1. The S. Log is used to document the movement of waste from multiple clients to either the landfill disposal location or to the recyclers.

2. The S. Log document allows for the listing of multiple clients on a single log.

3. Clients will be listed in the left column, with the project # in the second column.

4. The third column will contain the following information:
    i. the quantity of waste being moved (MT, M^3 etc.)
    ii. the waste type (glass, plastic, general garbage)
    iii. treatment type (Recycle, Landfill)
    iv. and the Service Provider (Haags Bosch, CCI etc.)

5. Finally, the date received, and the date closed (date delivered to the recycler or landfill.)

6. Any further comments on the waste type etc.

6.11 Waste Rejection

TRG is incapable of treating Radioactive wastes, and waste containing Halogenated/Chlorinated Organics as well as polychlorinated biphenyl (PCBs). If the generator of the waste identifies any of the above in the A & A1 forms the waste will not be received. If waste was received without any indication of the above-mentioned constituents from the generator and it is revealed in the screening process, the generator will be notified, and waste returned immediately. TRG has the capacity to treat any other waste stream at various concentrations of hazardous composition.

Figure 2: TRG Waste Receipt Procedure

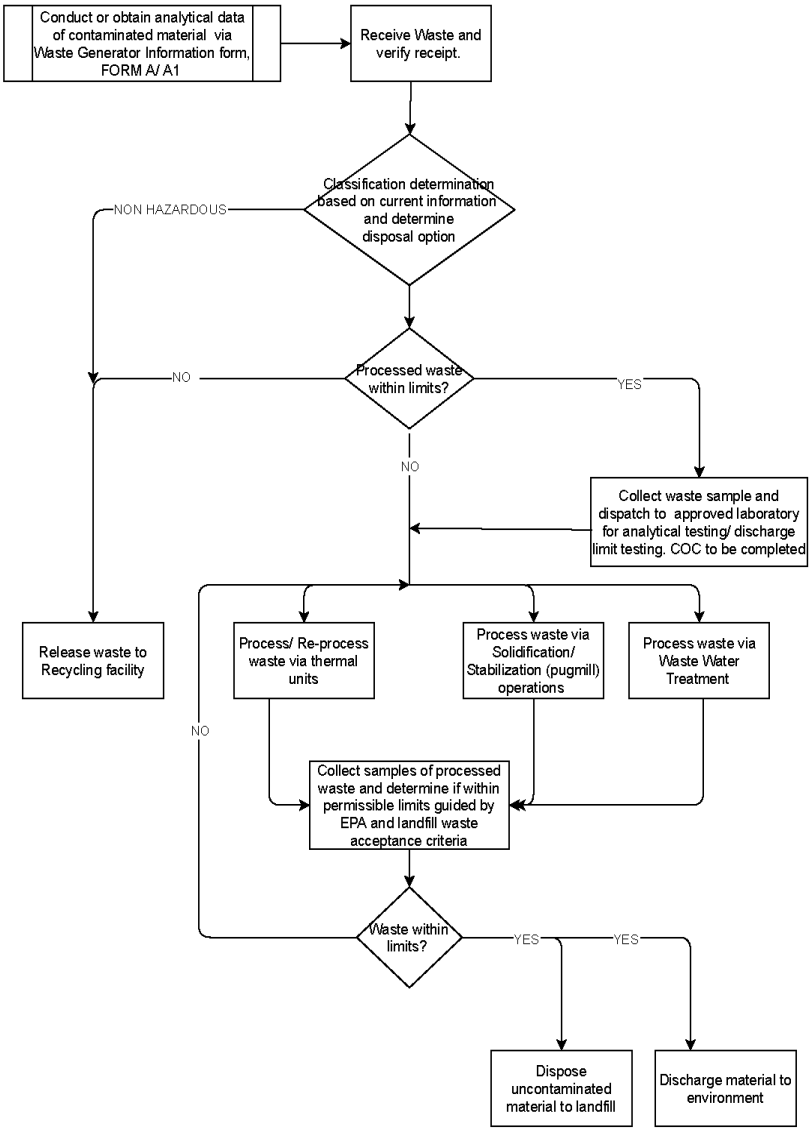


Figure 3: TRG Process Diagram

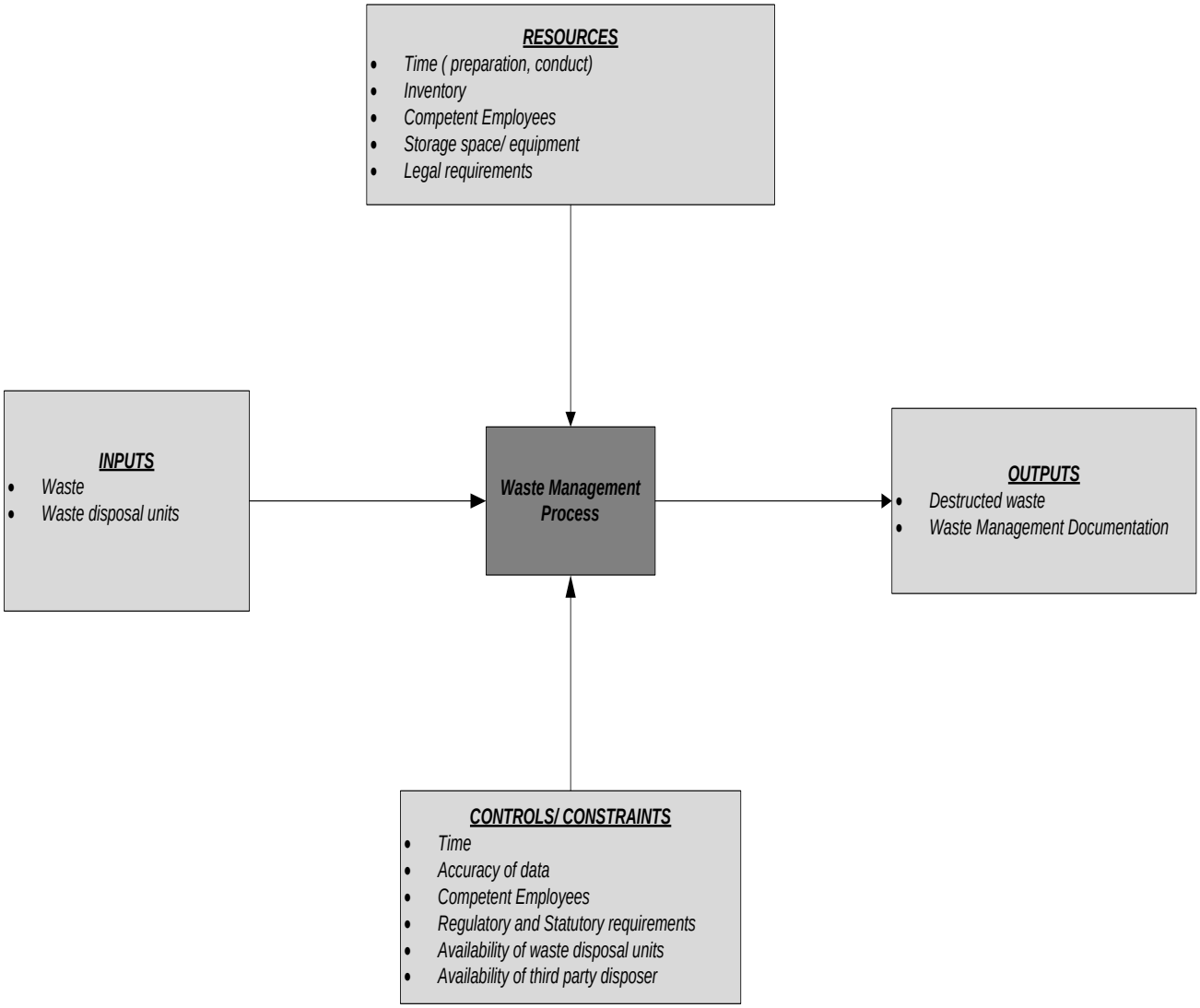


Table 3: Process Risk Assessment

RISK ID	Risk description	Probability/ Likelihood	Severity /Impact	Risk Rank	Mitigation	Contingency	Residual Risk Rank
WM P001	Lack of notification from client of waste receipt	MED	HIGH	HIGH	1. Operations department to query prior to transfer of waste/storage units. 2. Include WGI in proposal. 3. TRG Supervisors to verify prior to leaving client's site.	1. Training 2. Audits	MED
WM P002	Waste documentation not submitted by client (SDS, WGI)	MED	HIGH	HIGH	1. Environmental dpt. to notify transporters of documentation requirements prior to transit. 2. Waste documentation requirements to be stated in proposals.	1. Training 2. Audits	MED
WM P003	Waste destruction units not capable of destructing waste type	LOW	HIGH	HIGH	1. Review destruction requirements prior to making agreement with client. 2. Use third party disposer	1. Audits 2. Training 3. Environmental to develop listing of various waste types and possible destruction methods	LOW
WM P004	Lack of traceability of waste	MED	MED	MED	1. Environmental dpt. to ensure waste storage mediums are properly labeled. 2. Environmental dpt. to update and maintain the Waste Location Log 3. Ensure Internal Waste Movement Forms are completed	1. Training 2. Audits	LOW

WM P005	Processed/ Un-processed waste not adequately stored	MED	HIGH	HIGH	1. Environmental Representative to review storage requirements from SDS. 2. Seek alternative storage mediums such as frac tanks, IBC, cuttings boxes. 3. Determine appropriate reuse of processed where possible	1. Audits/ Inspections 2. Maintenance	MED

7.0 WASTE ANALYSIS PLAN

Waste Acceptance Procedures

All waste accepted by TRG must be approved through the pre-acceptance process. As described below, the pre-acceptance process requires completion of the A & A1 forms and waste profile forms by the generator or their authorized agent, and review and approval of the waste by TRG. Once this is reviewed and the waste is within categories that can be accepted by TRG, the client is informed of approval to send waste to TRG facility. The TRG shore base facility is the point of custody transfer.

7.1 Acceptance & Analysis

Acceptance & Analysis
When a shipment of waste arrives at TRG facility, a Waste Technician is responsible for either receiving or rejecting the waste upon completing the following procedure:

- Review the manifest or shipping paper for accuracy and completeness.
- Unload containers to the TRG waste receiving area.
- Check container labels for completeness and consistency with the A & A1 forms and waste profile.
- Check the condition of each container and verify that it meets TRG acceptance criteria.
- Verify that each container type is consistent with the information on the A & A1/profile, manifest and waste stored within.
- For new, waste streams that cannot be identified by the SDS due to physical and chemical changes from the process they were exposed to, TRG would require lab testing to be conducted to classify the incoming waste. Waste testing includes
    - In house testing with rapid test kits that would allow for profiling of waste streams.
    - Lab testing with local and regional accredited labs to re-evaluate ongoing incoming waste

- Visual verification of physical properties by technicians based on SDS submitted. (color, liquid/solid/powder)
- Gas testing/head space analysis (includes VOC's, CO2, LEL, H2S, Benzene)
- pH testing

- Once the waste is within criteria to be processed by TRG, waste will then be transferred into storage for treatment.

Hazardous and Non-Hazardous Waste Classification

The waste stream is categorized by the generator based on the SDS and process generating the waste. The generator will complete the relevant hazardous waste forms (A &A1-and provide SDS for all applicable waste streams. TRG will verify this information when waste is received via a screening process using a rapid test kit that will identify if the following hazardous parameters are present.

Kit analytical capabilities:

1. Thermal Oxidizers,
2. nitrates, chlorates, perchlorates, picrates,
3. Flammable Liquids – flashpoint < 140F
4. Halogenated Hydrocarbons, Chlorinated Solvents, Chlorinated Pesticides,
5. Acids and Bases,
6. Water Reactive Substances,
7. nitrides, carbides, hydrides, phosphides,
8. Oxidizers – peroxides, hypochlorites, nitrites, persulfates, pool shock chemicals,
9. Flammable Solids
10. Spontaneously Combustible substances,
11. Explosives,
12. Radioactive Materials,
13. Reactive Cyanides

The testing kit can also be used in the screening of unknown waste types. The rapid test kit will be utilized to establish baselines to determine waste treatment streams and ensure consistency is maintained for established waste streams.

Analytical Testing.

TRG conducts quantitative tests on various waste groups to establish.

1) The waste meets the treatability criteria of the waste processing equipment
2) On the processed material as confirmation that the waste has achieved the closure criteria

7.2 Table 4: Post Treatment Tests and Testing Parameters

Tests Conducted	Rationale	Parameters
TCLP Metals	Determines the concentration of leachable metals in the waste stream (arsenic, barium, cadmium, chromium, lead, mercury, silver, and selenium)	✓ TCLP Extractable Arsenic (mg/L) 5.0 mg/L3 ✓ TCLP Extractable Barium (mg/L) 100 mg/L3 ✓ TCLP Extractable Cadmium (mg/L) 1.0 mg/L3 ✓ TCLP Extractable Chromium (mg/L) 5.0 mg/L3 ✓ TCLP Extractable Lead (mg/L) 5.0 mg/L3 ✓ TCLP Extractable Mercury (mg/L) 0.2 mg/L3 ✓ TCLP Extractable Selenium (mg/L) 1.0 mg/L3 ✓ TCLP Extractable Silver (mg/L) 5.0 mg/L3 ✓ TCLP Extractable Zinc (mg/L) 10
Faecal Coliform	To determine the quantity of fecal matter present in the waste stream	✓ <400 CFU/100ml
TSS	To determine the level of treatment (sedimentation & filtration) to meet the discharge criteria.	✓ <100, g/L
BOD	Is used to capture the oxygen consumption for biological degradation of organic matter.	✓ < 50 mg/L
pH	To determine the level of acidity/alkalinity of the waste and the associated corrosivity.	✓ 5.0-9.0
TPH	Determine the level of Petroleum Hydrocarbons in the waste.	✓ < 40 mg/L
Oil & Grease	Is used to determine oil and grease concentrations	✓ < 40 mg/L
Volatile Organics	Determines if the waste is potentially listed (e.g., contains a volatile organic compound potentially used as a solvent) and if the concentration of any volatile organic compound exceeds the limits	Tested for presence.
Flash Point	Indicates the fire-producing potential of the waste and determines whether the waste is RCRA-ignitable	>93ºC

Retort Analysis	Used for determining oil, water, and solids content in the mud, comprising a sample chamber assembly of known volume filled with mud	Tested for presence.
Chlorinated Organics	Test Chlorinated organic carriers are chlorinated organo benzenes, toluenes and their isomers. These chemical compounds pose potential health risks to human health	Tested for presence.
Specific Gravity/Density	As a verification of the physical property of the waste as referenced on the SDS.	N/A

All treated waste destined for discharge or disposal must have a analytical test result showing that the material is within levels. See appendix 1 attached for copy of testing results previously acquired.

Ongoing Waste Evaluation Process

Testing and Waste Profiling is done where:

- new waste streams are received from an existing generator
- waste is received from a new generator
- If concentrations of hazardous components change, based on qualitative/quantitative screening
- If existing generator indicates a change in the waste generation process

Frequency

- Baseline sampling and analytical for all waste streams
- Biannually verification for the first year and annually thereafter.
- All waste post treatment prior to final disposal
- Waste profile is required annually for all hazardous and nonhazardous waste streams. Analytical profiling is only required annually by client. If there is any suspicion by TRG that waste stream has changed or if the process by which the waste is generated changes a new waste profile is required.
- TRG will conduct at least one random test per year per client waste stream. This is to verify information on the waste profile.

Re-Sampling

All waste streams that do not meet the discharge/disposal standards outlined are re-introduced into TRG as waste and re-treated and tested. This is tracked via the **sampling log.**

Documentation for new or modified waste.

Please reference the A & A1 forms, Waste Verification Form, & Waste Manifest Form. (Appendix 1 attached)

Treatment Confirmation following pre-screening/analytical tests

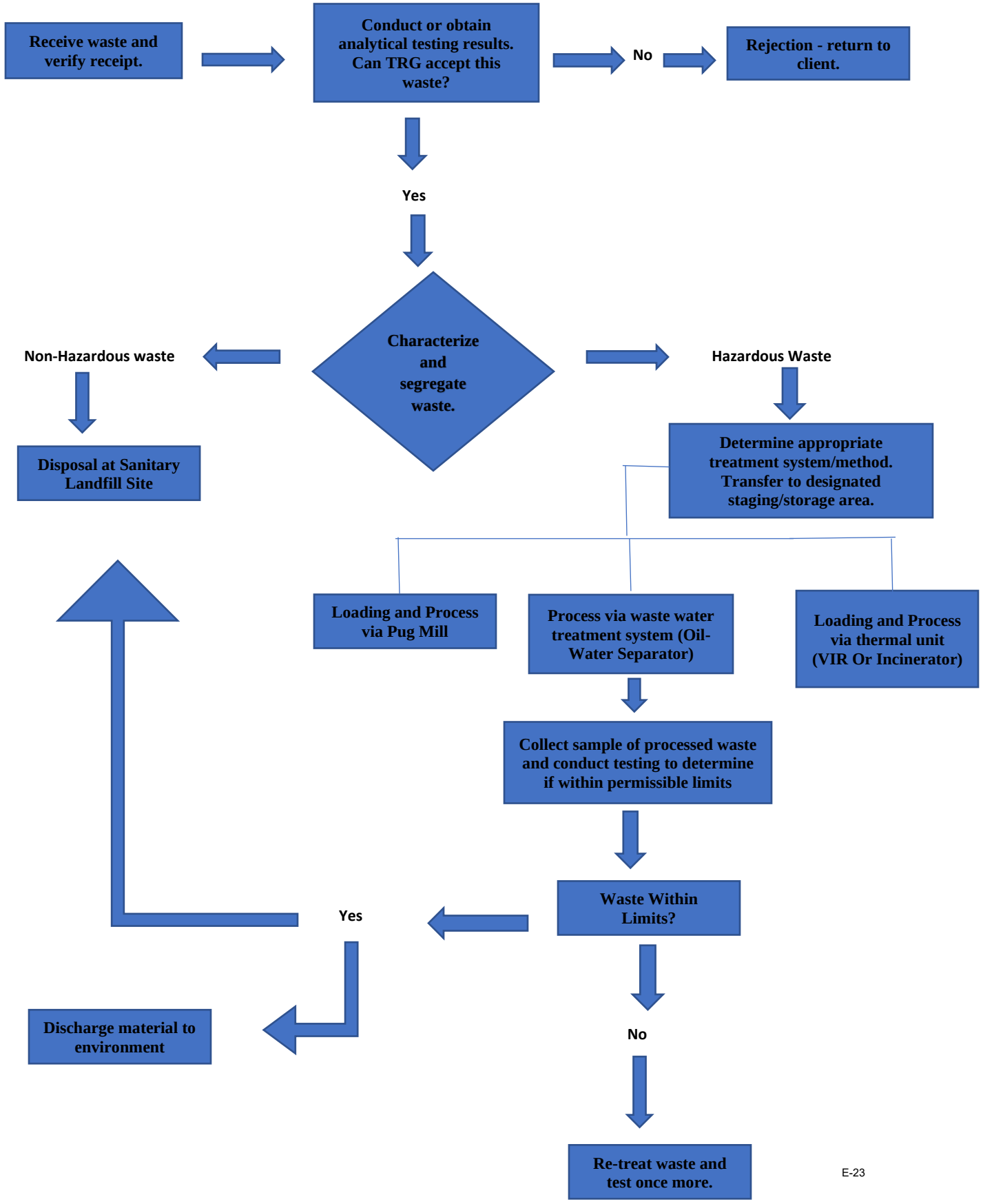
Final confirmation for new or modified waste stream is based on the SDS, Waste Profile Sheet and lab analytical provided by the client. Only waste streams not accepted are radioactive waste and chlorinated organics.

Discrepancies/ inconsistencies between the new / modified waste samples and the Generator submitted information are relayed to the customer via a **Non-Conformance Report**. All incoming waste accepted for treatment is verified and labeled with TRG internal waste labels for storage and treatment.

If waste was misclassified then it is put into temporary storage, the client is contacted to verify and then the waste manifest is adjusted. For waste streams that cannot be treated by TRG or is unknown, waste Is returned to client for analytical data and then TRG will review and confirm acceptance. Waste will only be accepted once a waste profile is completed by client in advance.

Please note, TRG has commenced process to develop the following documents as per requirement for a treatment storage disposal facility (TSDF):

1. Waste Analysis Process/Procedure
2. Waste Stream Modification Process/Procedure.


Receive waste and verify receipt.
Conduct or obtain analytical testing results. Can TRG accept this waste?
No
Rejection - return to client.
Yes
Characterize and segregate waste.
Non-Hazardous waste
Disposal at Sanitary Landfill Site
Hazardous Waste
Determine appropriate treatment system/method. Transfer to designated staging/storage area.
Loading and Process via Pug Mill
Process via waste water treatment system (Oil-Water Separator)
Loading and Process via thermal unit (VIR Or Incinerator)
Collect sample of processed waste and conduct testing to determine if within permissible limits
Waste Within Limits?
Yes
Discharge material to environment
No
Re-treat waste and test once more.

8.0 WASTE TREATMENT TECHNOLOGIES

8.1 Table 5: Treatment System Profile

Treatment Process	Treatment Technology
Waste Remediation Electricity is applied to the infrared heating elements inside the element housings. These elements heat up to 1600 degrees F (approx. 871 degrees C). As the waste temperature rises, hydrocarbons and water volatilize and create high pressure. This pressure forces the steam and volatilized hydrocarbons into the low-pressure, perforated element housings where they travel along the 1400-to-1600-degree elements where the vapours are destroyed prior to exhaust. Heat is transferred from the elements to the soil/sludge by conduction and the soil/sludge is heated to temperatures between 350- and 1600-degrees F. Typically the processing time is 72 hours or less, depending on the characteristics of the soil/sludge and the types and concentrations of the contaminants. After the waste goes thru the thermal system the result is a landfillable dry solid, subject to analytical testing before disposal (with grave/sand consistency in ton bag units). This waste is then stored in a designated area and composite samples are taken and sent to authorized labs for testing before discharge. Waste is stored in cuttings boxes before prior to treatment and stored in ton bags for final disposal. Maintenance activities carried out prior to every burn to ensure system performs at optimal capacity and no incidents/accidents/emergencies occur.	Vertical Infrared System Utilizes infrared heating elements to heat contaminated soil/sludge. Diesel/Electric Powered Oxidizer/rapid quench system Wet scrubber/stack Elements heat up to 871 degrees Celsius Capacity, 100bbl of soil/sludge 100bbl per 4-day cycle; 25bbl per day End product, landfillable dry solid subject to analytical testing before disposal By-product, stack emissions and oily water (treated in oil-water separator) **See attached appendix 2 for VIR System Operation and Safe Work Procedure.**

8.2 Table 6: Treatment System Profile

Treatment Process	Treatment Technology
Waste Destruction The solid waste incinerator is powered by two diesel-fired burners positioned to ensure efficient coverage of the hearth. The products of combustion from the primary chamber will exhaust into the secondary chamber located directly above the primary chamber for treatment. Within the secondary chamber additional heat and air are added to promote combustion in the gaseous phase. These gases will reside within the chamber at a minimum temperature of 900°C, thus ensuring complete combustion of the volatile and solid particulate. Treated gases will exit the secondary chamber and will enter the exhaust chimney and then be redirected into the rapid quench and then to the wet gas scrubber before being released into the atmosphere. The whole system is controlled and policed by a central PLC based / relay logic control System. Wastes are stored in ton bags and CCUs prior to treatment, and in ton bags for final disposal.	Solid Waste Incinerator Incorporates a primary chamber and a high-capacity thermal oxidizing secondary chamber. Diesel fired. Operates at temperatures up to 1,400 degrees Celsius. Integrated oxidizer chamber Rapid quench/wet scrubber/stack 1 metric ton per day End product, landfillable dry solid subject to analytical testing before disposal By product, stack emissions **See attached appendix 2 for Solid Waste Incinerator Operation and Safe Work Procedure.**

8.3 Table 7: Treatment System Profile

Treatment Process	Treatment Technology
Solidification/Stabilization Waste Encapsulation occurs when additives are mixed with waste to minimize the rate of migration or leaching from the waste and to reduce the toxicity of the waste. Waste Solidification - a process employing additives by which the physical nature of the waste is altered during the process causing it to lose its mobility. The pugmill employs a paddle system to mix waste with other material to make it environmentally safe. Waste is mixed	Pug Mill Hopper fed, dual counter rotating roto paddle shafts, discharge into ton sacs. Solidification/stabilization 10 metric tons of waste per day. End product, treated landfillable solid subject to analytical testing before disposal. By-product, none

with cements or other drying agents to encapsulate or stabilize to ensure that the material reaches safe limits for landfill disposal. Waste is stored in cuttings boxes prior to treatment and in ton bags after solidified before final disposal.	**See attached appendix 2 for Pug Mill Operation and Safe Work Procedure.**

8.4 Table 8: Treatment system profile

Treatment Process	Treatment Technology
Water Treatment After the wastewater has passed through the oil/water separator, the free oil is removed and taken for thermal treatment. The filtered water is then passed through a micron filter to remove large solid particles after which it goes into a holding tank. From the holding tank, water is then transferred to the charcoal filter to remove any organics. This water then goes through another micron mesh filter to a storage tank for testing. Once water reaches local allowable limits, the treated water is then discharged. Waste is stored in IBC totes, Cuttings Boxes, CCUs and TRG on site sump prior to treatment.	Oil-Water Separator Highland Oil-Water Separator is designed to treat up to 700 Barrels of oily wastewater per day. Two (2) gravity fed units. Activated charcoal filtration system. 1x 100bbl/day & 1x 700bbl/day. End product filtered water meeting GNBS discharge criteria. By-product, skimmed oil (blended in VIR or solidified in Pugmill) **See attached appendix 2 for Oil-water Separator Operation and Safe Work Procedure**.

8.5 Table 9: Treatment System Profile

Treatment Process	Treatment Technology
Depressurization and Encapsulation Crushed bulbs are placed into a metal drum and encapsulated using solidification additives. Waste is stored in CCUs prior to disposal. Aerosol cans are punctured, and the	Drum Crusher/Bulb Eater Electrically driven hydraulic drum press. Crushes 8 contaminated drums per hour.

liquid and aerosol contents are expelled through the lower chamber. Empty aerosol cans are sent to scrap metal recyclers. The liquid contents are then processed through thermal processes at TRG facility.	Also crushes bulbs and lamps. **See attached appendix 2 for Bulb Crusher, Drum Eater and Aerosol Unit Operation and Safe Work Procedures.**

8.8 Figure 4: Waste Treatment Technologies – Hazardous Waste Property Acceptance

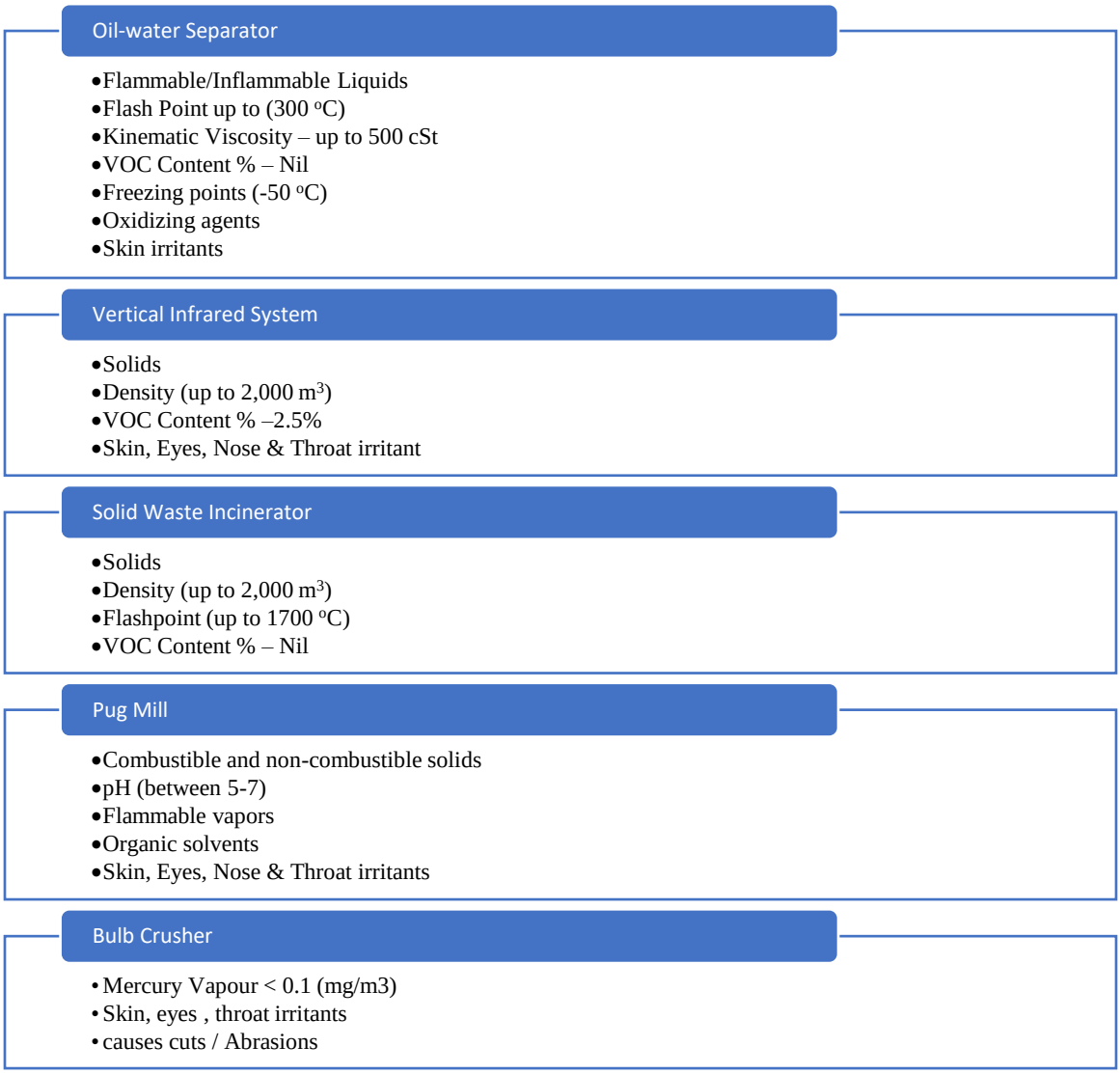


Table 10: Annual Capacity per Treatment System

Treatment System	Annual Capacity
Solid Waste Incinerator	300 MT
VIR System	1100 MT
Pugmill System	4500 MT
Above Ground Oil-Water Separator/Filtration System	24000 Barrels

9.0 STORAGE CONTAINERS

Cargo Carrying and storage units (CCUs) used for the transport and storage of waste include Boat skips, Hazardous waste skips, Cutting Boxes, 25-barrel tanks, toolboxes etc. All units used are properly maintained and inspected by certified staff, both upon arrival on site and before leaving site.

Figures 5, 6 & 7 – CCU Profiles

6.5' X 16' TUBINGLESS BASKET
L x W x H 4890 x 2110 x 965
TARE 2131 KG / 4700 LBS
PAYLOAD 6939 KG / 15300 LBS
8' X 10' BASKET HH W/ FRONT DOOR
L x W x H 2991 x 2438 x 1280
TARE 1650 KG / 3638 LBS
PAYLOAD 8000 KG / 17636 LBS
8' X 20' HH BASKET W/SIDE DOOR
L x W x H 6058 x 2438 x 1432
TARE 3050 KG / 6724 LBS
PAYLOAD 10000 KG / 22046 LBS
8' X 20' HH BASKET W/REMOV. DOOR
L x W x H 6058 x 2438 x 1432
TARE 3500 KG / 7716 LBS
PAYLOAD 10000 KG / 22046 LBS
10.3 M (34') BASKET
L x W x H 10300 x 1200 x 1100
TARE 2600 KG / 5732 LBS
PAYLOAD 10000 KG / 22046 LBS
11.9 M (39') BASKET
L x W x H 11900 x 1200 x 1100
TARE 3000 KG / 6614 LBS
PAYLOAD 10000 KG / 22046 LBS
39' X 7'4" TUBULAR TRANSPORT
L x W x H 11887 x 2238 x 1408
TARE 7550 KG / 16645 LBS
PAYLOAD 14450 KG / 31857 LBS
14.3 M (47') BASKET
L x W x H 14300 x 1200 x 1200
TARE 3930 KG / 8665 LBS
PAYLOAD 12000 KG / 26455 LBS
27.4 M (90') BASKET
L x W x H 27430 x 1200 x 1200
TARE 8800 KG / 19400 LBS
PAYLOAD 12000 KG / 26456 LBS
DRUM RACK/BOTTLE RACK
L x W x H 1428 x 1158 x 2171
TARE 700 KG / 1543 LBS
PAYLOAD 1970 KG / 4343 LBS
DRUM RACK (6' X 6')
L x W x H 1829 x 1829 x 1493
TARE 1050 KG / 2314 LBS
PAYLOAD 950 KG / 2094 LBS
MULTI-UNIT CARRIER (4 UNITS)
L x W x H 3150 x 2845 x 2184
TARE 2041 KG / 4500 LBS
PAYLOAD 13835 KG / 30500 LBS

1.5 M WASTE SKIP/TOOL BOX	
L x W x H	1500 x 1500 x 1275
TARE	965 KG / 2127 LBS
PAYLOAD	3035 KG / 6691 LBS

2 M WASTE SKIP/TOOL BOX	
L x W x H	2000 x 1500 x 1275
TARE	1150 KG / 2535 LBS
PAYLOAD	3050 KG / 6724 LBS

CLOSED TOP WASTE SKIP	
L x W x H	2800 x 1820 x 1790
TARE	2040 KG / 4497 LBS
PAYLOAD	5460 KG / 12037 LBS

BOAT RUBBISH SKIP	
L x W x H	3776 x 1839 x 1554
TARE	1600 KG / 3527 LBS
PAYLOAD	5900 KG / 13007 LBS

15 BBL CUTTINGS BOX	
x W x H	2100 x 2100 x 1230
TARE	2050 KG / 4520 LBS
PAYLOAD	7650 KG / 16865 LBS

22 BBL CUTTINGS BOX	
L x W x H	2280 x 1950 x 1250
TARE	1800 KG / 3968 LBS
PAYLOAD	8200 KG / 18078 LBS

25 BBL CUTTINGS BOX	
L x W x H	2438 x 2134 x 1305
TARE	2800 KG / 6173 LBS
PAYLOAD	10808 KG / 23827 LBS

550 GAL ACID TANK	
L x W x H	2422 x 1584 x 1912
TARE	1460 KG / 3220 LBS
PAYLOAD	2900 KG / 6390 LBS

19 BBL HORIZONTAL HELI-FUEL TANK	
L x W x H	2150 x 1900 x 2331
TARE	1850 KG / 4078 LBS
PAYLOAD	3650 KG / 8047 LBS

25 BBL SS VERTICAL TANK	
L x W x H	2006 x 2006 x 2600
TARE	1970 KG / 4343 LBS
PAYLOAD	6030 KG / 13294 LBS

47.5 BBL SS TANK	
L x W x H	2991 x 2438 x 2591
TARE	2650 KG / 5842 LBS
PAYLOAD	12350 KG / 27227 LBS

125 BBL SS TRANSPORT TANK	
L x W x H	6058 x 2438 x 2591
TARE	7300 KG / 16095 LBS
PAYLOAD	22700 KG / 50045 LBS

25 BBL IM 101 TRANSPORT TANK	
Non-DNV	
L x W x H	1829 x 2438 x 2341

500 BBL CGA TRANSPORT TANK	
Non-DNV	
L x W x H	12700 x 2591 x 3658

400 BBL OPEN TOP MIX TANK	
Non-DNV	
L x W x H	12852 x 2591 x 3429

500 BBL LIQUID STORAGE TANK	
Non-DNV	
L x W x H	13716 x 2438 x 3048

10.0 TRG WASTE SAMPLING AND ANALYTICAL PROCEDURE – PRE AND POST TREATMENT

10.1 Waste monitoring is a typical requirement outlined by regulators in the Terms of Reference of permits granted. The waste monitoring is conducted to ensure firstly there are no adverse impacts on the environment and secondly that the facility and its operations are operating within the compliance requirements of the permit and the legislation. Where no regulatory body or legislation is applicable, compliance will conform to industry best practice and / or international guidance pertaining to wastewater discharge quality standards.

This procedure applies to all operations generating or receiving waste for processing and disposal. The scope will include identification of the personnel responsible for the sampling, QA/QC guidelines, typical analytical parameters, sampling preparation, sampling techniques, shipping samples and documentation.

TRG has developed field sampling procedures for the following:

1. **Wastewater/Processed Water Pipeline**
2. **Wastewater/Processed Water Tank**
3. **Wastewater/Processed Water IBC**
4. **Solids/Sludge Vertical Infrared Unit**
5. **Solids/Sludge Incinerator**

In general, water samples with multiple or unknown chemical types should be stored in containers made from borosilicate glass, high density polyethylene plastic or polytetrafluoroethylene (PTFE or Teflon) as these materials minimize leaching, dissolution, and sorption (ASTM, 2000a; APHA, 1995). Samples for organic contaminant analysis should be stored in brown borosilicate glass containers with PTFE lid liners. If volatile compounds will be analyzed, containers should have a septum to minimize escape of volatile gases during storage and analysis. Extra containers should be provided for these analyses in the event that re-analysis of the sample is required. If samples are contaminated with photoreactive compounds such as PAHs, exposure to light should be minimized by using brown glass containers or clear containers wrapped tightly with an opaque material (e.g., clean aluminum foil). Plastic or acid-rinsed glass containers are recommended when the chemicals of concern are heavy metals. Fill containers completely if the sample will not be frozen prior to analysis. Any material that is in contact with a field sample has the potential to contaminate the sample or adsorb components from the sample. The use of appropriate materials, along with appropriate cleaning procedures, can minimize or mitigate interferences from sample containers. All utensils (e.g., spoons, scoops, spatulas) which come in direct contact with sediment samples during handling and processing should be made of non-contaminating materials (e.g., glass, high-quality stainless steel and/or Teflon®). If a sample is to be refrigerated, the container should be filled to the brim to reduce oxygen exposure. This is particularly critical for volatile compounds. If a sample is to be frozen, the container should be filled to approximately 90% of its

volume (i.e., 10% headspace) to allow for expansion of the sample during freezing. Refer to Figures #3 to #6. All sample containers should be properly labelled with a marker prior to sampling. Containers should be labelled on their sides in addition to or instead of labelling the lids. Each label should include, at a minimum, the study title, station location and/or sample identification, date and time of collection, sample type, and name of collector. Blind sample labelling (i.e., a sample code) should be used, along with a sample log that identifies information about each sample to minimize potential analytical bias. Additional information such as required analyses and any preservative used might also be included on the label although this information is typically recorded on the chain-of-custody form. Labelled containers should be stabilized in an upright position in the transport or storage container. Extra containers should be carried on each sampling trip.

Sample Collection

Before each sampling event, all instruments and equipment must be inspected prior to use i.e., clean, good working condition before used for sample collection. Ensure appropriate Personal Protective Equipment is worn (safety goggles, gloves, face shields etc.). Gloves should be clean, new, and disposable. These should be changed upon arrival at a new sampling point. Stick labels on sampling bottles and record on label information.

10.1.1 Sample Collection - Pipeline

Carefully open bleed point on sample line and allow water to flow for 5 - 10 seconds.

Ensure that the flow and material to be collected is constant/consistent before sample is actually collected. b)

Collect amount of representative sample in the pre-labelled sample bottles provided by following the instructions for each bottle type:

i. **Polyethylene Plastic Bottles** – Rinse bottle 2-3 times with a small amount of the effluent (one tenth of the bottle volume) and discard in an environmentally responsible manner. Fill bottle to top with minimal amount of air remaining in bottle. Stopper tightly and store on ice in cooler.

ii. **Borosilicate Glass Bottles** - One Liter – These are for organic tests and are not to be rinsed to allow for additional organic material to collect in the bottle. Simply fill the bottle to 90% full or to shoulder of bottle (maybe marked by lab) and store on ice in cooler.

iii. **Borosilicate Glass/HDPE Plastic Bottles** - 250 mls Sterilized - This is for microbiological testing and care must be taken not to touch the mouth or cap of bottle with anything besides the actual liquid sample. Do not rinse bottle before sampling. Fill bottle to shoulder level of bottle. Stopper tightly and store on ice in cooler.

10.1.2 Sample Collection – Tank

A) Prior to opening a tank for internal inspection, the tank sampling team shall:
   i. Review safety procedures and emergency contingency plans with the Health and Safety Officer.

   ii. Ensure that the tank is properly grounded.

   iii. Remove all sources of ignition from the immediate area.

B) Prior to commencing sampling, the tank headspace should be cleared of any toxic or explosive vapor concentration. After opening top hatch of tank, ensure all headspace gases are cleared and/or environmental sampler should wear a respirator. No work shall start if the lower explosive limit 1 (LEL) readings exceed 25% (refer to Section #24 References #11). At 10% LEL, work can continue but with extreme caution.

C) Collect air quality measurements for each potential sample location using an explosimeter/oxygen meter for a lower explosive limit (LEL/O2) reading and an applicable gas monitor for organic vapor concentration. Both readings should be taken from the tank headspace, above the sampling port, and in the breathing zone.

D) Determine the depth of any and all liquid, solid, and liquid/solid interface, and depth of sludge using a weighted tape measure, probe line, sludge judge, or equivalent.

E) Collect liquid samples from one (1) foot below the surface, using a subsurface grab sampler sampling rod).

F) Samples should always be collected through an opened hatch at the top of the tank.

G) Valves near the bottom should not be used, because of their questionable or unknown integrity.

H) Collect amount of representative sample in the pre-labelled sample bottles provided by following the instructions for each bottle type:
   i. Polyethylene Plastic Bottles – Rinse bottle 2-3 times with a small amount of the effluent (one tenth of the bottle volume) and discard in an environmentally responsible manner. Fill bottle to top with minimal amount of air remaining in bottle. Stopper tightly and store on ice in cooler.

   ii. Borosilicate Glass Bottles - One Liter – These are for organic tests and are not to be rinsed to allow for additional organic material to collect in the bottle. Simply fill the

bottle to 90% full or to shoulder of bottle (maybe marked by lab) and store on ice in cooler.

iii. Borosilicate Glass or HPE Plastic Bottles - 250 mls Sterilized - This is for microbiological testing and care must be taken not to touch the mouth or cap of bottle with anything besides the actual liquid sample. Do not rinse bottle before sampling. Fill bottle to shoulder level of bottle. Stopper tightly and store on ice in cooler.

Subsurface grab samplers are designed to collect samples of liquids at various depths. The sampler is usually constructed of aluminum or stainless-steel piping with an attached clamp that attaches to a 1-liter polyethylene plastic sample container. When using a subsurface grab sampler:

- ✓ Screw the sampling bottle onto the sampling head.
- ✓ Lower the sampler to the desired depth.
- ✓ Ensure sample bottles are filled with water sample, as indicated in steps ‘g’ to ‘j’.
- ✓ Lift sampler and remove filled sample bottle. Secure bottle cover and place in sampling cooler.

10.1.3 Sample Collection – Intermediate Bulk Container (IBC)

A) Prior to opening an IBC for internal inspection, the IBC sampling team shall:
   i. Review safety procedures and emergency contingency plans with the Health and Safety Officer.

   ii. Remove all sources of ignition from the immediate area.

B) Prior to commencing sampling, the IBC headspace should be cleared of any toxic or explosive vapor concentration. After opening the top fill aperture located on the surface of the IBC, ensure all headspace gases are cleared and/or environmental sampler should wear a respirator. No work shall start if the lower explosive limit 2 (LEL) readings exceed 25%. At 10% LEL, work can continue but with extreme caution.

C) Collect air quality measurements for each potential sample location using an explosimeter/oxygen meter for a lower explosive limit (LEL/O2) reading and an applicable gas monitor for organic vapor concentration. Both readings should be taken from the tank headspace, above the sampling port, and in the breathing zone.

D) Determine the depth of any and all liquid, solid, and liquid/solid interface, and depth of sludge using a weighted tape measure, probe line, sludge judge, or equivalent.

E) Collect liquid samples from one (1) foot below the surface, using a subsurface grab sampler (sampling rod).

F) Samples should always be collected through an opened lid at the top of the IBC.

G) Collect amount of representative sample in the pre-labelled sample bottles provided by following the instructions for each bottle type.

i. Polyethylene Plastic Bottles – Rinse bottle 2-3 times with a small amount of the effluent (one tenth of the bottle volume) and discard in an environmentally responsible manner. Fill bottle to top with minimal amount of air remaining in bottle. Stopper tightly and store on ice in cooler.

ii. Borosilicate Glass Bottles - One Liter – These are for organic tests and are not to be rinsed to allow for additional organic material to collect in the bottle. Simply fill the bottle to 90% full or to shoulder of bottle (maybe marked by lab) and store on ice in cooler.

iii. Borosilicate Glass or HDPE Plastic Bottle - 250 mLs Sterilized - This is for microbiological testing and care must be taken not to touch the mouth or cap of bottle with anything besides the actual liquid sample. Do not rinse bottle before sampling. Fill bottle to shoulder level of bottle. Stopper tightly and store on ice in cooler.

When using a subsurface grab sampler:

- ✓ Screw the sampling bottle onto the sampling head.
- ✓ Lower the sampler to the desired depth.
- ✓ Ensure sample bottles are filled with water sample, as indicated in steps above.
- ✓ Lift sampler and remove filled sample bottle.
- ✓ Secure bottle cover and place in sampling cooler.

10.1.4 Sample Collection – Vertical Infrared System & Incinerator

In **VIR system,** 100-bbls waste is processed per batch. Each batch usually generates 4-6 1-ton bags of solid material. A grab sample will be collected from each bag and a composite made. 3-batches or 300- bbls are processed before a sample is sent for analysis. This final sample is a composite of the composite made for each batch. This is done for homogenous waste. If a different waste type is processed, then a composite for that batch burn (100-bbls) will be sent.

For **incinerator** operations, homogenous waste types are comingled and loaded. A composite sample will be collected from no more than 3-bags per homogenous waste type and sent to the lab for analysis.

For generating a composite sample, from sample collection of each bag:

A) Dip the scoop (trowel) into the solid waste material and withdraw the scoop and level off the material so there is none above the sides of the scoop.

B) Transfer the sample into a wide stainless-steel tray.

C) Decontaminate/clean scoop.

D) Repeat steps above, for each bag.

E) After all grab samples are collected from each bag, and placed into the stainless-steel tray, thoroughly mix the waste.

F) Then add the composite mixed sample into two types of sampling bottles:
- ✓ a wide mouth 1-Liter HDPE plastic sample container and label "MET".
- ✓ a wide mouth 1-Liter Borosilicate Glass Bottle and label "ORG". Fill the sample right up to the top.

G) Seal the container with an appropriate lid that will prevent leakage or minimize ingress of:

i. air.

ii. Each sample bottle must be assigned a unique label.

iii. The information to be entered on the label includes:
- ✓ Date, time, and location of sample collection.
- ✓ Waste Collection Method: Composite
- ✓ Client Sample Identification Name.
- ✓ Client's Name.

iv. Composite samples are to be placed into a cooler, on ice, at < 6ºC for transport to the laboratory. Sample should not be frozen.

v. Solid waste samples must be delivered to the laboratory to allow for analyses or tests to be conducted within the prescribed holding and testing times. Holding times will vary depending on the analyses to be performed.

10.2 Allocation of Sample Bottles

The following sampling bottles are to be collected per wastewater sample/sample location:

- ✓ One (1) Borosilicate Glass Bottles - One Liter – Label as "TPH"; PRESERVE by adding 5 ml of 50% Sulphuric Acid (H2SO4). Stopper Tightly

- ✓ Two (2) Polyethylene Plastic Bottles – 500 milliliters. Label One **"TSS/pH"** and Label One **"BOD"** – **Do not** preserve these bottles.

- ✓ One (1) Borosilicate Glass or HDPE Plastic bottle - 250 ml Sterilized – Label as **"MICROB".**

10.3 Safety Practices

Liquid Samples –

1. Sampling a storage tank requires a great deal of manual dexterity, often requiring climbing to the top of the tank upon a narrow vertical or spiral stairway or ladder while wearing protective clothing and carrying sampling equipment.

2. Currently, US OSHA requires that workers on a walking or working surface with an unprotected edge that is 6 feet or more above a lower level shall wear a fall protection approved by OSHA including guardrails, safety net systems, and personal fall arrest systems (i.e., safety harnesses).

3. Before climbing onto the vessel, a structural survey should be performed. This will ensure appropriate consideration of safety and accessibility prior to initiation of any field activities.
4. As in all opening of containers, extreme caution should be taken to avoid ignition or combustion of volatile contents. All tools used must be constructed of a non-sparking material and electronic instruments must be intrinsically safe.

5. All sample locations should be surveyed for air quality prior to sampling. At no time should sampling continue with a lower explosive limit (LEL) reading greater than 25%.

Solid Samples –

1. As in all opening of containers, extreme caution should be taken to avoid ignition or combustion of volatile contents. All tools used must be constructed of a non-sparking material and electronic instruments must be intrinsically safe.
2. All sample locations should be surveyed for air quality prior to sampling. At no time should sampling continue with a lower explosive limit (LEL) reading>25%.

10.4 Sample Labelling

Place the sample bottle in designated container. Each sample bottle must be assigned a unique label. The information to be entered on the label includes:

1. Date and time of taken sample.
2. Client Sample Identification Name
3. Sample Type: Grab
4. Client's Name
5. Preservation

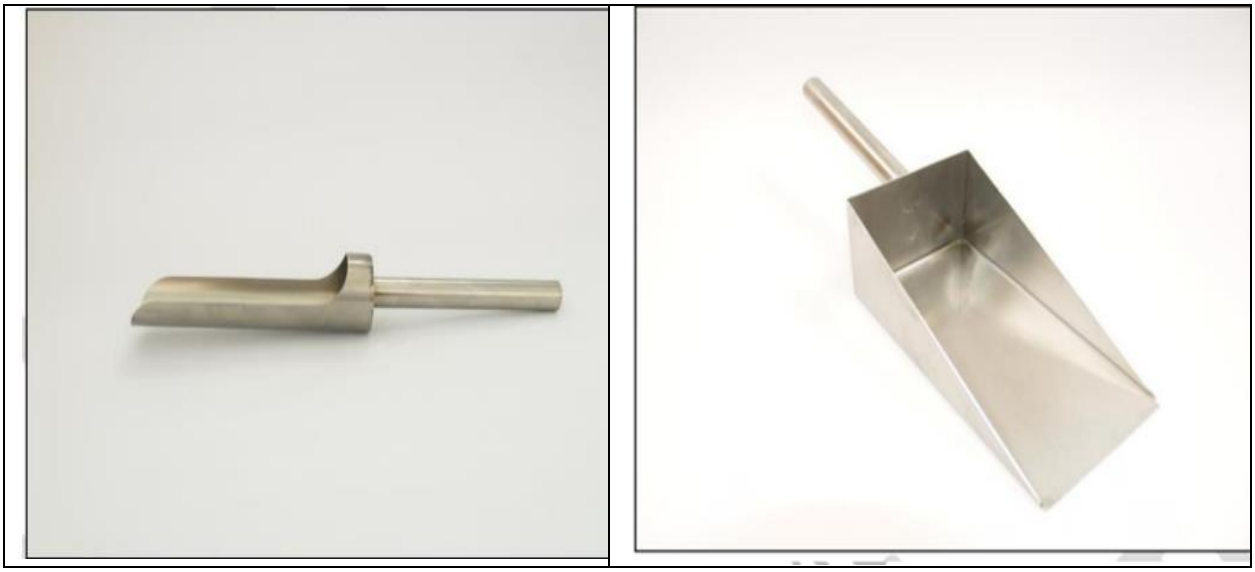
10.5 Temperature Analysis Procedure

Temperature Analysis Procedure: Using the Plastic bottle labelled "TSS/pH" - Place the thermometer or meter probe in the sample container at least 4 inches or halfway below the surface.

If using a thermometer, allow enough time for it to reach a stable temperature (at least 1 minute). If using a meter, allow the temperature reading to stabilize at a constant temperature reading. Make a note of the temperature reading as this will be transferred to the COC form in the post sampling phase.

The methods described shall be performed in conformance with the 23rd Edition, 2017, of "Standard Methods for the Examination of Water and Wastewater (SMEWW)", United States Environmental Protection Agency (USEPA) Reference Methods and the Standard Operating Procedures for Ecotox Environmental Services, the laboratory engaged to provide the waste analytical support services.

Figures 8 & 9 : Trowels used for solid sample taking.



10.6 Table 11: Sample Containers Preservation and Allocation

Sample Matrix	Sample Container	Initial Rinse with Sample	Sample Container Fill Level	Preservation	Label I.D.
Wastewater	1 x 1 Liter Borosilicate Glass	NO	Shoulder Level	5 ml of 50% Sulphuric Acid (H2SO4)	TPH
	1 x 500 milliliter Polyethylene Plastic Bottle	YES	Right-up	None. Store at ≤ 6°C.	TSS
	1 x 500 milliliter Polyethylene Plastic Bottle	YES	Right-up	None. Store at ≤ 6°C.	BOD
	1 x 250 mL Borosilicate glass or Polyethylene plastic bottle	NO	Shoulder Level	None. Store at ≤ 6°C.	MICROB
	1 x 1-L Borosilicate Glass Bottle	Not Applicable	Right-up	None. Store at ≤	ORG
Solid Waste	1 x 1-L Polyethylene Plastic Bottle	Not Applicable	Right-up	None. Store at ≤ 6°C.	MET

10.7 Chain of Custody

Samples must be sent with a completed chain-of-custody/analytical request form (temperature reading should include on this form or Field Log Form), signed by the Client Represented and Field Technician/Sampler. The following information must be completed on the chain-of-custody form:

- ✓ Client's Name.
- ✓ Project Name.
- ✓ Project Number.
- ✓ Sampled By (Person who performed the sampling procedure)
- ✓ Client Sample Identification (List of all samples taken) with corresponding date, time, and temperature of the sample.
- ✓ Sample Temperature
- ✓ Requested Analyses (Contract Lab)
- ✓ Matrix (water)
- ✓ Number of containers
- ✓ Plant Condition
- ✓ Weather Conditions
- ✓ Any other comments to be noted at time of sampling.
- ✓ Important information regarding the sample e.g., appearance
- ✓ Relinquished By (Signature by OPS)
- ✓ Received By (Signature by Contract Lab Representative).

10.8 Shipping Samples

The shipping or delivery to the laboratory must consider the holding time for any specific parameter to be tested. There must be enough time allowed for the for the samples to be taken, prepared, shipped and received by the laboratory before the holding time expires. Samples must be packed upright in a cooler surrounded by ice or ice packs. The samples that are most likely to deteriorate must be closest to the ice packs. Glass sample bottles must be wrapped in bubble wrap or some other protective wrapping to prevent breakage. Labels must be checked to ensure they are legible before wrapping.

10.9 Sample collection and storage containers

Plastic Microbiology Bottles

Glass Microbiology Bottles

Nalgene Plastic Bottles

Borosilicate Glass Bottles

11.0 WASTE RECYCLING

EPA and SMU Authorized dealer accepts recyclable waste (Scrap Metal, ULABs). This waste is then packaged and shipped for sale/recycling in accordance with the Basel Convention for the Transboundary Movement of Hazardous Wastes and their disposal.

12.0 TREATMENT PROCESS WASTE GENERATION

12.1 Table 12: Waste Categories, as per the Basel Convention & Environmental Protection (Hazardous Waste) Regulations definitions of Hazardous and Non-Hazardous Wastes, which are generated via TRG treatment processes.

Waste Type	Method of Generation	Waste Classification	Disposal method
Ash/Incineration Debris	Solid Waste Incinerator	Non-Hazardous	Landfill
Stabilized Solid Waste	Pugmill – Solidification/ Stabilization	Non-Hazardous	Landfill
Filtered Water	Water Treatment – Filtration	Non-Hazardous	Discharge
Skimmed Oil	Water Treatment - Filtration	Hazardous	VIR Processing

12.2 Table 13: Waste product from treatment systems and respective testing parameters prior to disposal.

Treatment System	Waste Type	Testing components	Respective Parameters/Standard
Oil-Water Separator	**Filtered Water**	• pH • Total Petroleum Hydrocarbon • Faecal Coliform • Biochemical Oxygen Demand • Total Suspended Solids	• Guyana National Bureau of Standards Interim Guidelines for Industrial Effluent Discharge into the Environment
Pugmill	**Stabilized Solid Waste**	• Total Oil & Grease • Toxicity Characteristic Leaching Procedure	• TCLP United States Environmental Protection Agency Resource Recovery and Conservation Act, RCRA-8 Metals Maximum Permissible Limits (Maximum Concentration of Contaminants) • Louisiana Administrative Code (LAC), Title 43, part XIX, Office of Conservation – General Operations Subpart 1. State-wide Order No. 29-B; Section 313, E, Burial or Trenching of Treated Pit Solid Phase Contents – Pit Closure Techniques and Onsite Disposal of Exploration and Production Waste Standard (November 2019).

Solid Waste Incinerator	**Ash/Incineration Debris**	• Total Oil & Grease • Toxicity Characteristic Leaching Procedure	• TCLP United States Environmental Protection Agency Resource Recovery and Conservation Act, RCRA-8 Metals Maximum Permissible Limits (Maximum Concentration of Contaminants) • Louisiana Administrative Code (LAC), Title 43, part XIX, Office of Conservation – General Operations Subpart 1. State-wide Order No. 29-B; Section 313, E, Burial or Trenching of Treated Pit Solid Phase Contents – Pit Closure Techniques and Onsite Disposal of Exploration and Production Waste Standard (November 2019).
VIR System	**Dry Solids**	• Total Oil & Grease • Toxicity Characteristic Leaching Procedure	• TCLP United States Environmental Protection Agency Resource Recovery and Conservation Act, RCRA-8 Metals Maximum Permissible Limits (Maximum Concentration of Contaminants) • Louisiana Administrative Code (LAC), Title 43, part XIX, Office of Conservation – General Operations Subpart 1. State-wide Order No. 29-B; Section 313, E, Burial or Trenching of Treated Pit Solid Phase Contents – Pit Closure Techniques and Onsite Disposal of Exploration and Production Waste Standard (November 2019).

13.0 SAFETY EQUIPMENT AND MACHINERY

List of Equipment and Machinery utilized in TRG Waste Management Operations

1. Air Compressor
2. 3- & 16-ton Forklifts
3. 250 & 450 kva Generators
4. Electrical and Engine Driven Vacuums
5. 2 Pugmills
6. 3 Diaphragm Pumps
7. Centrifugal Pumps
8. Electrical Drum Crusher
9. Oxidizer
10. Scrubbers

List of Safety Equipment utilized in TRG Waste Management Operations

1. Fire Extinguishers
2. Sand Buckets
3. Ladders
4. Gas Monitors
5. Personal Monitors
6. Rescue Rope
7. Self Contained Breathing Apparatus

Safety Documents

TRG has implemented the use of **Job Safety Analysis forms (JSAs).** These forms are filled before every task and serve to:

1. List activities associated with the task to be conducted when operating a treatment system or any activity in support of treatment system operation;
2. identify hazards associated with the operation of treatment system or performance of supporting tasks, and;
3. Provide recommendations on methods of elimination for each hazard identified.

Furthermore, a daily checklist has been developed for each treatment system. Checklists are filled before the use/operation of any treatment system or associated machinery to ensure optimal functionality and reduction of risk.

APPENDIX

Appendix 1 : RECORDS/DOCUMENT CONTROL

Waste Location Form

TIGER RENTALS GUYANA

WASTE LOCATION LOG FORM

76 Middle Street, North Cummingsburg,
Georgetown, Guyana
Office: +1 (592) 503 1394 24/7
Dispatch: +1 (877) 844-3791
Website: tigertankstrinidad.com

Area _____ ZONE _____

Unit Serial #	Unit type	Volume	Waste Description (Hazardous/ Non-Hazardous)	Disposal Option	IWM/ WMF/DN

Rev Date:9th November, 2018 Page 1 of 2 EF-017.00
Rev 3.0

*Please use an identification # to indicate specific location of each waste at the respective zones.

Waste Disposal/End of life certificate

WASTE DISPOSAL CERTIFICATE

GENERATOR INFORMATION

Generator: _____
Address: _____
Contact Information: Office _____ Mobile _____ email _____
Contact Person: _____ Position _____

WASTE INFORMATION

Waste Description: ☐ Hazardous ☐ Non Hazardous

(Provide a brief description) _____
Process Generating Waste: _____

Physical State ☐ Solid ☐ Liquid ☐ Sludge ☐ Other _____

Waste Volume ☐ _____ Barrels (42 Gal.) ☐ _____ Drum (55 Gal.) ☐ _____ Gallons
☐ _____ Cubic Meters ☐ _____ Pounds ☐ Other _____

Date Waste Received: _____

DISPOSAL INFORMATION

Disposal Option ☐ Recycling ☐ Thermal Desorption ☐ Bioremediation
☐ Incineration ☐ Landfill ☐ Special Disposal

Disposal Facility ☐ Tiger Tanks ☐ Oil Mop ☐ Enviro Care ☐ SWMCOL
Other _____

Date Waste Processed: _____

This Disposal Certificate confirms the waste listed above was processed in strict accordance with the regulatory requirements as outlined by the Environmental Management Authority. Where no regulations exists, internationally accepted procedures were employed

Completed By: _____ Signature _____ Date _____

Authorized By: _____ Signature _____ Date _____

Phone 868-651-1544, Fax 868-648-9763
Lot 22B LABIDCO Industrial Estate,
La Brea, Trinidad, W.I.

Issue Date: 19th. October, 2011
EF-020.00

Waste Generator Information Form

FORM – A1

WASTE GENERATOR INFORMATION

Generator: _____
Address: _____
Contact Information: Office _____ Mobile _____email_____
Contact Person: _____ Position_____
Manifest Number:_____

WASTE INFORMATION (To be completed by waste generator)

Waste Description: ☐ Hazardous ☐ Non Hazardous

(Provide a brief description)_____
Process Generating Waste: _____
_____
Physical State ☐Solid ☐ Liquid ☐ Sludge ☐ Other _____
Physical Properties Colour _____
Odour _____
MSDS ☐ Yes ☐ No
Special Handling Requirements ☐ Yes ☐ No
Waste Volume ☐ _____Barrels (42 Gal.) ☐_____ Drum (55 Gal.) ☐_____ Gallons
☐ _____ Cubic Meters ☐_____Pounds

DISPOSAL INFORMATION (To be completed by TTTU)

Disposal Option ☐ Recycling ☐ Thermal Desorption
☐ Incineration ☐ Landfill
Disposal Facility ☐ Tiger Tanks ☐ Haag Bosch
☐ Other _____
Haulage /Storage ☐ Truck ☐ HWS Skip ☐ Cuttings Box ☐ Other

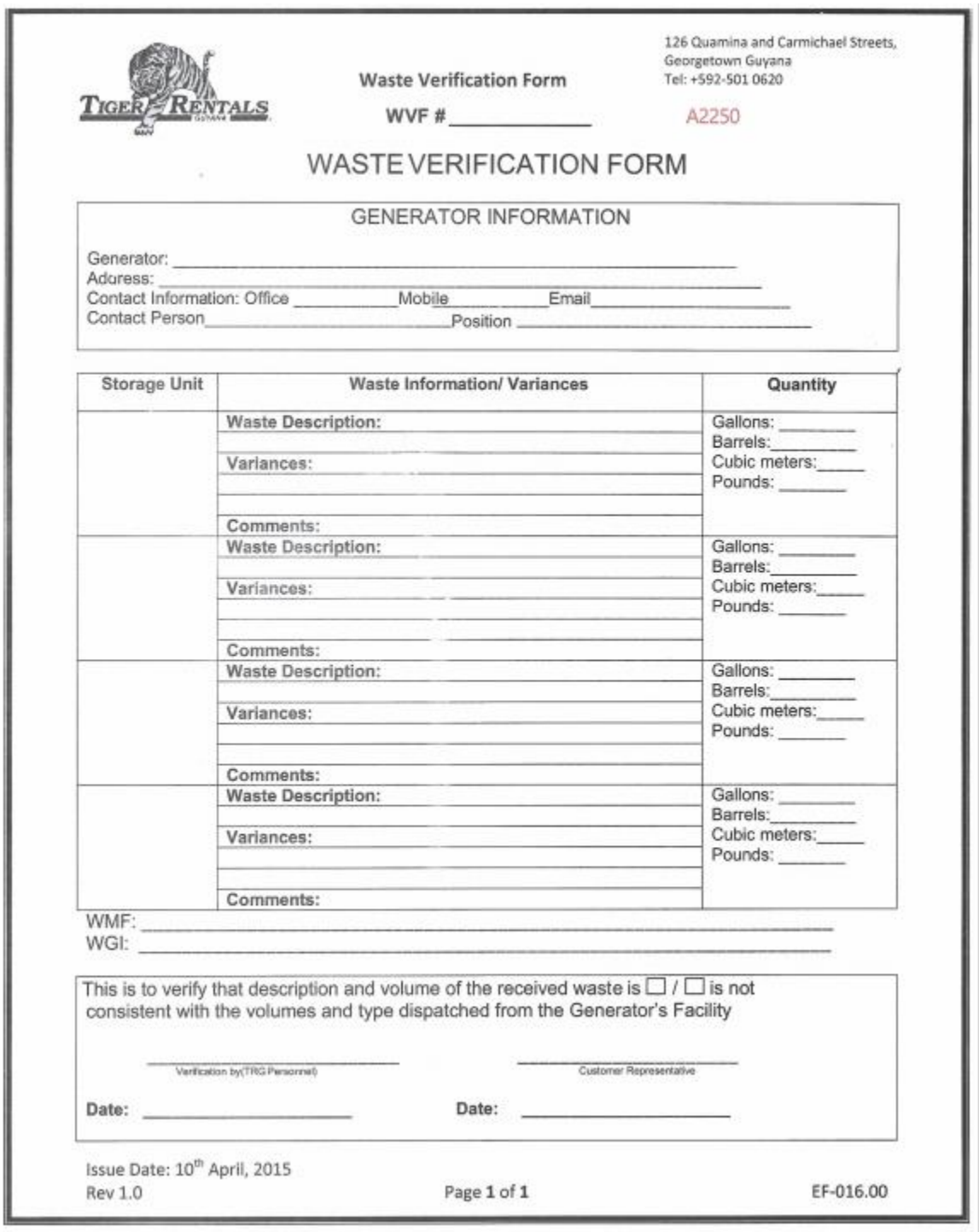
WASTE RECEIPT AT GENERATORS FACILITY

Physical State ☐Solid ☐ Liquid ☐ Sludge ☐ Other _____
Physical Properties Colour _____
Odour _____
MSDS ☐ Yes ☐ No
Waste Volume ☐ _____Barrels (42 Gal.) ☐_____ Drum (55 Gal.) ☐_____ Gallons
☐ _____ Cubic Meters ☐_____Pounds

Dispatched By: _____ Signature_____ Date _____
Received By:_____ Signature_____ __ Date_____

Revision 0.0
Revision Date: 2/13/2015

Waste Verification Form



TIGER RENTALS

126 Quamina and Carmichael Streets,
Georgetown Guyana
Tel: +592-501 0620

Waste Verification Form

WVF # _____ A2250

WASTE VERIFICATION FORM

GENERATOR INFORMATION

Generator: _____
Adoress: _____
Contact Information: Office _____Mobile_____Email_____
Contact Person_____Position _____

Storage Unit	Waste Information/ Variances	Quantity
	Waste Description: **Variances:** **Comments:**	Gallons: _____ Barrels:_____ Cubic meters:_____ Pounds: _____
	Waste Description: **Variances:** **Comments:**	Gallons: _____ Barrels:_____ Cubic meters:_____ Pounds: _____
	Waste Description: **Variances:** **Comments:**	Gallons: _____ Barrels:_____ Cubic meters:_____ Pounds: _____
	Waste Description: **Variances:** **Comments:**	Gallons: _____ Barrels:_____ Cubic meters:_____ Pounds: _____

WMF: _____
WGI: _____

This is to verify that description and volume of the received waste is ☐ / ☐ is not consistent with the volumes and type dispatched from the Generator's Facility

_____ Verification by(TRG Personnel)

_____ Customer Representative

Date: _____ **Date:** _____

Issue Date: 10th April, 2015
Rev 1.0

Page **1** of **1**

EF-016.00

Internal Waste Movement Form

INTERNAL WASTE MOVEMENT FORM

DATE OF WASTE REMOVAL (*DD/MM/YYYY*): _____

DATE OF WASTE TRANSFER (*DD/MM/YYYY*): _____

GENERATOR INFORMATION

WASTE GENERATOR NAME: _____

WASTE DESCRIPTION: ☐ HAZARDOUS ☐ NON –HAZARDOUS

PHYSICAL STATE: ☐ SOLID ☐ LIQUID ☐ SLUDGE OTHER _____

COLOR: _____ ODOR: _____

MANIFEST REFERENCES

WMF: _____

WGI: _____

WASTE TRANSFER INFORMATION			
REMOVED		***TRANSFERRED***	
SERIAL #/ LOCATION	QUANTITY	SERIAL #/ LOCATION	QUANTITY

JOB SUPERVISOR : _____ DATE: _____

TRANSPORTER : _____ DATE: _____

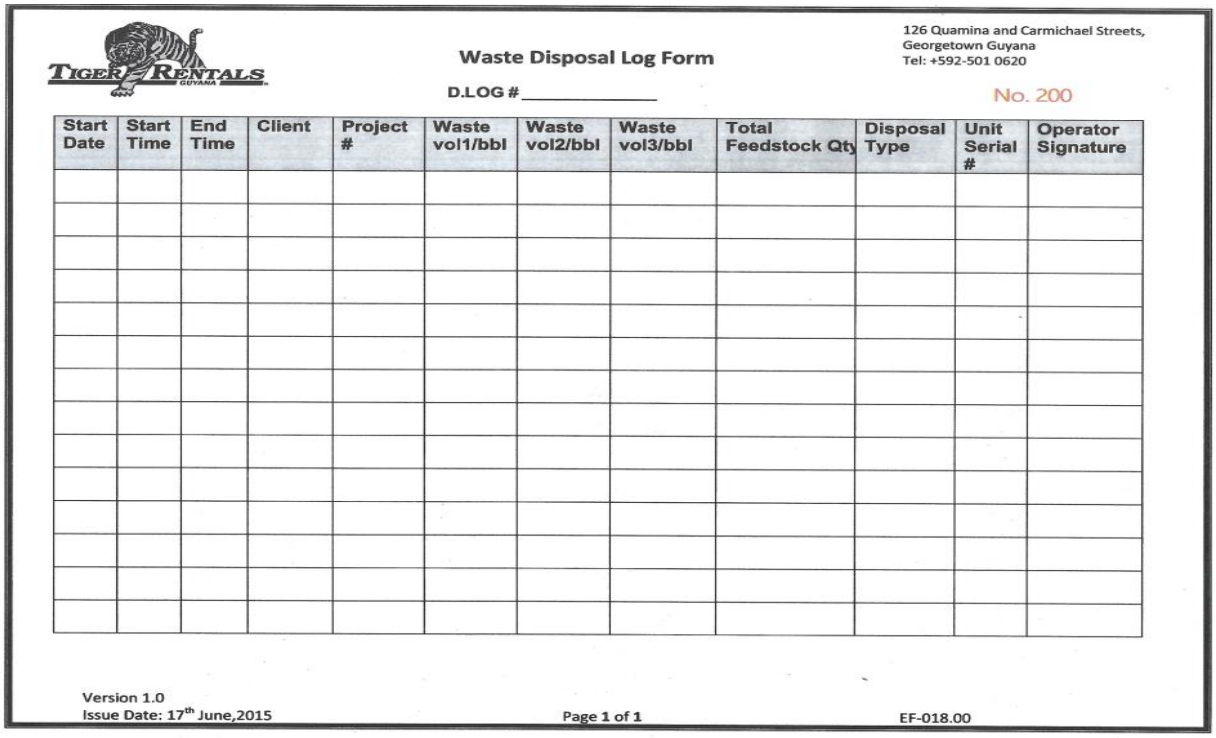
ENVIRONMENTAL REP : _____ DATE: _____

DIVISION SUPERVISOR _____ DATE: _____

REV 0.0
6TH MARCH, 2015

Page 1 of 1
IWM QF7.8-4/9

Waste Disposal Log Form



TIGER RENTALS GUYANA

Waste Disposal Log Form

126 Quamina and Carmichael Streets,
Georgetown Guyana
Tel: +592-501 0620

D.LOG #_____

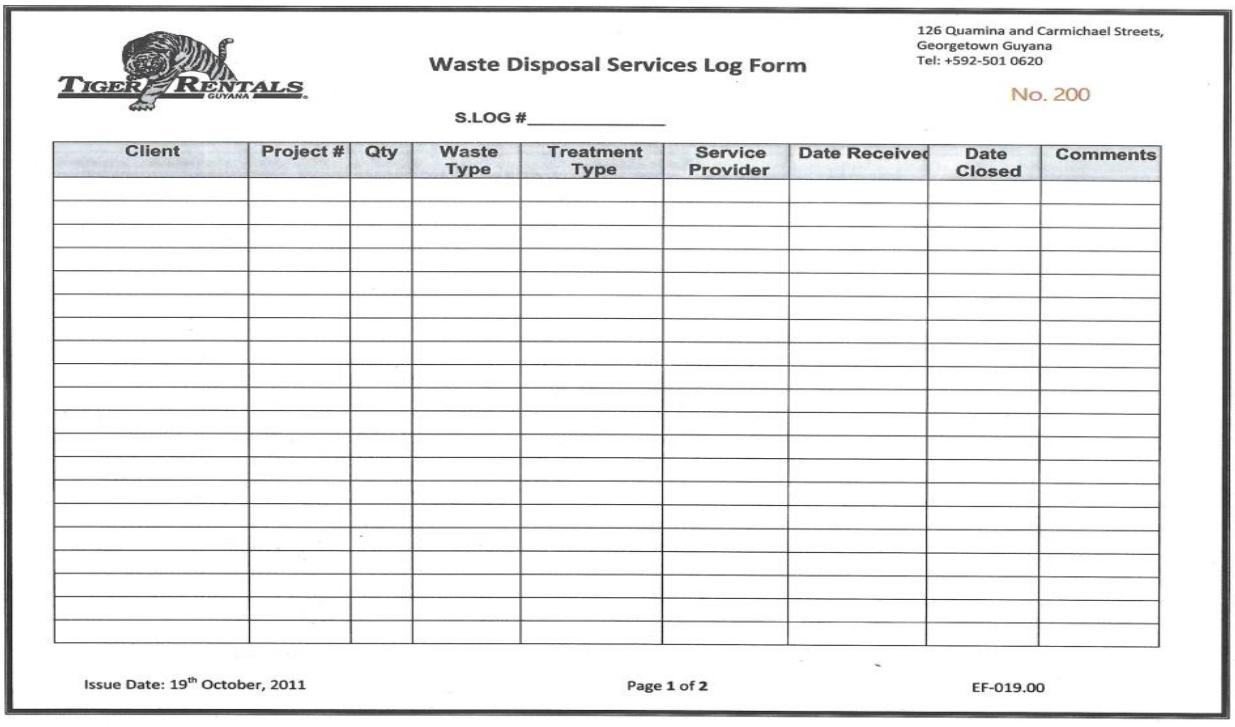
No. 200

Start Date	Start Time	End Time	Client	Project #	Waste vol1/bbl	Waste vol2/bbl	Waste vol3/bbl	Total Feedstock Qty	Disposal Type	Unit Serial #	Operator Signature

Version 1.0
Issue Date: 17th June,2015

Page 1 of 1

EF-018.00



TIGER RENTALS GUYANA

Waste Disposal Services Log Form

126 Quamina and Carmichael Streets,
Georgetown Guyana
Tel: +592-501 0620

S.LOG #_____

No. 200

Client	Project #	Qty	Waste Type	Treatment Type	Service Provider	Date Received	Date Closed	Comments

Issue Date: 19th October, 2011

Page 1 of 2

EF-019.00

Chain of Custody

ECOTOX ENVIRONMENTAL SERVICES LIMITED

ANALYTICAL REQUEST FORM
CHAIN OF CUSTODY

Laboratory Address: #213 Caroni Savannah Rd, Charlieville, Trinidad, West Indies.
Tel: (868)-672-6620 **Fax:** (868) 665-8620; (868) 221-9149
e-mail: admin@ecotoxes.com, md@ecotoxes.com

CLIENT: Tiger Tanks Trinidad Unlimited (for Tiger Tanks Guyana Rentals Inc.)

INVOICE TO:

REPORT TO: Mr. Shane Singh

ADDRESS: #126 Quamina & Carmichael Streets, Georgetown, Guyana.

PHONE: 592-501-0620 **FAX:**

BILLING ADDRESS:

P.O. NUMBER:

COC#:

TURNAROUND REQUEST in Business Days

Analysis

10 | 7 | 5 | 3 | 2 | 1 | <1 — *STD.*

Microbiological Analyses

10 | 7 | 5 | 3 | 2 | 1 — *STD.*

Please Specify

OTHER _____

PROJECT NAME:
PROJECT NUMBER:
SAMPLED BY:

REQUESTED ANALYSIS

CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME							MATRIX (W.S.O)	# OF CONT.	COMMENTS	ECOTOX ID
1.											
2.											
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											

RELINQUISHED BY:	**DATE:**	**RECEIVED BY:**	**DATE:**
PRINT NAME: **FIRM:**	**TIME:**	**PRINT NAME:** **FIRM:**	**TIME:**
RELINQUISHED BY:	**DATE:**	**RELINQUISHED BY:**	**DATE:**
PRINT NAME: **FIRM:**	**TIME:**	**PRINT NAME:** **FIRM:**	**TIME:**

ADDITIONAL INFO/SPECIAL REQUESTS:

PAGE OF

Waste Manifest Form

126 Quamina and Carmichael Streets
Tel: +592-501 0620
E-mail:sales@tigertankstrinidad.com|ops.guyana@tigertankstrinidad.com
Website:www.tigertankstrinidad.com

Form # A 1650

WASTE MANIFEST FORM

PLEASE PRINT IN BLOCK LETTERS UNLESS INSTRUCTED OTHERWISE

1.GENERATOR+S NAME:	A. GENERATOR+S ADDRESS: B. GENERATOR+S PHONE NO:
2.TRANSPORTER NAME:	C. TRANSPORTER ADDRESS: D. TRANSPORTER PHONE NO:
3.DESIGNATED DISPOSAL FACILITY NAME:	E. DESIGNATED FACILITY ADDRESS: F. DESIGNATED FACILITY PHONE NO.: G. DESIGNATED FACILITY CONTACT PERSON:

4. GENERAL DESCRIPTION OF WASTE

WASTE TYPE	*DISPOSAL METHOD*	*UOM(bbl, lbs, etc)*	*QTY*

5. WASTE PROPERTIES:

PHYSICAL STATE Solid Semi-solid Powder Liquid Other_____
COLOR Describe_____
ODOR Describe_____
FLASH POINT, °C _____
USED OILS PRESENT? YES NO
MSDS SUPPLIED? YES NO
OTHER INFORMATION:_____

6. WORK TIME: _____

A. TIME LEAVE TTTU BASE:_____ E. TIME LEAVE JOB LOCATION: _____
B. TIME ON JOB LOCATION:_____ F. TIME ARRIVE AT DISPOSAL SITE: _____
C. TIME START VACUUMING:_____ G. TIME LEAVE DISPOSAL SITE: _____
D. TIME STOP VACUUMING : _____ H. TIME RETURNED TO TTTU BASE: _____
ADDITIONAL COMMENTS / STANDBY : YES NO

7. GENERATOR DECLARATION: I HEREBY DECLARE THAT THE CONTENTS OF THIS CONSIGNMENT ARE FULLY AND ACCURATELY DESCRIBED ABOVE. I HAVE DONE AS MUCH AS IS REASONABLY PRACTICABLE TO MINIMIZE MY WASTE GENERATION AND, AS LISTED IN MY WASTE MANAGEMENT PROGRAM, I AM UTILIZING THE BEST WASTE MANAGEMENT METHOD THAT IS AVAILABLE AND AFFORDABLE TO MY COMPANY.

GENERATOR REPRESENTATIVE NAME (PRINT) GENERATOR REPRESENTATIVE (SIGNATURE) DATE (DD/MM/YY)

8. TRANSPORTER ACKNOWLEDGEMENT OF RECEIPT OF WASTE:

TRANSPORTER REPRESENTATIVE NAME (PRINT) TRANSPORTER REPRESENTATIVE (SIGNATURE) DATE (DD/MM/YY)

9. DESIGNATED DISPOSAL FACILITY OPERATOR ACKNOWLEDGEMENT OF RECEIPT OF WASTE AT SITE:

FACILITY REPRESENTATIVE NAME (PRINT) FACILITY REPRESENTATIVE (SIGNATURE) DATE (DD/MM/YY)

Sampling Report/ Testing Results

EcoTox Environmental Services Ltd.

Incinerator 4 Treated Waste (16th November 2020)

Quality Analysis Report

Date of Report: 28th December 2020

Client: Tiger Tanks Trinidad Unlimited

Project Code: ECO-TTTU-243

Test Conducted By:

ECOTOX
ENVIRONMENTAL SERVICES LIMITED
213 Caroni Savannah Road, Charlieville, Chaguanas, Trinidad, W.I.
Tel.: (868) 672-6620 Fax: (868) 665-8620 E-mail: admin@ecotoxes.com, www.ecotoxes.com

Nafeesa Ali — Laboratory Manager

Mikaiel Dookie — Operations Manager/Chemist

Date of Report: **28th December 2020**
Client: **Tiger Tanks Trinidad Unlimited**
Client Address: **La Bidco Estate, La Brea, Trinidad, W.I.**
Project Code: **ECO-TTTU-243**
Report No.: **243**

1.0 Introduction

ECOTOX Environmental Services Limited (ECOTOX) was contracted by Tiger Tanks Trinidad Unlimited (TTTU) to conduct analysis of one Incinerator 4 Treated Waste sample for TCLP[1] Extracted Heavy Metals, Total Oil and Grease and Total Petroleum Hydrocarbons. Samples were logged into the ECOTOX sample tracking system and assigned sample identification numbers (Table #1). The samples were appropriately stored until the tests were initiated.

Table #1: Client I.D. and Sample Details

Client Sample ID	ECOTOX Sample ID	Sample Collection Date / Time
Incinerator 4 Treated Waste	2002003	16th November 2020 / 3:00 p.m.

The samples were collected from the Tiger Tanks Guyana Rentals Inc. Waste Processing Facility, Guyana, by a representative on the 16th November 2020. Samples were collected and preserved according to recommended procedures as stipulated in the United States Environmental Protection Agency Methods for the requested parameters. The samples were appropriately stored in a cooler, on ice at 4 ± 2°C, for transportation to the laboratory. The samples were received by ECOTOX on the 7th December 2020. On receipt by the laboratory, samples were logged into the ECOTOX sample tracking system and assigned sample identification numbers. The samples were appropriately stored (refrigerator 4 ± 2°C) until the tests were initiated.

[1] Toxicity Characteristic Leaching Procedure - a sample extraction method for chemical analysis employed as an analytical method to simulate leaching through a landfill.

2.0 Results

Tests were done in accordance with those stipulated in the Standard Methods for the Examination of Water and Wastewater 23rd Edition (2017) and the United States Environmental Protection Agency Standard Methods for the requested parameters. Standard test procedures were followed for all analyses conducted with several quality control measures implemented for each parameter investigated. The results for the requested analyses are listed below in Table #2. Replicate analyses, blanks, spikes and standard reference materials were included during tests to assess the accuracy and precision of the analytical results obtained. Refer to Appendix A for method description and quality control and assurance measures. Refer to Appendix B, for Chain of Custody/Sample Receipt information.

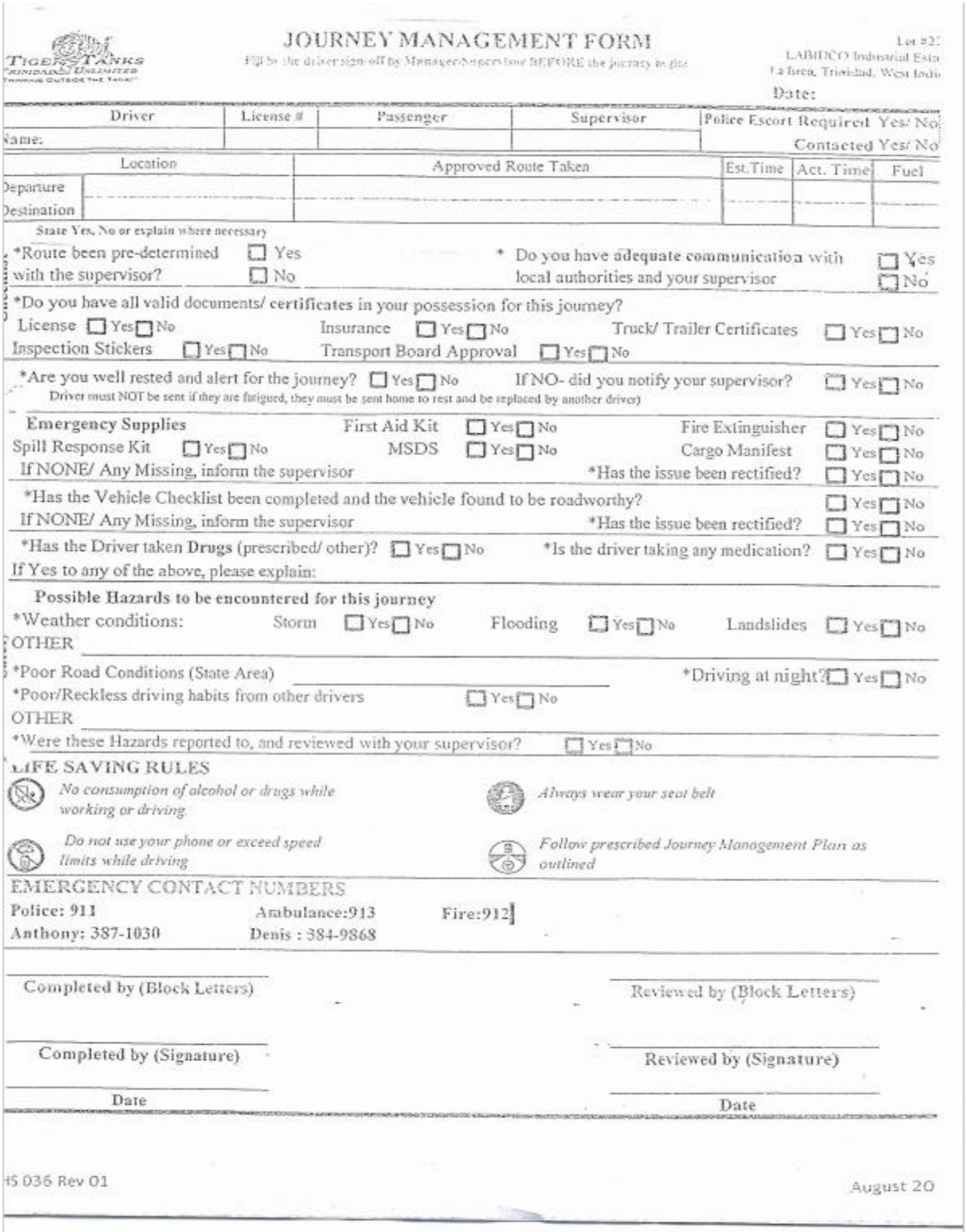
Table #2: Waste Characterization Results

Parameter	Maximum Permissible Limit (mg/Kg)	2002003 Incinerator 4 Treated Waste 16th November 2020
Total Petroleum Hydrocarbons (mg/Kg)	Not Listed[2]	714.0
Total Oil & Grease (mg/Kg)	< 3% or < 30,000 ppm[2]	1,408.1
TCLP Extractable Arsenic (mg/L)	5.0 mg/L[3]	< 0.005
TCLP Extractable Barium (mg/L)	100 mg/L[3]	1.762
TCLP Extractable Cadmium (mg/L)	1.0 mg/L[3]	< 0.005
TCLP Extractable Chromium (mg/L)	5.0 mg/L[3]	0.008
TCLP Extractable Lead (mg/L)	5.0 mg/L[3]	< 0.005
TCLP Extractable Mercury (mg/L)	0.2 mg/L[3]	< 0.005
TCLP Extractable Selenium (mg/L)	1.0 mg/L[3]	< 0.005
TCLP Extractable Silver (mg/L)	5.0 mg/L[3]	0.035
TCLP Extractable Zinc (mg/L)	Not Listed[3]	7.938

[2] Louisiana Administrative Code (LAC), Title 43, part XIX, Office of Conservation – General Operations Subpart 1. Statewide Order No. 29-B; Section 313, E, Burial or Trenching of Treated Pit Solid Phase Contents – Pit Closure Techniques and Onsite Disposal of Exploration and Production Waste Standard (November 2019).

[3] TCLP United States Environmental Protection Agency Resource Recovery and Conservation Act, RCRA-8 Metals Maximum Permissible Limits (Maximum Concentration of Contaminants).

Journey Management Form



TIGER TANKS TRINIDAD UNLIMITED

JOURNEY MANAGEMENT FORM

Fill by the driver sign-off by Manager/Supervisor BEFORE the journey begins

Lot #27
LABIDCO Industrial Estate
La Brea, Trinidad, West Indies

Date:

Driver Name:	License #	Passenger	Supervisor	Police Escort Required Yes/ No Contacted Yes/ No

	Location	Approved Route Taken	Est.Time	Act. Time	Fuel
Departure					
Destination					

State Yes, No or explain where necessary

*Route been pre-determined with the supervisor? ☐ Yes ☐ No

* Do you have adequate communication with local authorities and your supervisor ☐ Yes ☐ No

*Do you have all valid documents/ certificates in your possession for this journey?

License ☐ Yes ☐ No Insurance ☐ Yes ☐ No Truck/ Trailer Certificates ☐ Yes ☐ No

Inspection Stickers ☐ Yes ☐ No Transport Board Approval ☐ Yes ☐ No

*Are you well rested and alert for the journey? ☐ Yes ☐ No If NO- did you notify your supervisor? ☐ Yes ☐ No

Driver must NOT be sent if they are fatigued, they must be sent home to rest and be replaced by another driver)

Emergency Supplies

First Aid Kit ☐ Yes ☐ No Fire Extinguisher ☐ Yes ☐ No

Spill Response Kit ☐ Yes ☐ No MSDS ☐ Yes ☐ No Cargo Manifest ☐ Yes ☐ No

If NONE/ Any Missing, inform the supervisor *Has the issue been rectified? ☐ Yes ☐ No

*Has the Vehicle Checklist been completed and the vehicle found to be roadworthy? ☐ Yes ☐ No

If NONE/ Any Missing, inform the supervisor *Has the issue been rectified? ☐ Yes ☐ No

*Has the Driver taken Drugs (prescribed/ other)? ☐ Yes ☐ No *Is the driver taking any medication? ☐ Yes ☐ No

If Yes to any of the above, please explain:

Possible Hazards to be encountered for this journey

*Weather conditions: Storm ☐ Yes ☐ No Flooding ☐ Yes ☐ No Landslides ☐ Yes ☐ No

OTHER

*Poor Road Conditions (State Area) *Driving at night? ☐ Yes ☐ No

*Poor/Reckless driving habits from other drivers ☐ Yes ☐ No

OTHER

*Were these Hazards reported to, and reviewed with your supervisor? ☐ Yes ☐ No

LIFE SAVING RULES

No consumption of alcohol or drugs while working or driving

Always wear your seat belt

Do not use your phone or exceed speed limits while driving

Follow prescribed Journey Management Plan as outlined

EMERGENCY CONTACT NUMBERS

Police: 911 Ambulance:913 Fire:912

Anthony: 387-1030 Denis : 384-9868

Completed by (Block Letters)

Reviewed by (Block Letters)

Completed by (Signature)

Reviewed by (Signature)

Date

Date

HS 036 Rev 01

August 20

VIR Inspection Checklist

VIR Inspection Checklist		
Inspection	Comments	Corrective Actions
Ensure electrical connections within the VIR control are intact		
Ensure electrical connections within the lids are intact		
Inspect pipelines for any leaks		
Inspect lid gaskets for leaks		
Inspect for buildup of material in stainless steel hoses		
Inspect housing of VIR unit		
Inspect housing of element		
General		
Inspect incinerator for wear on housing		
Inspect refractory within the oxidizer		
Inspect burner for malfunction		
Observe ID fan for abnormal sounds		
Ensure quench pump is functional		
Inspect sump to determine quantity		
Inspect diesel piping to oxidizer		

Notes:

1) Test and identify status of heating elements before startup and/ or during routine maintenance. (go to page 2).

2) Identify newly installed heating elements before startup

3) Use Key below to identify status of heating element

4) Normal ohm reading @ 98.2 -104 ohms; Faulty ohm range - fluctuating readings or 0 ohms

STATUS	*IDENTIFICATION*
NEW	✓
EXISITING & FUNCTIONAL	#
FAULTY	X
THERMOCOUPLE HEATING ELEMENT	T

Inspected By:_____ Date:_____

Reviewed By:_____ Date:_____

Received By:_____ Date:_____

Operational Hours:_____

Shift:_____

Page 1 of 2

TTTU-PMP-VIR0126| 2.0 | 6th June 2017

Daily Forklift Checklist

TIGER RENTALS
TRINIDAD UNLIMITED
"THINKING OUTSIDE THE TANK!"

TIGER RENTALS

DAILY FORKLIFT CHECKLIST

	Inspection	X / ✓	Comments	Corrective Action
1	Check and record oil level			
2	Check and record breaks fluid			
3	Check and record hydraulic fluid			
4	Check and record power steering fluid			
5	Check coolant			
6	Check battery Water			
7	Check diesel			
8	Inspect condition of forklift			
9	Inspect windshield			
10	Inspect tire condition			
11	Check mirrors			
12	Inspect body of forklift			
13	Check reverse alarm			
14	Check head lights			
15	Check park lights			
16	Check right indicator lights			
17	Check left indicator light			
18	Check reverse lights			
19	Check revolving light			
20	Check breaks lights			
21	Check Up /Down mass			
22	Check Left / Right mass			
23	Check Forward / Backward mass			
24	Check mass hydraulic Ram			
25	Check mass chain			
26	Check horn			
27	Ensure battery is secured			
28	Check seat belts			

✓- Conforming
X- Non-conforming

☐ BIG FORKLIFT ☐ SMALL FORKLIFT

Operational Hours &Mileage:

EQUIPMENT INSPECTED BY	SUPERVISOR ON DUTY	
PRINT NAME:	PRINT NAME:	PRINT NAME:
SIGNATURE:	SIGNATURE:	SIGNATURE:
DATE/ TIME:	DATE/ TIME:	DATE/ TIME:

Example of Job Safety Analysis Form (Incinerator Operation)

TIGER RENTALS

JOB SAFETY & ENVIRONMENTAL HAZARD ANALYSIS FORM

JOB SITE LOCATION: _____

DATE: _____ TIME: _____

JOB TYPE: Incinerator Use SAFE WORK PERMIT required? (Y/N) (circle)

(Permit required for hot work, confined space entry, excavation/trenching, hazardous materials, and elevated work)

SITE CONDITIONS: (check all applicable)

☐ Fair weather ☐ Rainy weather ☐ Traffic on site

☐ Noise exposure ☐ Pits/ponds present ☐ Buildings/structures

HAZARD IDENTIFICATION, DISCUSSION AND RECOMMENDATIONS:

ACTIVITIES	HAZARDS IDENTIFIED	RECOMMENDATIONS	
Conduct toolbox talk	Unknown/ Unauthorised persons in area	Ensure that Supervisors address all safety concerns. Discuss JSAs and SOPs	☐
Secure waste using forklift and Loading Incinerator	Mechanical Failure; collisions; spill of content due to improper maneuver and lifts; exposure to waste; Repetitive movements; Pinch points	Conduct pre-job inspections of Forklift. Have qualified banksman to guide forklift. Ensure path is cleared to avoid collisions. Wear appropriate PPE for the waste being loaded.	☐
Light Burners	Mechanical and Electrical Failure; Fire/ smoke exposure	Conduct pre-job inspections of Incinerator. Ensure door to burner is properly sealed.	☐
Monitor Unit	Fire; Mechanical, Electrical failure; Mechanical Failure due to spikes in temperature; Heat exposure/ burns	Monitor temperature and make necessary adjustments as required Wear appropriate PPE (thermal apron, gloves)	☐
Emptying Incinerator (opening and closing of incinerator door)	Exposure to dust and heat.	Do not empty incinerator until temperature has cooled. Wear appropriate PPE (thermal apron, gloves, dust mask, face shield)	☐

HSE Equipment Maintenance Log

Serial No.	Location	Quantity	Expiry Date	Frequency of Inspection	Method of testing	Name of inspector	Deficiency found during test	Corrective action	Status
DRWN 2789	PPE Stores container	1	16-Nov-21	1YEAR	Hydro Test	Survival Systems Ltd.	None		Good
BRWN 0812	PPE Stores container	1	16-Nov-21	1YEAR	Hydro Test	Survival Systems Ltd.	None		Good
BRWN 2849	PPE Stores container	1	16-Nov-21	1YEAR	Hydro Test	Survival Systems Ltd.	None		Good
LANYARD									
Serial No.	Location	Quantity	Expiry Date	Frequency of Inspection	Method of testing	Name of inspector	Deficiency found during test	Corrective action	Status
022420-011	PPE Stores container	1	April, 2021	6 MONTHS	Visual	JAGUAR	None		Good
110519-039	PPE Stores container	1	April, 2021	6 MONTHS	Visual	JAGUAR	None		Good
17-3318647	PPE Stores container	1	January, 2021	6 MONTHS	Visual	JAGUAR	None		Good
551439-141	Tank Cleaning Container	1	October, 2020	6 MONTHS				Needs external certification	
170487	PPE Stores container	1	April, 2021	6 MONTHS	Visual	JAGUAR	None		Good
10032833	PPE Stores container	1	April, 2021	6 MONTHS	Visual	JAGUAR	None		Good
019212316	PPE Stores container	1	April, 2021	6 MONTHS	Visual	JAGUAR	None		Good
551439-155	Issued to Pug mill crew	1	April, 2021	6 MONTHS	Visual	JAGUAR	None		Good
RESCUE ROPE									
Serial No.	Location	Quantity	Expiry Date	Frequency of Inspection	Method of testing	Name of inspector	Deficiency found during test	Corrective action	Status
TTTU-SR-03	Tank Cleaning Container	1	28-Oct-19	1YEAR	Pull Test	Trinidad Inspection Services Ltd	None		Good
GAS MONITOR									
Serial No.	Location	Quantity	Expiry Date	Frequency of Inspection	Method of testing	Name of inspector	Deficiency found during test	Corrective action	Status
MA 218-000268	Trinidad	1	3-Apr-21	3 MONTHS	Calibration	Analytical Testing Services Limited	None		Good
GAS PRO - 462398/04-001	Trinidad	1	7-Jul-20	3 MONTHS	Calibration	Trinidad Inspection Services Ltd		sent for external certification	
PERSONAL MONITOR									
Serial No.	Location	Quantity	Expiry Date	Frequency of Inspection	Method of testing	Name of inspector	Deficiency found during test	Corrective action	Status
893044975RN	Guyana	1	9-Mar-21	3 MONTHS	Calibration				
893051497RN	Trinidad	1	5-Jan-21	3 MONTHS	Calibration	Analytical Testing Services Limited	None	sent for external certification	
893044973RN	Guyana	1	9-Mar-21	3 MONTHS	Calibration				
893051498RN	Trinidad	1	3-Jan-21	3 MONTHS	Calibration	Analytical Testing Services Limited	None	sent for external certification	
FIRE EXTINGUISHER									
Serial No.	Location	Quantity	Expiry Date	Frequency of Inspection	Method of testing	Name of inspector	Deficiency found during test	Corrective action	Status

Copies of all records, checklist daily toolbox meetings, manifests, internal site permits etc. are available at the site for review as required.

Appendix 2: Operation and Safe Work Procedure – Vertical Infrared System (VIR)

Purpose

This procedure was developed to ensure the safe and efficient operation of the Vertical Infra-Red Unit (V-IR) and includes:

- To define the procedures for operation of the V-IR
- To ensure that Environmental and Health & Safety considerations are included as part of the operating procedures
- To clearly define the responsibilities of personnel responsible for the operation of the V-IR Unit

Scope

- Start-up Procedure
- Standard Operational procedure
- Operational Parameters
- Standard and Emergency shutdown Procedures

Responsibilities/Authorities

The General Manager has the responsibility and authority for ensuring resources are available for implementation of this procedure.

The Operations Manager has the responsibility for ensuring implementation of this procedure for Virtual Infra-Red (VIR) Operations.

Thermal Equipment Technician is responsible for receiving and treating waste which will be processed via Thermal Remediation, ensure that accurate paperwork and documentation is received with waste.

The Thermal Equipment Technician operates the V-IR Desorption Unit in accordance with all health and safety compliance requirements and documents the remediation of waste daily.
The Technical Service Coordinator is responsible for identification of waste to be treated & coordinate with the operations person on the execution of task.

The Compliance Coordinator is responsible for ensuring samples are taken and analyzed and ensure all quality control checks/ assurance are achieved before discharge.

Procedure

Personal Protective Equipment Needed:

- Fire Retardant Coveralls
- Steel Toed Safety Shoes
- Rubber boots
- Full face respirator
- Hard Hat
- Safety Glasses
- Workmen's gloves- heat resistant/ temperature resistant
- Rubber gloves
- Harnesses no one uses a harness
- Spill kit
- Ear Protection

Equipment Required:

- VIR Box
- VIR lids
- PLC System
- Oxidizer
- Burners
- ID Fans
- Centrifugal pumps
- Cooler / Quench
- Scrubber
- Stack
- Forklift
- Fire Extinguishers
- Fire Pump
- Compressor
- Generator

The following outlines the procedure for the operation, and maintenance of V-IR Thermal Unit and identifies possible hazards and preventative control measures that should be implemented to keep these hazards at a minimum.

Pre start-up

Generator and Air Compressor

4.1. Step 1

Before removing the V-IR's lid, ensure the internal temperature of the box is between 70-100° F This can be verified by the thermocouple present on two ends of the VIR box. The temperature can be seen on the panel of the temperature reader.
Binders on the box are then released and removed accordingly. Lids are then removed from the VIR box while ensuring the pillars (legs) of the lids are placed on a clean/level surface in such a way as not to put any pressure on the heating element housings.

4.2 Step 2

V-IR Loading

1. Prior to loading the V-IR with sludge, check to make sure that there is no damage to the inside of the V-IR.
2. Check to make sure that the element housings (pipes) are in their individual positions, straight and secured.
3. Fill the V-IR with sludge using either the excavator or vacuum pump to within 8 to 10 inches from the top. Be sure to load the unit evenly. (Nb. The door has been permanently sealed off.)
4. Clean off the top edges of the unit where the lid closes against the lid gasket.
5. Insert the lid being careful to fit each of the lid's legs into its respective groove.
6. Manually using chain & binder ensure the lid seals firmly against the lid gasket.

4.3. Step 3

Startup

Check to confirm that the V-IR's Power Control Panel door(s) is properly closed and locked.
Turn the main power disconnect switch (photo 2) "on" position - this will energize the V-IR's Power Control Panel.

Turn the V-IR's Power Control Panel's control selector switch to "setup" and verify that the WATLOW EZ-Zone Temperature & set safety Selector switch to automatic. Controller is showing both the current element temperature and the set-point temperature (see photo 3).

Using the control wheel, set the set point temperature on the WATLOW Limit-LV to
850 ° F

Use the up and down arrows on the WATLOW EZ-Zone Temperature Controller to adjust the set-point temperature to 800 ° F.

Turn the control selector switch to "on" (this energizes the heating elements and begins the sludge treatment cycle).

As the sludge begins to heat, it will produce steam. Once steam pressure builds within the V-IR, startup the off-gas treatment equipment.

Once every hour, increase the set-point temperature by 100 ° F on both controllers (starting with the WATLOW Limit-LV) until it reaches 1350 ° F.

Note: When changing the set-point temperature of the WTLOW EZ-Zone controller, remember to first turn the V-IR's Power Control Panel's control selector switch to the set position.

4.4. Step 4

Monitoring During Treatment

During a treatment cycle, it is necessary to periodically monitor the following:

1. Confirm – scrubber water level and ph Output of the V-IR power control panel
2. Liquid level in the scrubber
3. Keep vacuum pressure between ¼" & ½" water column
4. Testing sludge temperatures
5. Steam leakage
6. Check Heating elements (once per batch)

Output of the V-IR power control panel

If possible, the output temperature of the WATLOW EZ-Zone Temperature Controller should be observed at least once every ½ hour during operation. The need for hourly observation is simply to ensure that the controller has not tripped the high limit controller and shut down power to the heating elements.

Liquid Level in the scrubber

This level can be monitored via the clear plastic sight glass located on the scrubber. This value should intermediate between 16 – 20 inches of liquid from the bottom of the scrubber tank to the top of the side glass. Like the output of the temperature controllers, the water level should be monitored every thirty minutes.

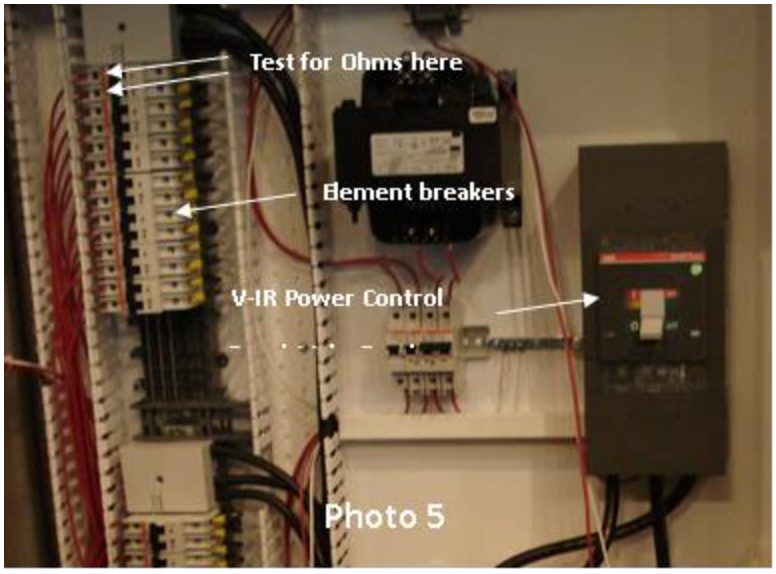
Old System) ID is usually operated at 50- 55%. Oxidizer temperature is usually kept between 1400 to 1550 ^{0}F.

Sludge temperatures
Sludge temperature is periodically check using the thermocouples which are inserted into the VIR box before the burn commence. The temperature is recorded on the control panel to determine the progress of treatment.

Checking for steam leaks
Visually inspect the V-IR unit for steam leaks. Typically, if there is a vapor leak, it is caused by too much positive pressure within unit. To stop the leak, increase the draft.

Checking Heating Elements after burn is completed.

1. Turn the main power disconnect switch (photo 2) to the "off" position.
2. Open the panel door
3. Turn the V-IR's Power Control Panel Main Breaker (photo 5) to the "off" position.
4. Switch all the element breakers to the "off" position.
5. Use a Multi-meter to check the Ohm's reading on the element side (left) of each breaker. The Ohm readings should be around 90 to 110 Ohms each.
6. Once you have taken the readings, turn the breakers back to the "on" position, turn the V-IR's Power Control Panel Main Breaker to the "on" position, close the panel door and turn the V-IR back on.



4.5. Step 5

Shutdown

When sludge temperatures indicate that a batch is completed (typically, soil/sludge temperatures between 350° and 600° F), the V-IR Power Control Panel's control selector switch can be switched to the "off" position. This is done manually by inserting a probe at the bottom of the box, once the probe comes out dry the process is completed. During the cool down process, the internal temperatures of the processed materials are monitored & once the temperature is less than 250 ^{O} F & power is disconnected.

Switch each V-IR's main 200 amp disconnect panel to the "off" position.
Disconnect the electrical feed lines that connect the V-IR's Power Control Panel to the V-IR lids.
Disconnect the flexible exhaust hoses that connect the V-IR's lids to the off-gas treatment equipment.

Remove thermocouple probes from the sludge. CAUTION: These thermocouple probes will be hot from exposure to the sludge.

The unit is ready to be open using a forklift. The lids are hoisted off the V-IR box and materials "knock off" and lids are placed on a level surface.
Processed material is cool for approximately 8 to 12 hours.

4.6. Step 6

Unloading the V-IR

CAUTION: If combustible material inside the V-IR is heated and then exposed to oxygen, it may combust. Keep fire suppression equipment or a water supply nearby in case it is needed to cool the sludge or extinguish any combustible material.

Lid Removal

Use CAUTION when opening the lid clamps, be sure to wear gloves to protect hands from hot air and/or steam inside the V-IR and also to wear proper breathing apparatus should there be remnant hazardous gases. Remove the lid.

CAUTION: Any equipment that is exposed to the treated solids or to the inside of the V-IR will get hot. This includes but is not limited to heavy equipment buckets, lifting harnesses or chains and hand shovels

CAUTION: The treated solids that are emptied from the V-IR are hot. Do not touch the solids or place anything on them until they have had adequate time to cool.

CAUTION: Take care to empty the V-IR slowly. This will help reduce the amount of dust that is created by the flow of treated solids.

Sludge Sampling

It is recommended that a sludge sample (for each batch) be pulled prior to treatment. This sample should be retained until post-treatment sampling results have been reviewed. If post-treatment results indicate that treatment levels have not been met, the pre-treatment sample may be sent to the laboratory to verify pre-treatment contamination levels.

Post-treatment sampling should be performed once the V-IR has been emptied. If sampling is done immediately after treatment, samples may have to be allowed to cool prior to placing into sample containers.

What follows is a listing of some safety CAUTIONS. This list is not intended to be comprehensive of all such issues but simply examples.

4.7 Refilling Box / Loading Procedure

1. *Ensure the level in the box is below 2" ball valve which estimated 40bbls have completed processing.*
2. *Lower temperature of the box to 500F before re-filling the box*
3. *Connect pipework from source (waste storage medium) to 2" ball valve on VIR Box*
4. *Once pipework is secured, open ball valve and slowly feed material into the VIR Box- approximately 5 bbl/ min. Monitor pipework for any leaks.*
5. *Monitor box for any variations or signs of over pressure, i.e. lids raising, fluctuations in temperature*
6. *When box has been filled to desired level, close ball valve and disconnect pipework. Ensure all leaks are contained*

Resume increasing temperatures as outlined in step 3 of the procedure.

5.0. SAFETY PRECAUTIONS

THE V-IR SHOULD BE OPERATED ONLY IN FULL COMPLIANCE WITH ALL APPLICABLE PROVISIONS OF 19 CFR PART 1910, AND ANALOGOUS OR RELEVANT AND OR APPLICABLE STATE LAWS.

Inclement weather operation

The V-IR units are designed to operate under most weather conditions; however, they should not be energized during any weather conditions that could cause damage to the V-IR because of falling or blowing debris. In addition, they should not be energized during rain events that might cause flooding.

Lockout/Tagout

Follow all applicable lockout/tagout procedures of 29 CFR 1910. 147 and analogous state laws.

V-IR Power Control Panel Access
Do not unlock or open the V-IR's Power Control Panel door without following the lockout/tagout procedure for maintenance/repairs.

Operating Temperature
Do not operate the Chromalox 1604 Temperature Controller output setpoint over 1550 F.

Lifting hazards
Wear hard hats
Use load-certified lifting harnesses

High temperatures
Do not climb inside a V-IR after sludge treatment unless it is empty and has had at least 24 hours to cool. The V-IR's interior and exterior can store heat from treatment – use CAUTION when working around the unit. After treatment, sludge temperatures are high, use CAUTION when working around treated sludge.

Emissions
Do not touch the V-IR's flexible exhaust hoses or the exhaust steam/air. The exhaust steam/air is very hot. Avoid breathing of emissions from any exhaust stack.

6.0. MAINTENANCE

There are a few components of the V-IR that require routine maintenance. These components include:

V-IR's Power Control Panel
Lid seal gaskets
Exhaust Manifold
V-IR's Exterior

1. Weekly

Each week, after following proper lockout/tagout procedures of 29 CFR 1910. 147, ensure that all electrical connections within the V-IR's Power Control Panel are tight.

2. Bi-weekly

Follow proper lock-out/tag-out procedures and check that all electrical connections are tight inside the V-IR's Power Control Panel
3. Monthly

Lid seal gaskets
If the V-IR is being used continuously, it is recommended that the lid seal gaskets be replaced. The need to replace these gaskets will be indicated by their ability to seal the lid and contain steam during operation. If the gaskets are not damaged, monthly replacement may not be necessary.

Exhaust Manifold
Remove the 4" flexible stainless steel exhaust hose from the V-IR's exhaust manifold and inspect the inside for solids. Clean it out if necessary so that the exhaust can flow out without obstructions.

V-IR's exterior
Each month, when the V-IR is not in use, the V-IR's exterior should be washed with soap and water.

7.0. INSPECTIONS

After each batch, the following should be visually inspected for any defects:

- Lid Clamps
- Lid Gaskets
- Heating element housings
- Electrical feed lines

In addition, the interior and exterior of the V-IR should be visually inspected for any unusual wear and tear or metal fatigue. The interior and exterior of the V-IR Power Control Panel should also be visually inspected for any possible component failures. Prior to inspection of the interior of the Power Control Panel, be sure to follow proper lock-out / tag-out procedures.

Repairs

The three main components that may need replacement are:

1. Heating Elements
2. Thermocouple Probes
3. Thermowells

Replacing Heating Elements

Follow proper lock-out/tag-out procedures.

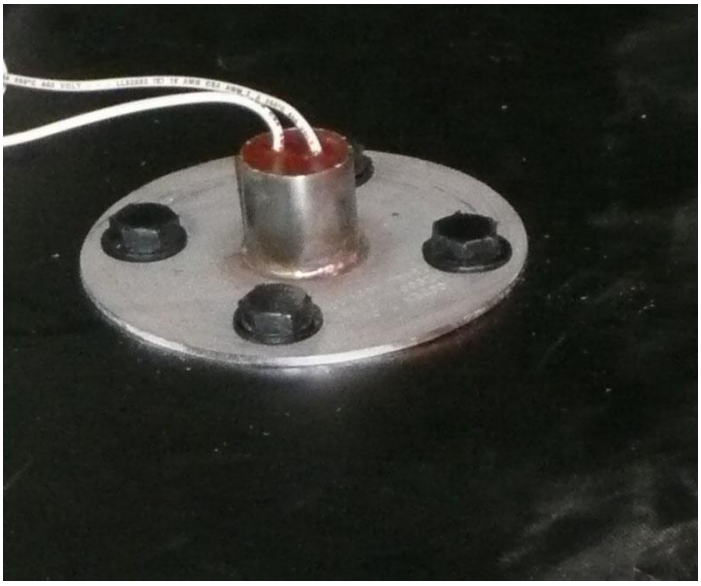
Disconnect the heating element wires from their connections (approximately 12" from where the wires enter the heater itself).

Remove the 4 bolts (photo 7) that hold the heater in place.

If there is a thermocouple probe attached to the heater, disconnect its leads at their connection.

Pull out the heating element.

Slide in a new heating element.



Replacing the Thermocouple Probes

Follow proper lock-out/tag-out procedures.

Identify the thermocouple probe that is non-functional. Since the thermocouple is located within the heating element, disconnect the heating element terminals and thermocouple terminals. Remove the heating element and replace with a new "probe-containing" element. Reconnect terminals.

8.0. TROUBLESHOOTING

Most repairs to the V-IR can be performed on-site. Only a licensed electrician should perform any electrical repairs and/or electrical troubleshooting.

Problem: Heating element temperatures are falling even though the power control panel is on.
Cause: The high limit controller has tripped
Fix: Reduce the setpoint temperature or raise the high limit setting

Problem: High limit controller keeps tripping
Cause: Faulty thermocouple connections or probes
Fix: Check thermocouple probes and connections
Check heating element Ohm's

Problem: Steam is coming out of the V-IR
Cause: Vacuum pressure is too low
Fix: Increase the vacuum by adjusting the off-gas treatment equipment ID fan speed

Problem: Breakers tripping inside the V-IR Power Control Panel
Cause: Breakers are too hot because of elevated temperatures inside the V-IR Power Control Panel or heating elements are failing.
Fix: Shelter the V-IR Power Control Panel from the sun, check heating elements for failures.

9.0. EMERGENCY SPILL RESPONSE

A. Emergency Spill Response (Loading Material)

Purpose

To provide a plan for the addressing of spills this can occur during the loading of waste materials.

If a spill should occur during loading of waste material, the TTTU personnel should assess the situation and initiate basic spill containment procedures if appropriate based on the size of the spill and the measure of the spilt material. Anyone from Management should be immediately contacted. They will ensure that any other emergency personnel is contacted based on the situation.

Procedure

1. Treat a spill as an emergency.
2. If possible, shut off the source of the spill by righting containers, plugging holes and shutting valves.

3. Immediately report any spill to:
    a. the shift Team Leader
    b. Management

and give the following information:

- Location
- Type and size of spill
- Any spill response procedures initiated
- Point of Contact

4. Isolate the area; prohibit vehicles and personnel from entering.
5. Contain the spill using sandbags, dirt, dry sweep, rags, etc.
6. Prevent the spill from entering drains or any water source.
7. Clean up the spill and dispose of contaminated materials in an appropriate manner according to environmental regulations

b. Emergency Spill Response (Waste Treatment Facility)

Purpose

To provide a plan for the addressing of spills on the company's facility.

Preparation and planning for spills

1. Ensure MSDS for all chemicals, waste materials for disposal or any other substance which may be spilt due to handling or use are kept both on-site and on file. A copy of the MSDS should be reviewed prior to handling or use of the material. Materials can be in the solid, semi solid or liquid form.
2. Ensure that workers that handle or use these materials receive spill response training.
3. Ensure spill absorbent material is in stock.
4. Ensure that all safe work procedures for handling or using materials are adhered to.
5. Ensure that all mitigation measures are taken to prevent and contain a spill prior to using the materials.
6. Ensure there is adequate water supply, eye wash devices and first aid material should anyone come into contact with the spilt material.
7. Dispose of spilt materials and soiled clothing in a bag which should be included in the spill response kit. Ensure that this bag is labeled to include the date of the spill and the material that was spilt.
8. Evacuation procedures as listed below in **Spill Response Procedures,** as well as emergency numbers should be posted on the notice board and on all trucks that are involved in the transportation of waste.

Spill response Procedures

In the event of a spill:

1. All workers performing clean-up actions must wear the appropriate personal protective equipment depending on the material. The MSDS sheet can be used as a guide.
2. If handling liquids or semi solids, create a barrier to any drainage system by placing blocks / absorbent material to confine the material.
3. Use appropriate absorbent pads or other absorbent material to absorb spill material.
4. Place the contaminated spill absorbent in the designated container. Ensure that no leaks are present.
5. Clean area to remove remnants of spilt material.
6. Wash all clothing in contact with material; if necessary, dispose of them.
7. Dispose of contaminated spill absorbent appropriately.

9.0. PROCESS RISK SUMMARY

1. Job Risk Assessment (JSA) – Operations of the Virtual Infra- Red Unit.

2. Job Risk Assessment (JSA) – Manual Handling of the Materials

Appendix 3: Operation and Safe Work Procedure – Incinerator

Purpose

This procedure was developed to ensure the safe and efficient operation of the Incinerator Operations

- To define the procedures for the Incinerator Operations.
- To ensure that Environmental and Health & Safety considerations are included as part of the operating procedures
- To clearly define the responsibilities of personnel responsible for the operation of the Incinerator.

Scope

1. Defining responsibilities of Technician
2. Standard operational procedure

- Maintenance / Troubleshooting

Responsibilities/Authorities

The General Manager has the responsibility and authority for ensuring resources are available for implementation of this procedure.
The Operations Manager has the responsibility for ensuring implementation of this procedure for Incinerator Operations.
The Plant Technician will be responsible for the following:

- Complete all required checklist , permits and inspection of equipment this includes oxidizer, burners on incinerator, fuel level, scrubber, the incinerator quench.

- A Toolbox meeting should be done before work commence.

- Complete all the documentation associated with the destruction process (D Log, Waste Location Log, Waste Manifest)

- Compliance with all Health, Safety and Environmental requirements of the facility.

- The Environmental Technician / Compliance Personnel will be responsible for the sampling of the processed material (Ash) & Analysis.

PPE Requirements

- Steel Toed Safety Shoes
- High temperature – Fire retardant gloves.
- Hard Hat
- Safety Glasses
- Fire Retardant coveralls
- Spill kit

Equipment Requirement

- Incinerator
- Scrubber Tank

Operating Procedure

Incinerator Operation

Generator Start-up

1. Technician must inspect the plant to make sure that it is in a safe state to start. Check for any lockouts, tag outs or other isolations that are still engaged. HSE placing isolation is to remove if task is completed and safe to do so.
2. Technician must ensure Power Circuit breaker is in the OFF position.
3. Technician must Put Control panel in "MANUAL" and "start" using labelled buttons.
4. After generator starts, the display should show generated voltage levels - should be approximately 480VAC Phase-Phase and 277 Phase-Ground. This must be verified by the Technician.
5. Power System up by Turning breaker to the ON position

Air Compressor Start-up

1. Ensure all pre-check are done such as oil levels, coolant levels, Fuel levels, all air lines are inspected and intact.
2. Using the on start switch on the compressor, power on the compressor.

Incinerator Operation

1. The Technician must verify the off-gas fans are not running to send gases to each other. (applicable for operation of VIR and Incinerator). Other verifications may include ensuring

there is sufficient water supply for to cool gases in the ECC /Scrubber and no AIR FLOW restrictions.

2. Waste must be weighed and identified before loading into incinerator, maximum Incinerator capacity is 150kg per hour (Based on the type of material being processed.)

3. Switch on incinerator cooling pump, scrubber pump and ID fan. This can be done using the using the HDMI on the PLC control panel. Incinerator cooler temperature on the PLC should be set at 500 ^{0}F and ID fan speed set 30% to 40% max. The cooler temperature is monitored on the incinerator control panel. This is done every 30 minutes during operation. The burner temperature is automated in the sense that it will cut off when the temperature in the primary chamber exceeds 900 0F.

4. Switch on power to incinerator and start secondary burner (this is done by powering on switch located on the incinerator control panel, warm up secondary chamber to at least 600 ^{0}F.

5. Switch on primary burner 1 & 2 (these switches are located on the incinerator control panel) then pre-set temperature on the primary burners is 900 ^{0}F
   When this temperature is achieved in the primary chamber the burners will automatically cut off and the fire and temperatures will self - sustain until the temperature drops below 900 ^{0}F.

6. Continuously loading Incinerator - This must be done when the flames in the incinerator are at minimum, this is achieved by looking through the inspection glass. The incinerator Secondary hatch can then be safely opened by manually unscrewing the butterfly lock. Waste to be processed is then added manually in small quantities until the chamber is fill within capacity. Secondary hatch is closed manually by operator using the butterfly lock.
7. All necessary personal protective equipment must be worn.

8. Cool down incinerator - when the incineration process is completed, switch off burners and allow temperatures to drop to at least 250 ^{0}F.

9. Before opening and emptying the incinerator. The temperature must be kept below 250^{0}F. All necessary personal protective equipment to be worn.

10. The incinerator cooling pump can be switched off during cooling down once the temperature stays below 500 ^{0}F.

11. The incinerator door is opened manually by removing wing latch. The plant technician (geared in all required Personal Protective equipment) uses a 12-foot stainless steel hoe and manually removed the processed material from the chamber into a metal tray which is placed directly below the opening of the incinerator chamber.

Process Risk Summary

3. Job Risk Assessment (JSA) – Incinerator Operations
4. Job Risk Assessment (JSA) – Manual Handling of the Materials

Records

1. Inspection Equipment Checklist
2. D- log
3. Job Safety Sheets
4. Analytical Results for Waste Materials
5. Temperature logs
6. Waste Location Logs

Appendix : 4 Operation and Safe Work Procedure – Pug Mill

Purpose

This procedure was developed to ensure the safe and efficient operation of the Pug – Milling Operations

1. To define the procedures for the Pug-milling Operations.
2. To ensure that Environmental and Health & Safety considerations are included as part of the operating procedures
3. To clearly define the responsibilities of personnel responsible for the operation of the Pug-Milling.
4. Maintenance / Troubleshooting.

Scope

1. Defining responsibilities of Technician

2. Standard operational procedure

Responsibilities / Authorities

The General Manager has the responsibility and authority for ensuring resources are available for implementation of this procedure.

The Operations Manager has the responsibility for ensuring implementation of this procedure for Pug-Milling Operations.

The Operator will be responsible for the following:

- Complete all required checklist, permits and inspection of equipment this includes excavator, forklift, pugmill, hopper, tools, electrical panels, mega bags.

- A Toolbox meeting should be done before work commence.

- Complete all the documentation associated with the destruction process (D Log, Waste Location Log, Waste Manifest)

- Compliance with all Health, Safety and Environmental requirements of the facility.

- Use appropriate tools to open the units that is storing the waste. Use all necessary Personal Protective Gears. Vent cargo unit for minimum 20 minutes after which a gad test is performed, once the test readings are good the pug-milling process can begin.

- NB. gas testing should be continuously done through the process, a mega bag will be securely placed beneath the pugmill to receive the process material.
- The Technical Service Coordinator is to advice on the proportion of cement that is to be added to have a uniform mixture.
- The Compliance Coordinator is responsible for all quality assurance / quality control checks.

Procedure

Operating Procedure

1. Selected cargo unit with waste that is to be process - the unit should be pre-selected by authorized personnel and numbers given to the pugmill team.

2. Prior to starting up the Pugmill inspection checklist is used to ensure all the necessary operational and safety requirements are in place.

3. Filling the hopper - the hopper is to be placed on the ground and will be filled using an excavator. The excavator will move the waste from the CCU to the hopper. All personnel should be a safe distance away from the excavator while the excavator is filling the hopper. The excavator puts one bucket (10 barrels) of waste in the hopper, cement is added accordingly to the waste (based on density) to have a uniform mixture.

4. Manual Mixing of cement and waste - after the excavator has placed waste and cement in the hopper. It is mixed manually using shovel to obtain a consistent mixture. All tools used should be inspected and in good condition. All necessary personal Protective equipment should be worn. The process is repeated until hopper is filled.

5. Placing hopper on pugmill - The forklift is used to place the hopper on the pugmill. The operator must ensure the grooves on the hopper and placed properly on the pugmill platform. During this process, a banksman will assist the forklift operator by giving him directions to safely place the hopper on the pugmill. At this time, no personnel should be on the pugmill platform.

6. Start Pugmill process - harness and all other necessary Personal equipment should be worn before proceeding to the pugmill platform. When operator has reached at the top of the pugmill platform 100% harness tie off should be immediately done. Personnel will then switch on the extractor fans after which the pugmill is switched on. Personnel will then begin to manually pull the material from the hopper using a hoe down into the pugmill in a uniformed and consistent manner. All moving parts (scroll & motor are all guarded.

7. There will be someone monitoring the mega bag that is collecting the pugmill waste when

the mega bag is filled the person feeding the pugmill will stop . The forklift will then carefully remove the filled mega bag, with the aid of a banks man and place it in the designated storage area, a new mega bag will put in place and the process continues.

8. Housekeeping - Housekeeping should be performed after the pugmill process is completed. The excavator, pugmill and all other equipment must be cleaned thoroughly.

PPE Requirements

- Harness
- Steel Toed Safety Shoes
- Hard Hat
- Safety Glasses
- Workmen's gloves
- Spill kit
- Respirator

Equipment Requirement

- Pug-Mill
- Forklift
- Excavator

Process Risk Summary

1. Job Risk Assessment (JSA) – Pug-Milling Operations
2. Job Risk Assessment (JSA) – Manual Handling of the Materials

Records

1. Inspection Equipment Checklist
2. D- log
3. Job Safety Sheets
4. Analytical Results for waste materials

Appendix 5: Safe Work and Operating Procedure – Oil-Water Separator

Purpose

This procedure was developed to ensure the safe and efficient operation of the Oil – Water Separator

- To define the procedures for the Water Treatment.
- To ensure that Environmental and Health & Safety considerations are included as part of the operating procedures
- To clearly define the responsibilities of personnel responsible for the operation of the Water Treatment.

Scope

1. Defining responsibilities of Technician
2. Standard operational procedure
3. Maintenance / Troubleshooting

Responsibilities/Authorities

The General Manager has the responsibility and authority for ensuring resources are available for implementation of this procedure.
The Operations Manager has the responsibility for ensuring implementation of this procedure for Pug-Milling Operations
The Waste Technician will be responsible for the following:

- Complete all required checklist , permits and inspection of equipment this includes Oil water separator, pumps, hoses, sand filter, charcoal filter, Pod filters, discharge tank
- A Toolbox meeting should be done before work commence.
- Complete all the documentation associated with the destruction process (D Log, Waste Location Log, Waste Manifest)
- Compliance with all Health, Safety and Environmental requirements of the facility.

The Technical Service Coordinator is responsible for identification of waste & determine the best method of treatment.
The Compliance Coordinator is responsible for the sampling, analysis and all other quality assurance / quality control checks that are necessary.

PPE Requirements

- Steel Toed Safety Shoes
- Hard Hat
- Safety Glasses
- Chemical Gloves
- Respirator
- Spill kit
- Coveralls / Tyvek

Equipment Required:

- Oil – Water Separator
- Sand Filter
- Pod Filter
- Charcoal Tank
- Frac Tanks
- Diaphragm & Centrifugal Pumps

Procedure

1. Filling the Oil -Water Separator - This is achieved by either pumping or gravity flow. All lines and connection must be secured. Before filling open the inlet and outlet valves on the oil – water separator followed by the valve on the storage tank. If a pump is being use start the inlet pump. Be certain to ensure there are no leaks.

2. Pumping from the Oil – Water Separator - When the effluent clarewell chamber is filled, and liquid begins to flow out of the outlet line/valve. Start the outlet pump & check to ensure there are no leaks.

3. Pumping to the Sand Trap Filter: As the outlet pump sends into the sand trap filter, NOTE if the sand trap filter is empty the relieve valve on the sand trap filter must be open to relieve any build-up of air pressure while filling.

4. The sand trap filter maximum pressure should not exceed 50 psi. This pressure can be monitored on the gauge at the top of the sand trap filter. Ensure there are no leaks.

5. Pods - The pressure from the sand trap filter will take the liquid through the two filter pods, which will trap any larger particles in the filtered water.

6. Pumping from POD to Charcoal tank - After flow is achieved through the Pods start the inlet charcoal pump. The valve at the top of the charcoal tank should be slightly open to avoid air pressure build up while pumping/filling the tank. Ensure there are no leaks.

7. Pumping from charcoal tank - allow the charcoal tank to fill at least halfway, then start the outlet charcoal pump. This will take the liquid to the final storage tank for testing. Ensure there are no leaks.

Preventative Spill Measures

1. The entire Water Treatment system (From Oil-Water Separator into Frac Tanks) is in a bunded area.
2. Ensure Pre – Inspection equipment checklist is completed before the job commence.
3. Inspect all hoses for any sign of wear, tear, or other damages to ensure the integrity of the hose used during transfer.
4. Ensure all hoses & connections are secured tightly using the respective clamps.
5. Spill response equipment (kits) are present and easily accessible in the event of an emergency.

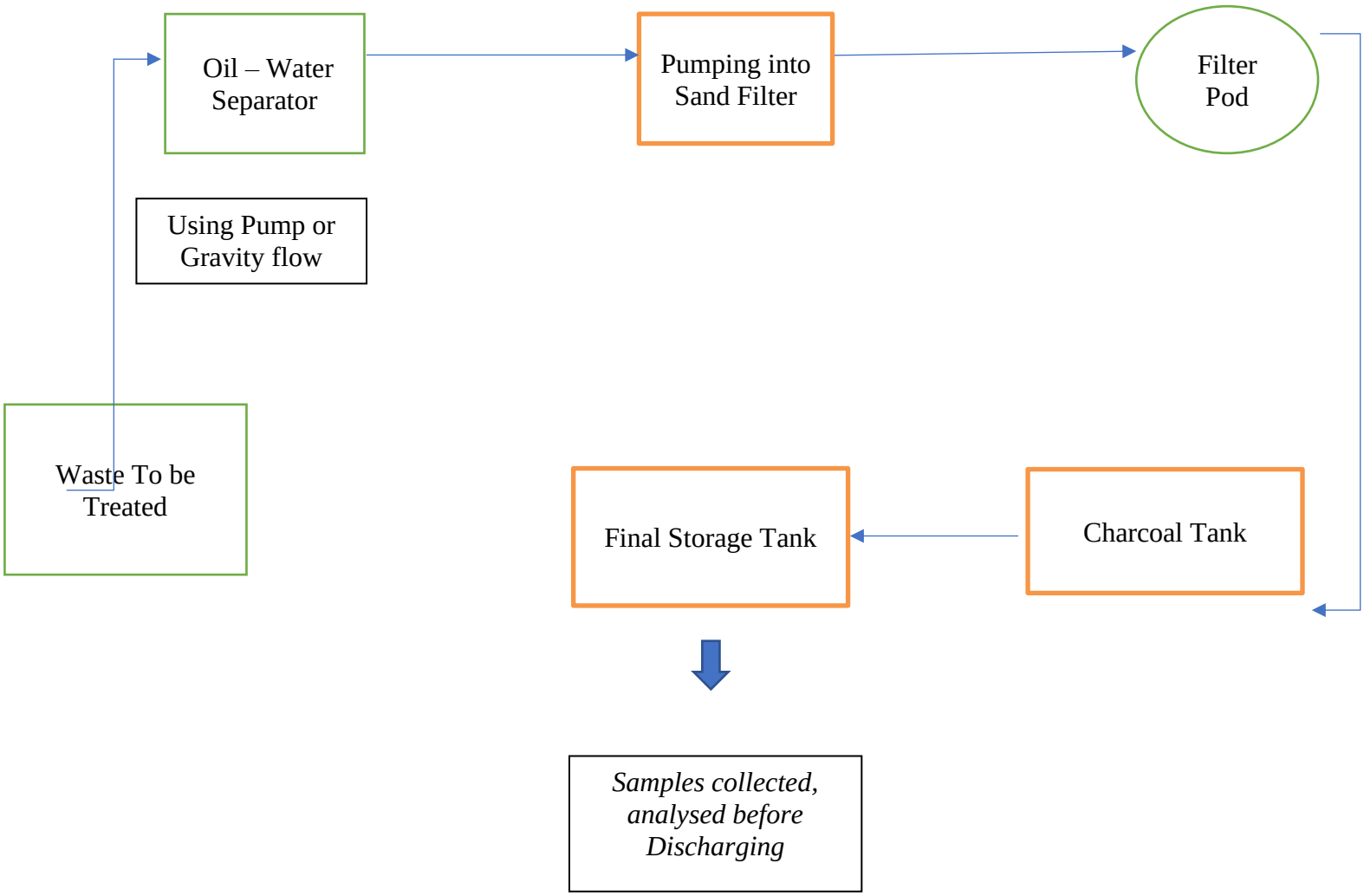
Process Risk Summary

1. Job Risk Assessment (JSA) – Operation of the Water Treatment System.
2. Job Risk Assessment (JSA) – Manual Handling of the Materials

Records

1. Inspection Equipment Checklist
2. D- log
3. Job Safety Sheets
4. Analytical Results for Treated waste.
5. Waste Logs

Flow Diagram showing the stages in the Water Treatment Plant



Appendix 6: Operations and Safe Work Procedure – Drum Crusher

Purpose

This procedure was developed to ensure the safe and efficient operation of the Drum Crusher System.

1. To define the procedures for operation of the Drum Crusher
2. To ensure that Environmental and Health & Safety considerations are included as part of the operating procedures
3. To clearly define the responsibilities of personnel responsible for the operation of the Drum Crusher.

Scope

- Defining responsibilities of Technician
- Standard operational procedure
- Maintenance / Troubleshooting.

Responsibilities/Authorities

The General Manager has the responsibility and authority for ensuring resources are available for implementation of this procedure.

The Operations Manager has the responsibility for ensuring implementation of this procedure for Drum Crusher operations.

The Operator will be responsible for the following:

- Pre-inspection of the Drum Crusher using checklist.
- Ensure the drums are decontaminated before crushing.
- Complete all the documentation associated with the destruction process (D Log, Waste Location Log, Waste Manifest)
- Compliance with all Health, Safety and Environmental requirements of the facility.

Procedure

Operating Procedure

1. Open door & manually insert drum into chamber. Ensure door is sealed & closed properly by securing the door latch.
2. Press start button to commence the cycle of crushing. Estimated completion time for this cycle is 10 seconds.
3. Manually remove door latch & open door to remove crushed drum & repeat cycle with new drum.

Personal Protective Equipment Requirements

- Fire Retardant Coveralls
- Steel Toed Safety Shoes
- Hard Hat
- Safety Glasses
- Workmen's gloves
- Spill kit

Equipment Required

- Drum Crusher

Process Risk Summary

1. Job Risk Assessment (JSA) – Drum Crusher Operations
2. Job Risk Assessment (JSA) – Manual Handling of the Materials

Records

1. Inspection Checklist
2. D- log
3. Waste Manifest

Appendix 7: Operations and Safe Work Procedure – Bulb Eater

Purpose

This procedure was developed to ensure the safe and efficient operation of the Fluorescent Tube (Bulb Eater) Disposal System and includes:

3. Assembly procedure
4. Standard operational procedure
5. To ensure that Environmental and Health & Safety considerations are included as part of the operating procedures
6. To clearly define the responsibilities of personnel responsible for the operation of the Bulb Eater Unit
7. Maintenance
8. Troubleshooting

Scope

- To define the Procedures for Operation of the Bulb Eater
- Defining responsibilities of Technician

Responsibilities/Authorities

The General Manager has the responsibility and authority for ensuring resources are available for implementation of this procedure.

The Operations Manager has the responsibility for ensuring implementation of this procedure for Bulb Eater operations.

The Operator will be responsible for the following:

- Assembly and Pre-inspection of the Bulb Disposal Equipment
- Inventory (quantity and type) of Waste (Tubes) processed.
- Ensure appropriate hazardous waste labeling of drums used for crushed tubes
- Ensure first stage bag filters and HEPA Filters are changed as per the manufacturer's specifications

- Complete all the documentation associated with the destruction process (D Log, Waste Location Log, Waste Manifest)

- Compliance with all Health, Safety and Environmental requirements of the facility.

4. Procedures

The following outlines the procedure for the assembly, operation, and maintenance of the Bulb Disposal Unit and also identifies possible hazards and preventative control measures that should be implemented to keep these hazards at a minimum.

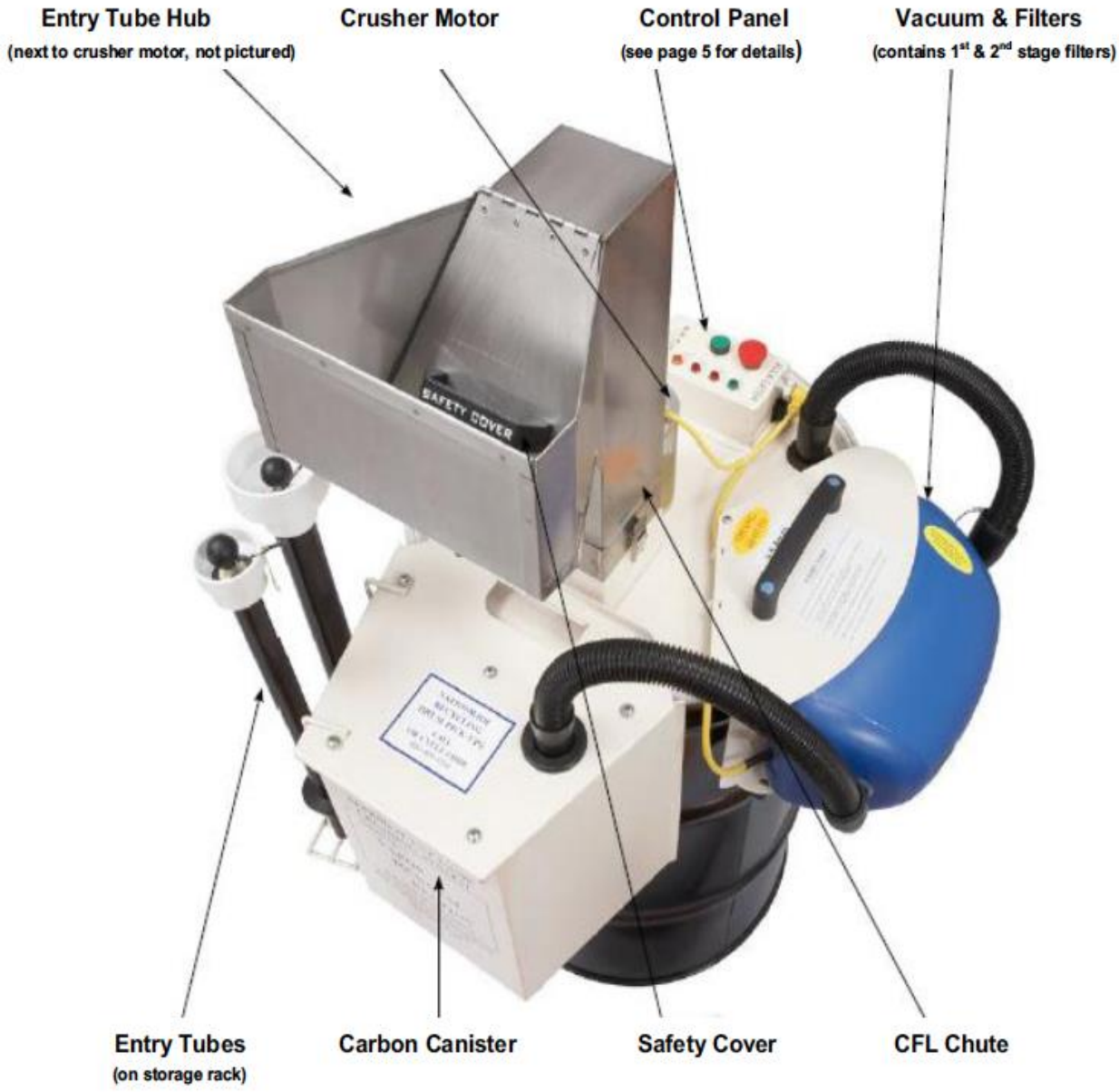
4.1. Step 1

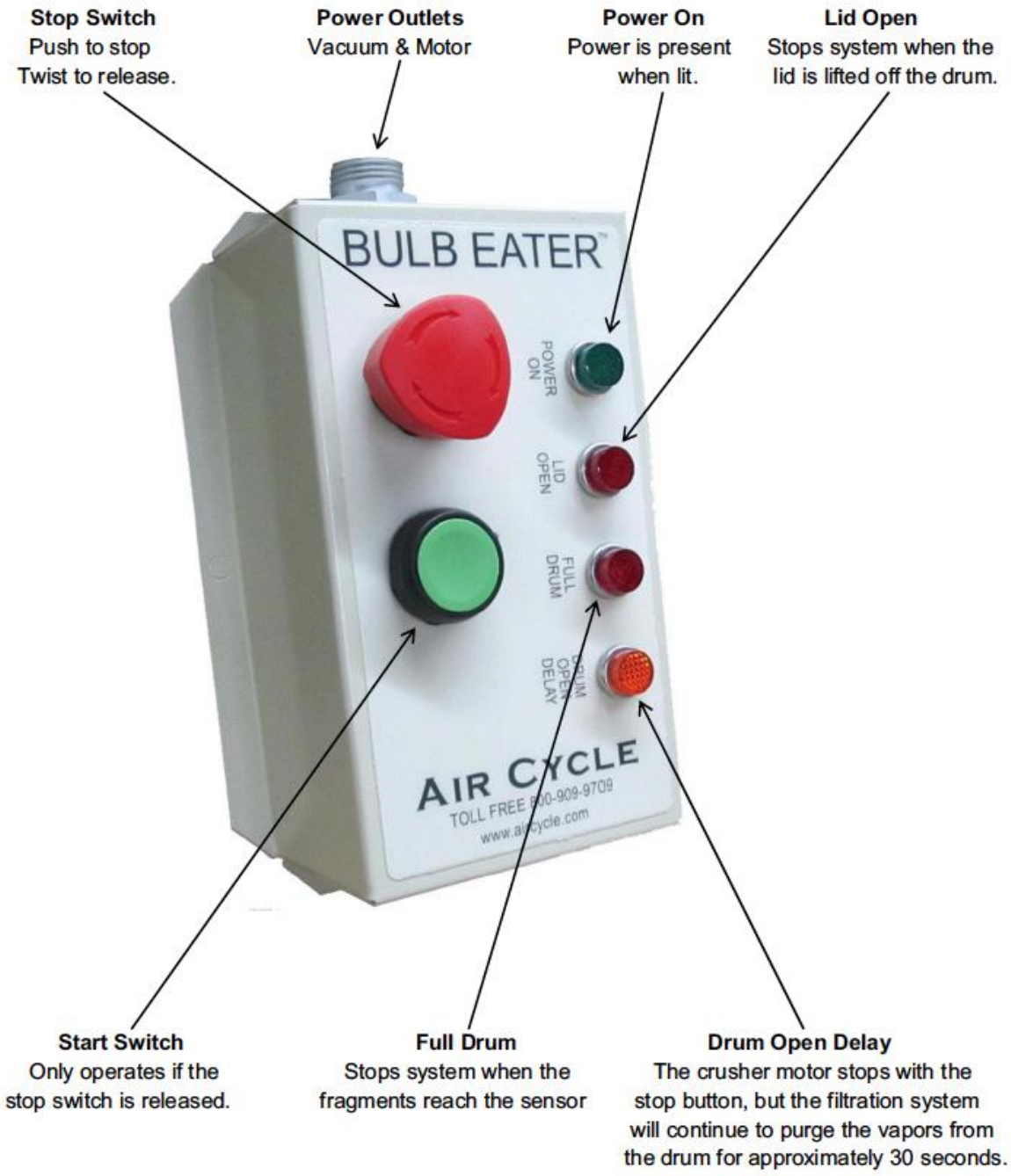
Assembly

1. Mount the Bulb Eater® onto the drum, tightening the bolt ring with a 15/16" wrench or socket.
2. Unscrew the cap on the entry tube hub and screw the entry tube into the lid.
3. Connect the vacuum hose to the drum lid by inserting the nozzle end into the black rubber grommet on the drum lid and screwing the other end into the hole on the right side of the blue filter case.
4. Remove the carbon bag from the beige carbon canister and slowly pour the activated carbon granules into the carbon canister.
5. Attach the lid and entry tube rack to the carbon canister– Use rubber grommets between the entry tube rack and lid and align all screws before tightening.
6. Hang the canister on the drum edge on the small standoffs provided as hooks.
7. Plug in the hose from the blue vacuum into the black rubber grommet on top of the carbon canister to complete the filtration system. Make sure the nozzle is pushed in deep for a good seal.
8. Finally, connect the power cord to the control panel on your Bulb Eater® and plug it into an outlet.

Operating Procedure

1. Release the stop switch and press green START button. Confirm suction at top of entry tube and air flow
    a. out of carbon canister before crushing lamps.
2. Insert lamp into entry tube and then let go. Do not force the lamp down the entry tube.
3. After crushing, press STOP button to stop the crusher motor and begin purge cycle (approximately 30 seconds).
4. Once the purge cycle is complete, seal the top of the entry tube with the rubber plug. When the machine is not in use, make sure that all openings are sealed.
5. Before removing lid: Let the machine sit OFF for at least 15 minutes after the purge cycle is done to allow dust to settle before opening the lid.


Entry Tube Hub
(next to crusher motor, not pictured)
Crusher Motor
Control Panel
(see page 5 for details)
Vacuum & Filters
(contains 1st & 2nd stage filters)
SAFETY COVER
Entry Tubes
(on storage rack)
Carbon Canister
Safety Cover
CFL Chute


Stop Switch
Push to stop
Twist to release.
Power Outlets
Vacuum & Motor
Power On
Power is present when lit.
Lid Open
Stops system when the lid is lifted off the drum.
BULB EATER
POWER ON
LID OPEN
FULL DRUM
DRUM OPEN DELAY
AIR CYCLE
TOLL FREE 800-909-9709
www.aircycle.com
Start Switch
Only operates if the stop switch is released.
Full Drum
Stops system when the fragments reach the sensor
Drum Open Delay
The crusher motor stops with the stop button, but the filtration system will continue to purge the vapors from the drum for approximately 30 seconds.

PPE Requirements

- Fire Retardant Coveralls
- Steel Toed Safety Shoes
- Rubber boots
- Full face respirator
- Hard Hat
- Safety Glasses
- Workmen's gloves
- Rubber gloves
- Spill kit
- Spanners & Wrenches

Equipment Requirements

- Fire Extinguisher
- Bulb Eater

5. MAINTENANCE

Filter Changing Procedures

- 1st Stage Bag Filter must be changed a minimum of twice per full drum of crushed lamps
- 2nd Stage HEPA Filter must be changed at least once every 10 drums of crushed lamps
- 3rd Stage Carbon Filter:

Spent filters must NEVER be left exposed. Spent filters must either remain in the blue vacuum case attached to the unit, be sealed in a full drum of crushed lamps, or bagged in a zip-top bag to avoid mercury release. DO NOT DISPOSE OF FILTERS IN THE TRASH.

- Confirm that the Bulb Eater is clearly "off" and not operating.
- The operator must wear safety glasses and gloves when changing any of the three Bulb Eater filters

Replacing the 1st Stage filter:

1. Locate the right-hand door on the blue filter case of the Bulb Eater®.
2. Remove black nozzle from blue door and immediately cap the end of the black nozzle to prevent dust from falling to the floor.
3. Press the yellow label marked PUSH on the far most right edge of the curved blue vacuum case to open the filter case door.
4. Carefully remove the door from the blue filter case.
5. Immediately place a circular white label from your Bulb Eater® filter kit over the center hole on the front of the 1st Stage filter. This prevents mercury-laden dust from escaping during the change-out process.
6. With the 1st Stage filter safely covered with the white label, grab each side of the brown cardboard front of the filter with both hands.
7. Carefully pull the 1st Stage filter slowly out of the blue vacuum case and place it on top of the full drum of crushed lamps (within the drum) or store in a zip-top bag if drum is not yet full. Avoid compression of the filter to minimize the release of mercury-laden dust.
8. Insert a new filter into the filter case, making sure the cardboard "front" is securely in place and the bag portion of the filter is unfolded and beside the cartridge, not rolled up in front of the cartridge.
9. Replace the blue door and verify that it is latched.

Replacing the 2nd Stage HEPA filter:

1. Follow steps 1 through 7 above to remove the 1st Stage Filter
2. Locate the 2nd Stage filter in the middle of the blue case.
3. Rotate the filter a quarter turn counterclockwise.
4. Once the HEPA cartridge is free, carefully remove it from the blue filter case and place it in the full drum along with the crushed lamps and 1st Stage filters for disposal.
5. Replace both filters and replace the blue door, verifying that the door is secure.

Replacing the 3rd Stage Carbon Canister filter:

1. Unplug the hose from the tip of the carbon canister at the grommeted opening.
2. Remove the used canister from the standoffs on the lid of the machine and place duct tape over the open grommeted hole to prevent carbon spillage. It is recommended that the canister be placed into a DOT approved appropriately sized container and sealed. (A 55-gallon DOT metal drum may be the most convenient and cost effective). The used carbon canister should be placed into the shipping container immediately upon removal from the Bulb Eater®. Once the canister is removed, a determination should be made of the waste type in accordance with applicable local, state, and federal regulations. Also, be sure to manage, store, and label the container accordingly.
3. Remove the carbon bag form the new beige carbon canister and slowly pour the activated carbon granules into the carbon canister.
4. Hang the new carbon canister on the standoffs on the lid of the machine.

5. Plug in the hose from the blue vacuum into the black grommet on top of the new carbon canister to complete the filtration system. Make sure the nozzle is pushed in tightly for a good seal.

6. Process Risk Summary

5. Job Risk Assessment (JSA) – Bulb Eater Operations
6. Job Risk Assessment (JSA) – Manual Handling of the Materials

6.0 REFERENCES

- Training Records
- Equipment Operation Manual

7.0 INSPECTIONS

Inspections as per the Checklist are to be conducted prior to each start up.

8.0 TROUBLESHOOTING

Bulb Eater runs with low suction or is overheating.

Low suction and overheating can be an indication that your 1st stage bag filter or 2nd stage HEPA filters need to be changed. In ideal conditions, crushing clean bulbs, 1st stage bag filters should be changed a minimum of twice per full drum of crushed lamps and the 2nd stage HEPA filters, every 10 drums. However, dirty bulbs and various environmental conditions can cause filters to fill more quickly.

- Replace the 1st stage bag filter (instructions can be found in the Maintenance & Troubleshooting section)
- If the problem persists, replace the 2nd stage HEPA filter.

Control Panel Lights

- **“**Power” light does not illuminate when machine is plugged in and is operating.
- If your Bulb Eater functions normally when plugged in but the power light does not illuminate, you likely have a faulty light. The Bulb Eater will function properly with a faulty power light; you can continue using The Bulb Eater with no changes.
- “Lid Open” light is on when the Bulb Eater properly secured to drum. The lid open sensor

is a safety shut off to prevent the operation of the machine if it is not installed on a drum.

If the light is lit when the lid is installed properly:

• **If your machine has a white sensor block** (found on the underside of the Bulb Eater lid) **–** Follow the instructions found on page 11 of the operations manual

• **If your machine has a black sensor block –** Remove the setscrew retaining the sensor and with a small screwdriver set, slide the sensor out so it is flush with the end of the block. Then reinstall the setscrew to lightly hold the sensor in place.

9.0 Records

- D - Log
- S – Logs
- Waste Manifest

Appendix 8: Operation and Safe Work Procedure – Aerosol Unit

Purpose

This Procedure was developed to ensure the safe and efficient operation of the Aerosol Unit.

1. To define the Procedures for operation of the Aerosol Unit.
2. To ensure that Environmental and Health & Safety considerations are included as part of the operating procedures
3. To clearly define the responsibilities of personnel responsible for the operation of the Aerosol Unit.
4. Maintenance / Troubleshooting.

Scope

- Defining responsibilities of Technician
- Standard operational procedure

Responsibilities/Authorities

The General Manager has the responsibility and authority for ensuring resources are available for implementation of this procedure.

The Operations Manager has the responsibility for ensuring implementation of this procedure for Aerosol Unit Operations

The Operator will be responsible for the following:

- Pre-inspection using checklist & operation of the Unit.
- Complete all the documentation associated with the destruction process (D Log, Waste Location Log, Waste Manifest)
- Compliance with all Health, Safety and Environmental requirements of the facility.

Operating Procedure

1. Remove cover from the vapor catcher & manually insert can into chamber. Placed cover on unit and ensure it closed properly.

2. Pull lever to puncture the can, approximately after 10 seconds remove both cover and can. NB. Whatever liquid is present in the can will fall into the drum and if any upward vapor is present it will be caught in the filter present on the unit.

3. Repeat steps 1 -2 for new Can.

PPE Requirements: -

- Fire Retardant Coveralls
- Half -Face Mask
- Steel Toed Safety Shoes
- Hard Hat
- Safety Glasses
- Workmen's gloves
- Spill kit

Equipment Requirement: -

- Aerosol Unit

Process Risk Summary

1. Job Risk Assessment (JSA) – Aerosol Unit Operations
2. Job Risk Assessment (JSA) – Manual Handling of the Materials

Records

1. Inspection Checklist
2. D- log
3. Waste Manifest

Appendix 9: Journey Management Procedure

1.0 PURPOSE

The purpose of the procedure is to describe the requirements for managing driving risks associated with the activities of Tiger Tanks Trinidad (TTT) and *Tiger Rentals Guyana (TRG)* and external providers of Transporting services.

2.0 SCOPE

The procedure applies to all driving activities managed or subcontracted by Tiger Tanks/ Tiger Rentals and associated work activities carried out by Tiger Tanks Trinidad and Tiger Rentals Guyana or subcontracted employees.

The procedure applies to the driving of all motor vehicles:

- Vehicles owned, leased or rented by TTT/TRG
- Vehicles leased or rented by TTT/TRG for an employee's use as part of a salary package arrangement.

The procedure does not apply to the operation of heavy earth moving equipment. (Bulldozers, front-end loaders etc.)

3.0 RESPONSIBILITIES/AUTHORITY

The General Manager has the overall responsibility to provide the necessary support and resources required for implementing this procedure.

The HSE Representative has the responsibility to implement and review the Journey Management Program and continuously improve the system.

The Operations Manager has the responsibility to ensure the Journey Management system is being adhered to by Tiger Tanks and subcontracted employees.

The Supervisor has the responsibility to plan the safe Journey in collaboration with driver and to maintain records of the plan. He/she also has the responsibility to ensure vehicles are in good working order.

Drivers/Employees/Subcontractors has the responsibility to adhere to the Journey Management Procedure, record the approve routes and inform Supervisor/Management of any changes or nonconformities on the Journey that may pose additional risk.

4.0 REFERENCES

- Trinidad and Tobago Occupational Safety and Health Act Chapter 88:08

- Trinidad and Tobago Motor Vehicles and road Traffic Act Chapter 48:50
- Guyana Motor Vehicle Act

5.0 DEFINIITONS

None

6.0 PROCEDURE

For Guyana's operations, the HSE Representatives are responsible for ensuring the transportation contractors adhere to the requirements of this procedure.

6.1 REQUIREMENTS

6.1.1 Element 1: The Right Vehicle

The Supervisor or Driver has conducts/verifies the following:

1. Regular inspection and maintenance of vehicle
2. Assurance that maintenance is conducted by a competent person
3. Knowledge and understanding of the legislation, standards, HSE rules and regulations and applicable procedures
4. Valid inspection from Licence Authority
5. Vehicle meets job requirements. This includes requirements at client's sites. Vehicles are to be inspected for every trip
6. Selected vehicle is suitable for driving in required route and meets client's requirements
7. Job risk assessment identifying hazards and the risks associated with the potential working environment and ensure that vehicles are fit for the intended purpose

The Driver ensures that all motor vehicles are equipped with the following safety mechanisms:

i Airbags (at least driver side) for vehicles travelling at speeds > 40 km/hr.
ii Head restraints for all seating positions
iii Driver and passenger door /side mirrors.
iv Spare wheel and Tire
v Strapping to secure any loads carried in the tray
Audible reverse alarm which can be clearly heard by pedestrians in proximity to vehicle

Any further equipment requirements shall be based on a risk assessment of the existing driving conditions.

The Supervisor arranges inspections for the vehicles at regular intervals per legal and regulatory requirements.

If a vehicle is not roadworthy, the Supervisor removes the vehicle from service, notifies the Transportation division and Operations Manager.

The Supervisor makes the necessary arrangement to conduct maintenance from a competent resource (internal or external).

6.2.3 Element 2: The Right Journey

Transportation of products/ materials begin conducted internally, do not require completion of a Journey Management form. The Supervisor and Driver determines the best route for journey and conducted as outlined below:

7.0 Journey Planning

Responsibility/Authorities

The Driver and Supervisor makes a pre-determined assessment on probable routes for the haulage of waste specifically to reduce the risk associated with spills and other incidents.

The Operations Manager hosts a planning meeting to discuss the route and job requirements.

The Supervisor/ Driver makes maps available to select a suitable route from the collection and discharge locations.

Points to consider	Action Required
Location of the job	Operations Manager obtains confirmation from client on the job location
How trucks can safely reach job location	Supervisor/ Driver determines the following: o Clearances from overpasses of loads o Traffic and alternative routes o Probable checkpoints o Width and length of vehicles
Are there any hazards to be considered?	Drivers makes preliminary assessment on the hazards for routes
Are mitigation measures in place?	Drivers makes preliminary assessment on the control required to prevent hazards
Are drivers competent?	Drivers have the necessary entry requirements for site and have suitable experience
Have procedures, client's requirements emergency response procedures been communicated?	Operations Manager / Supervisor communicate requirements to team.

Are vehicles available?	Operations Manager/ Supervisor determines upcoming jobs and availability of vehicles from fleet
Do drivers conform to fatigue management program?	Ensure drives do not operate vehicles for more than 16 hours
Are there changes to traffic / alternative routes for scheduled journey time?	Operations Manager / Supervisor / Driver reviews news updates etc
Does cargo require police escort?	Operations Manager / Supervisor submits letter requesting service
Are there any legal requirements to consider?	Operations Manager/ Supervisor to obtain any legal requirement for journey

Element 3: The Right Driver
The Operations Manager/ Supervisor verifies the following:

1. Drivers must be trained, licensed and competent to operate vehicle selected

Vehicle type	Classification of Licence
Motor Cycle	Class 1
Wheel Tractor	Class 2
Light Motor Vehicle	Class 3

2. Drivers are medically and *mentally* fit to operate class of vehicle
3. Drivers can meet client's site requirements
4. Drivers have a valid Defensive Driving certificate *for class of vehicle, cargo and location*
5. Drivers haves skills to complete the Journey Management Form
6. Drivers are competent to assess risks during journey and can implement necessary controls
7. Drivers have knowledge on accident/ incident reporting and emergency response protocols
8. Drivers are not under influence of drugs , alcohol or other substances which can impair decision making

The Operations Manager verifies this with support of the TTT's GPS tracking system.

Persons who drive a company vehicle home after work related activities or functions are on their own time and are subject to all driving laws including driving under the influence.

Element 4: Legal and Other Requirements

Supervisors/Drivers requests the following information from the relevant departments or news updates

1. any legal requirements
2. special client's requirements
3. road / traffic alerts
4. speed limits
5. any requirements for transportation of hazardous/ dangerous cargo

The driver must ensure adherence to Trinidad and Tobago's Motor Vehicles Act (48:50) and Guyana Motor Vehicle and Road Traffic (51:02) Act requirements while driving company vehicles.

TTT/TRG mandates all personnel in company vehicles must wear seat belts while in driver and passenger sears. Speeds limits are to be adhered to. EMPLOYEES WILL BE HELD LIABLE FOR ANY NON-COMPLIANCES.

Element 5: Number of Passengers

The Driver ensures the number of passengers does not exceed the Manufacturers' design specifications or legal requirements.

It must be noted that in addition to being non-compliant with the legal requirements, overcrowding also invalidates the insurance coverage of the vehicle. Passengers in company vehicles are limited to company employees only.

The driver will be held liable personnel/ vehicle damages for any unauthorized occupant of a company vehicle.

Element 6: Load Design

1. The Drivers ensure loads are secured with the appropriate strapping devices for the loads and do not exceed manufacturers design specifications or design limits for the selected vehicle.

2. Loads should only be carried on fit for purpose vehicles and should not exceed the rate carrying capacity.

    a. Loads should be secured at all times.

b. All dangerous cargo should be carried in accordance with legal and regulatory requirements, displaying appropriate warning signage. Where there are no legal or regulatory requirements, the process should default to an established standard or best practice.

c. Loads should not be carried in the passenger compartment.

d. Fixed securing devices (stanchions) should be in good condition and of adequate strength for the load.

e. Sufficient straps, chains, should be applied to prevent movement of loads during transportation.

f. During long distance journeys, drivers should check load periodically

g. The driver must load, transport and offload cargo in accordance with HSESWP 053.

Element 7: Communications
Drivers are not to operate any mobile communication equipment while driving.

Drivers are not to operate mobile communication equipment while driving.

In case of emergencies, drivers may use mobile communication equipment if the vehicle is off the roadway or is lawfully parked on the roadway. When using the mobile device in such a manner, do not cause an obstruction, interfere with the line of vision of another motorist or impeded traffic.

Element 8: Vehicle Tracking
The Operations Manager/ Supervisor ensures a GPS Tracking System is installed and monitored in all company vehicles or company leased vehicles to facilitate locating and monitoring of vehicles during a journey.

The equipment should have the capability to provide the following;

- Speed Tracking
- Vehicle Tracking
- Real-time data processing and alerts

Element 9: Emergency Response Capabilities
The Operations Manager/ Supervisor ensures immediate availability of the following for all hazardous waste/dangerous cargo haulage vehicles:

a) stock of first response equipment
b) SDS consistent with the waste type being hauled to provide immediate emergency response efforts including spill and first aid response

c) Emergency numbers
d) Certified fire extinguisher

8.0 PROCESS DIAGRAM

9.0 PROCESS PERFORMANCE METRIC(S)

- Reference QHSE Performance Tracker

10. PROCESS RISK SUMMARY

RISK ID	Risk description	Probability	Severity /Impact	Risk Rank	Mitigation	Contingency	Residual Risk Rank
JM001	Changes in traffic rules	HIGH	HIGH	HIGH	3. Operations Manager to not route and notify transportation of any rules 4.	1. General work staff to note during daily meeting where applicable	MED
JM002	Vehicles inadequate for journey	MED	MED	MED	3. Operations Manager to ensure equipment is inspected and adequate for job during selection process	1. Audits	LOW

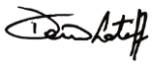
If waste is transported by the generator, the generator will be responsible for any liability associated with the transportation of the waste. TRG will accept responsibility for the waste at the point of custody transfer at our shore base facility.

11. RECORDS

Journey Management Form (HSEF036/1-1)
Vehicle Checklist

APPENDIX F TRG'S WASTE SAMPLING PLAN

Document Verifications:

Authorized by	
Name: Denis Latiff	**Position: General Manager**
Date: 4th January, 2021	**Signature:** 
Responsible Persons	
Name: Shane Singh	**Position: General Manager**
Date: 4th January, 2021	**Signature:**
Name: Elizabeth Thomson	**Position: Environmental Coordinator(TT)**
Date: 4th January, 2021	**Signature:**
Name:	**Position: Environmental Coordinator(GUY)**
Date: 4th January, 2021	**Signature**
Name:	**Position:**
Date:	**Signature**

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Issue Record

Revision #	Revision Date	Review Date	Next Review Date	Comments
0.0	30th July, 2019	4th January, 2021	4th January, 2022	No change
1.0	30th April, 2021	30th April, 2021	4th January, 2022	Pugmilling Sample Plan

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1.0 PURPOSE

Waste monitoring is a typical requirement outlined by regulators in the Terms of Reference of permits granted. The waste monitoring is conducted to ensure firstly there are no adverse impacts on the environment and secondly that the facility and its operations are operating within the compliance requirements of the permit and the legislation. Where no regulatory body or legislation is applicable, compliance will conform to industry best practice and / or international guidance pertaining to wastewater discharge quality standards.

2.0 SCOPE

This procedure applies to all operations generating or receiving waste for processing and disposal. The scope will include identification of the personnel responsible for the sampling, QA/QC guidelines, typical analytical parameters, sampling preparation, sampling techniques, shipping samples and documentation.

Methods for field sampling listed in this document are applicable to standard operating procedures listed in Tables #2, #3, #4, #5. #6 and #7, below for water and solid waste samples. Field sampling procedures discussed are listed for the following:

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- Wastewater/Processed Water Pipeline
- Wastewater/Processed Water Tank
- Wastewater/Processed Water IBC
- Solids/Sludge Vertical Infrared Unit
- Solids/Sludge Incinerator

3.0 RESPONSIBILITY

The execution of this procedure is the responsibility of the assigned Environmental Coordinator/ Technician. The Operations Coordinator in conjunction with the Country Manager and HSEQ Coordinator will review the process to ensure all QA/QC Steps are adhered to.

4.0 REFERENCE

- Reference: Standard Methods for the Examination of Water and Wastewater Method No. 1060. 23rd Edition, 2017. Approved by Standards Methods Committee, American Public Health Association, American Water Works Association, Water Environment Federation.
- Waste Management Process (Trinidad, QOP8.1/5; Guyana, 2.3/1-1)

5.0 SAMPLING PROCEDURE

A. QUALITY ASSURANCE /QUALITY CONTROL

Analytical Method Requirements/Quality Control Requirements

The methods described shall be performed in conformance with the 23rd Edition, 2017, of "Standard Methods for the Examination of Water and Wastewater (SMEWW)", United States Environmental Protection Agency (USEPA) Reference Methods and the Standard Operating Procedures for Ecotox Environmental Services, the laboratory engaged to provide the waste analytical support services.

The QC practices are an integral part of each method, are summarized below:

- Training and Competency - Evaluation of analyst performance for each method.
- Determine competence by analyses of samples containing known concentrations.
- Calibrate instruments and ensure that instrument measurements do not drift.
- Asses the precision of analytical procedures by analysing at least 10% of sample in duplicate.
- Analyse a minimum of one duplicate with each set of samples.
- Determine bias of an analytical procedure in each sample batch by analysis of blanks, known additions with a frequency of at least 5% of samples, and an externally provided standard.
- % regression of standard curve must be ≥ 90%.
- % recovery of test name standard must be within the acceptable range of 90.0 to 110.0 %
- Percent Relative Standard Deviation must be ≤ 10%.
- Duplicate/Triplicate analyses,
- Method Blank, Laboratory Fortified Blank.
- Standard Reference Material
- Routine and Random Duplicates/Triplicates.
- Determine Method Detection Limit for sample analyte.
- Instrument Operational Range – Upper and Lower Limits
- Calibration & Verification Procedures and Standards
- Equipment Usage and Preventative Maintenance Procedures
- Quality Risk Assessments & Associated Procedures
- Risk Assessments (incorporating Preventative Actions), Corrective Actions, Implementation of Control Measures and Improvement Procedures.
- QHSE Internal Audits
- Management Reviews

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B. SAMPLING PROCEDURE

3.PROCESS

5.1. Sampling Containers

In general, water samples with multiple or unknown chemical types should be stored in containers made from borosilicate glass, high density polyethylene plastic or polytetrafluoroethylene (PTFE or Teflon) as these materials minimize leaching, dissolution, and sorption (ASTM, 2000a; APHA, 1995). Samples for organic contaminant analysis should be stored in brown borosilicate glass containers with PTFE lid liners. If volatile compounds will be analyzed, containers should have a septum to minimize escape of volatile gases during storage and analysis. Extra containers should be provided for these analyses in the event that re-analysis of the sample is required. If samples are contaminated with photoreactive compounds such as PAHs, exposure to light should be minimized by using brown glass containers or clear containers wrapped tightly with an opaque material (e.g., clean aluminium foil). Plastic or acid-rinsed glass containers are recommended when the chemicals of concern are heavy metals. Fill containers completely if the sample will not be frozen prior to analysis.

Any material that is in contact with a field sample has the potential to contaminate the sample or adsorb components from the sample. The use of appropriate materials, along with appropriate cleaning procedures, can minimize or mitigate interferences from sample containers. All utensils (e.g., spoons, scoops, spatulas) which come in direct contact with sediment samples during handling and processing should be made of non-contaminating materials (e.g., glass, high-quality stainless steel and/or Teflon®).

If a sample is to be refrigerated, the container should be filled to the brim to reduce oxygen exposure. This is particularly critical for volatile compounds. If a sample is to be frozen, the container should be filled to approximately 90% of its volume (i.e., 10% headspace) to allow for expansion of the sample during freezing. Refer to Figures #3 to #6. All sample containers should be properly labelled with a marker prior to sampling. Containers should be labelled on their sides in addition to or instead of labelling the lids. Each label should include, at a minimum, the study title, station location and/or sample identification, date and time of collection, sample type, and name of collector. Blind sample labelling (i.e., a sample code) should be used, along with a sample log that identifies information about each sample to minimize potential analytical

bias. Additional information such as required analyses and any preservative used might also be included on the label although this information is typically recorded on the chain-of-custody form. Labelled containers should be stabilized in an upright position in the transport or storage container. Extra containers should be carried on each sampling trip

Figure 3- Nalgene Plastic Bottles

Figure 4- Borosilicate Glass Bottles

Figure 5- Glass Microbiology Bottles

Figure 6- Plastic Microbiology Bottles

5.2. Collection of Wastewater Samples

Before each sampling event, all instruments and equipment must be inspected prior to use i.e. clean, good working condition before used for sample collection.

1. Ensure appropriate Personal Protective Equipment is worn (safety goggles, gloves, face-shields etc.). Gloves should be clean, new and disposable. These should be changed upon arrival at a new sampling point.
2. Stick labels on sampling bottles and record on label information as listed in #9 below.

5.3 SAMPLING PROCESS: Sample Source - PIPELINE

a) Carefully open bleed point on sample line and allow water to flow for 5 - 10 seconds.

Ensure that the flow and material to be collected is constant/consistent before sample is actually collected.

b) Collect amount of representative sample in the pre-labelled sample bottles provided by following the instructions for each bottle type:

i. Polyethylene Plastic Bottles – Rinse bottle 2-3 times with a small amount of the effluent (one tenth of the bottle volume) and discard in an environmentally responsible manner. Fill bottle to top with minimal amount of air remaining in bottle. Stopper tightly and store on ice in cooler.

ii. Borosilicate Glass Bottles - One Liter – These are for organic tests and are not to be rinsed to allow for additional organic material to collect in the bottle. Simply fill the bottle to 90% full or to shoulder of bottle (maybe marked by lab) and store on ice in cooler.

iii. Borosilicate Glass/HDPE Plastic Bottles - 250 mls Sterilized - This is for microbiological testing and care must be taken not to touch the mouth or cap of bottle with anything besides the actual liquid sample. Do not rinse bottle before sampling. Fill bottle to shoulder level of bottle. Stopper tightly and store on ice in cooler.

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5.4. SAMPLING PROCESS: Sample Source - TANK

a) Prior to opening a tank for internal inspection, the tank sampling team shall:

i. Review safety procedures and emergency contingency plans with the Health and Safety Officer.
ii. Ensure that the tank is properly grounded.
iii. Remove all sources of ignition from the immediate area.

b) Prior to commencing sampling, the tank headspace should be cleared of any toxic or explosive vapor concentration. After opening top hatch of tank, ensure all headspace gases are cleared and/or environmental sampler should wear a respirator. No work shall start if the lower explosive limit[1] (LEL) readings exceed 25% (refer to Section #24 References #11). At 10% LEL, work can continue but with extreme caution.

i. Collect air quality measurements for each potential sample location using an explosimeter/oxygen meter for a lower explosive limit (LEL/O2) reading and an applicable gas monitor for organic vapor concentration. Both readings should be taken from the tank headspace, above the sampling port, and in the breathing zone.

c) Determine the depth of any and all liquid, solid, and liquid/solid interface, and depth of sludge using a weighted tape measure, probe line, sludge judge, or equivalent.

d) Collect liquid samples from one (1) foot below the surface, using a subsurface grab sampler (sampling rod).

e) Samples should always be collected through an opened hatch at the top of the tank.

Valves near the bottom should not be used, because of their questionable or unknown integrity.

f) Subsurface Grab Sampler

i. Subsurface grab samplers are designed to collect samples of liquids at various depths. The sampler is usually constructed of aluminium or stainless-steel piping with an attached clamp that attaches to a 1-liter polyethylene plastic sample container.

[1] The minimum concentration of a particular combustible gas or vapor necessary to support its combustion in air

ii. Screw the sampling bottle onto the sampling head.
iii. Lower the sampler to the desired depth.
iv. Ensure sample bottles are filled with water sample, as indicated in steps 'g' to 'j'.
v. Lift sampler and remove filled sample bottle. Secure bottle cover and place in sampling cooler.

g) Collect amount of representative sample in the pre-labelled sample bottles provided by following the instructions for each bottle type:
   i. Polyethylene Plastic Bottles – Rinse bottle 2-3 times with a small amount of the effluent (one tenth of the bottle volume) and discard in an environmentally responsible manner. Fill bottle to top with minimal amount of air remaining in bottle. Stopper tightly and store on ice in cooler.
   ii. Borosilicate Glass Bottles - One Liter – These are for organic tests and are not to be rinsed to allow for additional organic material to collect in the bottle. Simply fill the bottle to 90% full or to shoulder of bottle (maybe marked by lab) and store on ice in cooler.
   iii. Borosilicate Glass or HPE Plastic Bottles - 250 mls Sterilized - This is for microbiological testing and care must be taken not to touch the mouth or cap of bottle with anything besides the actual liquid sample. Do not rinse bottle before sampling. Fill bottle to shoulder level of bottle. Stopper tightly and store on ice in cooler.

k) Safety Practices:

   i. Sampling a storage tank requires a great deal of manual dexterity, often requiring climbing to the top of the tank upon a narrow vertical or spiral stairway or ladder while wearing protective clothing and carrying sampling equipment.
   ii. Currently, US OSHA requires that workers on a walking or working surface with an unprotected edge that is 6 feet or more above a lower level shall wear a fall protection approved by OSHA including guardrails, safety net systems, and personal fall arrest systems (i.e. safety harnesses).
   iii. Before climbing onto the vessel, a structural survey should be performed. This will ensure appropriate consideration of safety and accessibility prior to initiation of any field activities.
   iv. As in all opening of containers, extreme caution should be taken to avoid ignition or combustion of volatile contents. All tools used must be constructed of a non-sparking material and electronic instruments must be intrinsically safe.
   v. All sample locations should be surveyed for air quality prior to sampling. At no time should sampling continue with a lower explosive limit (LEL) reading greater than 25%.

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5.5 SAMPLING PROCESS: Sample Source – INTERMEDIATE BULK CONTAINER (IBC)

a) Prior to opening an IBC for internal inspection, the IBC sampling team shall:

i. Review safety procedures and emergency contingency plans with the Health and Safety Officer.
ii. Remove all sources of ignition from the immediate area.

b) Prior to commencing sampling, the IBC headspace should be cleared of any toxic or explosive vapor concentration. After opening the top fill aperture located on the surface of the IBC, ensure all headspace gases are cleared and/or environmental sampler should wear a respirator. No work shall start if the lower explosive limit[2] (LEL) readings exceed 25%. At 10% LEL, work can continue but with extreme caution.
Collect air quality measurements for each potential sample location using an explosimeter/oxygen meter for a lower explosive limit (LEL/O2) reading and an applicable gas monitor for organic vapor concentration. Both readings should be taken from the tank headspace, above the sampling port, and in the breathing zone.

c) Determine the depth of any and all liquid, solid, and liquid/solid interface, and depth of sludge using a weighted tape measure, probe line, sludge judge, or equivalent.
d) Collect liquid samples from one (1) foot below the surface, using a subsurface grab sampler (sampling rod).

e) Samples should always be collected through an opened lid at the top of the IBC.

f) Subsurface Grab Sampler:

Subsurface grab samplers are designed to collect samples of liquids at various depths. The sampler is usually constructed of aluminium or stainless-steel piping with an attached clamp that attaches to a 1-liter polyethylene plastic sample container.

i. Screw the sampling bottle onto the sampling head.
ii. Lower the sampler to the desired depth.
iii. Ensure sample bottles are filled with water sample, as indicated in steps ‘g’ to ‘j’
iv. Lift sampler and remove filled sample bottle.
v. Secure bottle cover and place in sampling cooler.

[2] The minimum concentration of a particular combustible gas or vapor necessary to support its combustion in air

g) Collect amount of representative sample in the pre-labelled sample bottles provided by following the instructions for each bottle type.

i. Polyethylene Plastic Bottles – Rinse bottle 2-3 times with a small amount of the effluent (one tenth of the bottle volume) and discard in an environmentally responsible manner. Fill bottle to top with minimal amount of air remaining in bottle. Stopper tightly and store on ice in cooler.

ii. Borosilicate Glass Bottles - One Liter – These are for organic tests and are not to be rinsed to allow for additional organic material to collect in the bottle. Simply fill the bottle to 90% full or to shoulder of bottle (maybe marked by lab) and store on ice in cooler.

iii. Borosilicate Glass or HDPE Plastic Bottle - 250 mLs Sterilized - This is for microbiological testing and care must be taken not to touch the mouth or cap of bottle with anything besides the actual liquid sample. Do not rinse bottle before sampling. Fill bottle to shoulder level of bottle. Stopper tightly and store on ice in cooler.

7. Safety Practices:

i. As in all opening of containers, extreme caution should be taken to avoid ignition or combustion of volatile contents. All tools used must be constructed of a non-sparking material and electronic instruments must be intrinsically safe.

ii. All sample locations should be surveyed for air quality prior to sampling. At no time should sampling continue with a lower explosive limit (LEL) reading>25%.

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8. Allocation of Sample Bottles:

The following sampling bottles are to be collected per wastewater sample/sample location:

One (1) Borosilicate Glass Bottles - One Liter – Label as “TPH”; PRESERVE by adding

- 5 ml of 50% Sulphuric Acid (H2SO4). Stopper Tightly

Two (2) Polyethylene Plastic Bottles – 500 millilitres

- Label One “TSS/pH” and Label One “BOD” – Do not preserve these bottles

One (1) Borosilicate Glass or HDPE Plastic bottle - 250 mLs Sterilized – Label as

- "MICROB".

9. Place the sample bottle in designated container. Each sample bottle must be assigned a unique label. The information to be entered on the label includes:
    - Date and time of taken sample.
    - Client Sample Identification Name.
    - Sample Type: Grab
    - Client's Name
    - Preservation

10. Temperature Analysis Procedure:

    Using the Plastic bottle labelled "TSS/pH" - Place the thermometer or meter probe in the sample container at least 4 inches or halfway below the surface. If using a thermometer, allow enough time for it to reach a stable temperature (at least 1 minute). If using a meter, allow the temperature reading to stabilize at a constant temperature reading. Make a note of the temperature reading as this will be transferred to the COC form in the post-sampling phase.

    Cleaning of Thermometer:

    a) Gently scrub the Probe/Bulb with dilute soap solution (to remove dirt and any oily residue).
    b) Thoroughly rinse with potable water and wipe the Probe/Bulb dry with clean paper towel.

11. Ensure all sample bottles are tightly capped.

12. Place all filled sample bottles back into coolers provided and fill cooler with ice, before returning to Contracted Lab.

13. Ensure Chain of Custody is completed (refer to Section 41.5).

5.6 COLLECTION OF SOLID WASTE SAMPLES – VIR & Incinerator Processing

1. *SAMPLING PROCESS: Sample Source – VIR Processing*

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100-bbls waste is processed per batch. Each batch usually generates 4-6 1-ton bags of solid material. A grab sample will be collected from each bag and a composite made. 3-batches or 300- bbls are processed before a sample is sent for analysis. This final sample is a composite of the composite made for each batch. This is done for homogenous waste. If a different waste type is processed then a composite for that batch burn (100-bbls) will be sent.

2. *SAMPLING PROCESS: Sample Source – Incinerator Processing*

For Incinerator operations homogenous waste types are comingled and loaded. A composite sample will be collected from no more than 3-bags per homogenous waste type and sent to the lab for analysis.

3. *SAMPLING PROCESS: Sample Source – Pugmilling Processing*

For Pugmilling operations, a composite sample will be collected from no more than 18 bags of Processed homogenous material & sent to the lab for analysis.

4. Procedure for grab sample collection from each bag and compositing, for sample type listed in #1 and #2 above, is detailed below:

i. For generating a composite sample, from sample collection of each bag:

a. Dip the scoop (trowel) (Refer to Figures #7 and #8) into the solid waste material - treated (each bag),and withdraw the scoop and level off the material so there is none above the sides of the scoop.
b. Transfer the sample into a wide stainless-steel tray.
c. Decontaminate/clean scoop.
d. Repeat steps 4(i)(a), 3(i)(b) and 3(i)(c) above, for each bag,
e. After all grab samples are collected from each bag, and placed into the stainless-steel tray, thoroughly mix the waste.
f. Then add the composite mixed sample into two types of sampling bottles:
   - a wide mouth 1-Liter HDPE plastic sample container and label “MET”.
   - a wide mouth 1-Liter Borosilicate Glass Bottle and label “ORG”.

   Fill the sample right up to the top.
g. Seal the container with an appropriate lid that will prevent leakage or minimise ingress of:

h. air.

ii. Each sample bottle must be assigned a unique label.

iii. The information to be entered on the label includes:

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- Date, time and location of sample collection.
- Waste Collection Method: Composite
- Client Sample Identification Name.
- Client's Name.

iv. Composite samples are to be placed into a cooler, on ice, at < 6ºC for transport to the laboratory. Sample should not be frozen.

v. Solid waste samples must be delivered to the laboratory to allow for analyses or tests to be conducted within the prescribed holding and testing times. Holding times will vary depending on the analyses to be performed.

Trowel-A

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Trowel-B

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5.7 SAMPLE CONTAINERS, PRESERVATION & ALLOCATION

Sample Matrix	Sample Container	Initial Rinse with Sample	Sample Container Fill Level	Preservation	Label I.D.
Wastewater	1 x 1 Liter Borosilicate Glass	NO	Shoulder Level	5 ml of 50% Sulphuric Acid (H2SO4)	TPH
	1 x 500 milliliter Polyethylene Plastic Bottle	YES	Right-up	None. Store at ≤ 6°C.	TSS
	1 x 500 milliliter Polyethylene Plastic Bottle	YES	Right-up	None. Store at ≤ 6°C.	BOD
	1 x 250 mL Borosilicate glass or Polyethylene plastic bottle	NO	Shoulder Level	None. Store at ≤ 6°C.	MICROB
	1 x 1-L Borosilicate Glass Bottle	Not Applicable	Right-up	None. Store at ≤	ORG
Solid Waste	1 x 1-L Polyethylene Plastic Bottle	Not Applicable	Right-up	None. Store at ≤ 6°C.	MET

5.8 ANALYTICAL METHODS

Table # 1: Analytical Methodology Listing – Sampling – Water & Solid Waste Matrix

Item	Test Method and Description
Test Method Reference	WATER-As outlined in SMEWW[15] Method # No. 1060-A, B, C. SOLID- As outlined in the following: - RCRA Waste Sampling Draft Technical Guidance, Planning, Implementation, and Assessment, EPA530-D-02-002, August 2002. - US EPA SW 846 Compendium of Hazardous Waste Testing Methods, Test Methods for Evaluating Solid Waste. - US EPA Hazardous Waste Incineration Measurement Guidance Manual, Volume III of the Hazardous Waste Incineration Guidance, Section 3.3 "Sampling", EPA/625/6-89/021, June 1989. - US EPA Hazardous Waste Incineration Measurement Guidance Manual, Volume III of the Hazardous Waste Incineration Guidance, Section 3.3.1.2 "Viscous Liquids, Slurries, Sludges, and Solid Waste Samples", EPA/625/6-89/021, June 1989, as follows: - Incinerator Ash, Moist or Dry Solids - Trowel (Scoop) Method
Test Description	GRAB SAMPLES Grab samples are single samples collected at a specific spot at a site over a short period of time (typically seconds or minutes). Thus, they represent a "snapshot" in both space and time of a sampling area. *In-Situ* Sampling in the same place the phenomenon is occurring without isolating it from other systems or altering the original conditions of the test. Parameters to analyze from this sampling method are Temperature, pH.

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Sample Collection & Preservation	Sample can be collected in polyethylene (plastic) bottles and/or borosilicate (glass) bottles. Volume for minimum sample collection 1000 mLs. Sample collection as a grab and/or analyzed *In-situ*. **Polyethylene Plastic Bottles** – Rinse bottle 2-3 times with a small amount of the effluent (one tenth of the bottle volume) and discard. Fill bottle to top with minimal amount of air remaining in bottle. Stopper tightly and store on ice in cooler. Cool, ±6°C, in dark. **Borosilicate (Glass) Bottles** – Rinse bottle 2-3 times with a small amount of the effluent (one tenth of the bottle volume) and discard. Fill bottle to top with minimal amount of air remaining in bottle. Stopper tightly and store on ice in cooler. Cool, ±6°C, in dark. For Oil & Grease and TPH – do not rinse bottles.
Maximum Holding Time, Storage & Transportation, QAQC	Outlined in Tables #6 to #13 for the specified parameters.

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[15] SMEWW – Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017.

Table # 2: Methodology Listing – Temperature – Matrix Water

Item	Test Method and Description
Test Method Reference	As outlined in SMEWW[16] Method # No. 2550 Temperature & ECOTOX SOP Method W-009.
Test Description	Temperature is measured using a standard liquid-in-glass or electronic thermometer with an analog or digital readout. The device is able to distinguish temperature changes of 0.1°C or less, and equilibrate rapidly (have a minimal thermal capacity).

Sample Collection & Preservation	Analysis of sample for temperature *In-Situ*. Temperature Analysis Procedure: □Thermometers are calibrated for total immersion or partial immersion. One calibrated for total immersion must be completely immersed to the depth of the etched circle around the stem just below the scale level □Place the thermometer or meter probe in the water effluent sample at least 4 inches below the surface or halfway. □If using a thermometer, allow enough time for it to reach a stable temperature (at least 1 minute). If using a meter, allow the temperature reading to stabilize at a constant temperature reading. □Read the temperature with the thermometer bulb beneath the water surface. □Record the temperature on the chain-of-custody form.
Maximum Storage Recommended	Analyze Immediately; 0.25 Hours.
Storage & Transportation	Not Applicable
Quality Assurance/Control	□ Ensure Thermometer/Meter has been calibrated and inspected for good working condition. □ Thermometer/Probe must be clean (via Laboratory Cleaning Procedures) before use. □ Thermometer is calibrated before use.

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16 SMEWW – Standard Methods for the Examination of Water and Wastewater, 23rd Edition (2017).

Table # 3: Methodology Listing – pH – Matrix Water

Item	Test Method and Description

Test Method Reference	As outlined in SMEWW[17] Method # No. 4500-H^+ pH Value B Electrometric Method & ECOTOX SOP Method W-014.
Test Description	The basic principle of electrometric pH measurement is determination of the activity of the hydrogen ions by potentiometric measurement using a standard hydrogen electrode and a reference electrode.
Sample Collection & Preservation	Analysis of sample for pH *In-Situ*. pH Analysis Procedure: □ pH Meters are calibrated. Regression Percent Range must be 95 – 100%. □ Place the pH meter probe in the water effluent sample at least 4 inches below the surface or halfway. □ Allow enough time for meter reading to stabilize at a constant pH reading. (Meter can sound a 'beep' when reading is stable). □ Record the pH on the chain-of-custody form.
Maximum Storage Recommended	Analyze Immediately; 0.25 Hours.
Storage & Transportation	Not Applicable
Quality Assurance/Control	□ Ensure pH Meter has been calibrated and inspected for good working condition. □ pH probe must be clean (via Laboratory Cleaning Procedures) before use. □ pH Meter is calibrated before use; Regression Percent Range must be 95 – 100%.

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[17] SMEWW – Standard Methods for the Examination of Water and Wastewater, 23rd Edition (2017).

Table # 4: Methodology Listing – Total Suspended Solids – Matrix Water

Item	Test Method and Description
Test Method Reference	As outlined in SMEWW[18] Method # 2540 A, D

Test Description	Solids refer to matter suspended in water or wastewater. Solids may affect water or effluent quality adversely in a number of ways. ‘‘Total solids’’ is the term applied to the material residue left in the vessel after evaporation of a sample and its subsequent drying in an oven at a defined temperature. A well-mixed sample is filtered through a weighed standard glass-fiber filter (47 mm) and the residue retained on the filter is dried to a constant weight at 103 to 105°C. The increase in weight of the filter represents the
Sample Collection & Preservation	Use resistant-glass or plastic bottles, provided that the material in suspension does not adhere to container walls. Begin analysis as soon as possible because of the impracticality of preserving the sample. Refrigerate sample at 4°C up to the time of analysis to minimize microbiological decomposition of solids. Preferably do not hold samples more than 24 hours. In no case hold sample more than 7 days. Bring samples to room temperature before analysis. Sample can be collected in polyethylene (plastic) bottles and/or borosilicate (glass) bottles. Volume for minimum sample collection 1000 mLs. Sample collection as a grab. **Polyethylene Plastic Bottles** – Rinse bottle 2-3 times with a small amount of the effluent (one tenth of the bottle volume) and discard. Fill bottle to top with minimal amount of air remaining in bottle. Stopper tightly and store on ice in cooler.
Maximum Storage Recommended	7 Days
Storage & Transportation	After collection, sample handling should be minimized. Field Technicians should use extreme care to ensure that samples are not contaminated during storage. Environmental and wastewater samples are typically stored in coolers. To reduce the risk of cross contamination, sample containers should be placed inside of sealed, plastic bags before being placed in the cooler(s). If ice is required for preservation of the samples, the ice should be contained in a plastic bag or some equivalent container to prevent the potential for cross contamination of the samples by water produced from melting ice. If ice is emptied into cooler(s) (not contained) the cooler(s) should be checked regularly and water should be drained as needed. Custody of samples will be maintained. Samples will be transported to the analytical laboratory by field technician. All samples must therefore be transported to the laboratory in this manner. At the laboratory samples must be stored at ≤ 6°C, in dark (refrigerator).

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[18] Standard Methods for the Examination of Water and Wastewater, 23rd Edition (2017).

Item	Test Method and Description
Quality Assurance/Control	□ Duplicate/Triplicate analyses, □ Method Blank, Laboratory Fortified Blank. □ Routine and Random Duplicates/Triplicates. □ Determine Method Detection Limit for sample analyte. □ Instrument Operational Range – Upper and Lower Limits □ Calibration & Verification Procedures and Standards. □ Equipment Maintenance and Preventative Maintenance Procedures.

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Table # 5: Methodology Listing – Biological Oxygen Demand (5-Day) – Matrix Water

Item	Test Method and Description
Test Method Reference	As outlined in SMEWW[19] Method # 5210 A, B, 5-Day BOD Test Method. (Approved by Standard Methods Committee, 2016). Quantification of the relative oxygen requirements after 5 Days of incubating diluted samples at 20 ± 1ºC.
Test Description	The method consists of filling with diluted and seeded sample, to overflowing, an airtight bottle of specified size and incubating it at the specified temperature for 5 days. Dissolved oxygen is measured initially and after incubation, and the BOD is computed from the difference between initial and final DO. Because the initial DO is determined shortly after the dilution is made, all oxygen uptake occurring after this measurement is included in the BOD measurement.

Sample Collection & Preservation, Maximum Holding Time	Collect samples in polyethylene, fluoropolymer, or glass containers. Samples for BOD analysis may degrade significantly during storage between collection and analysis, resulting in low BOD values. Collect samples in polyethylene, fluoropolymer, or glass containers. Volume for minimum sample collection 500 mLs. Sample collection as a grab. If analysis is begun within 2 hours of collection, cold storage is unnecessary. If analysis is not started within 2 hours of sample collection, keep sample at or below 4°C from the time of collection. Begin analysis within 6 hours of collection. **Maximum Storage – 24 Hours[20] – 48[21] Hours**
Storage & Transportation	After collection, sample handling should be minimized. Field Technicians should use extreme care to ensure that samples are not contaminated during storage. Environmental and wastewater samples are typically stored in coolers. To reduce the risk of cross contamination, sample containers should be placed inside of sealed, plastic bags before being placed in the cooler(s). If ice is required for preservation of the samples, the ice should be contained in a plastic bag or some equivalent container to prevent the potential for cross contamination of the samples by water produced from melting ice. If ice is emptied into cooler(s) (not contained) the cooler(s) should be checked regularly and water should be drained as needed. Custody of samples will be maintained. Samples will be transported to the analytical laboratory by field technician. All samples must therefore be transported to the laboratory in this manner. At the laboratory samples must be stored at ≤ 6°C, in dark (refrigerator).

[19] SMEWW – Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017.

[20] US EPA, A Guide To The Sampling And Analysis Of Waters, Wastewaters, Soils And Wastes, © Environment Protection Authority, 7th edition, March 2000, http://www.monitor2manage.com.au/userdata/downloads/p_/Victorian%20EPA%20A%20guide%20to%20the%20s ampling%20and%20analysis%20of%20waters.pdf..

[21] US EPA, Method for Chemical Analysis and of Water and Waste, EPA 600/4-79-020, https://www.wbdg.org/ffc/epa/criteria/epa-600-4-79-020

Quality Assurance/Control	□ Multiple dilution analyses, standard reference material, seed controls. □ Method Blank, Laboratory Fortified Blank, Laboratory Fortified Matrix. □ Routine and Random Duplicates/Triplicates. □ Determine Method Detection Limit for sample analyte. □ Instrument Operational Range – Upper and Lower Limits □ Calibration & Verification Procedures and Standards. □ Equipment Maintenance and Preventative Maintenance Procedures. □ Occupational Health & Safety Management Policies and Procedures.

Table # 6 : Methodology Listing – Faecal Coliform – Matrix Water

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Item	Test Method and Description
Test Method Reference	As outlined in SMEWW[22] Method # 9221 A, B, E, J – Multiple-Tube Fermentation Technique for Members of the Coliform Group.

Test Description	The coliform group consists of several genera of bacteria belonging to the family Enterobacteriaceae. The historical definition of this group has been based on the method used for detection, lactose fermentation, rather than on the tenets of systematic bacteriology. Accordingly, when the fermentation technique is used, this group is defined as all facultative anaerobic, gram-negative, non-spore-forming, rod-shaped bacteria that ferment lactose with gas and acid formation within 48 h at 35°C. When multiple tubes are used in the fermentation technique, coliform density can be estimated by using a most probable number (MPN) table. This number, based on certain probability formulas, is an estimate of the mean density of coliforms in the sample. Results of coliform testing, together with other information obtained from engineering or sanitary surveys, provide the best assessment of water treatment effectiveness and the sanitary quality of source water. The precision of the fermentation test in estimating coliform density depends on the number of tubes used. The most satisfactory information will be obtained when the largest sample inoculum examined shows acid and/or gas in some or all of the tubes and the smallest sample inoculum shows no acid and/or gas in any or a majority of the tubes. Bacterial density can be estimated by the formula given or from the table using the number of positive tubes in the multiple dilutions. The MPN tables are based on the assumption of a Poisson distribution (random dispersion).

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Sample Collection & Preservation	**Collect samples as directed in SMEWW Sections 9060A and B:** Maintain consistent sampling procedures. When the sample is collected, leave ample air space in the bottle (at least 2.5 cm) to facilitate mixing by shaking, before examination. Reject sample bottles that are overfilled and request resampling or, alternatively, add overfilled samples to a larger sterile sample bottle in the laboratory to assure adequate mixing. Keep sampling bottle closed until it is to be filled. Remove cap or stopper, if used, as a unit. Do not place cap down on any surface. Avoid external contamination during sample collection and do not contaminate inner surface of stopper or cap and bottle neck. Fill container without rinsing, replace stopper or cap immediately, and secure hood, if used, around neck of bottle. Use sample containers specified in SMEWW Section 9030B.19: Sample can be collected in clean/sterile polyethylene (plastic) bottles and/or borosilicate (glass) bottles. Volume for minimum sample collection 1000 mLs. Sample collection as a grab and/or composite. **Sterilized Borosilicate Glass Bottles** – Fill bottle to top with headspace (at least 2.5 cm). Stopper tightly and store on ice in cooler. Cool, ±6°C, in dark. Start microbiological analysis of water samples as soon as possible after collection to avoid unpredictable changes in the microbial population. Do not analyze samples submitted to the laboratory with chlorine residual or with leakage. In such cases, request resampling. For most accurate results, ice samples during transport to the laboratory if they cannot be processed within 1 hour after collection. Maintain samples in the dark and keep cool with ice or blue ice at ≤ 6°C but not frozen. Samples arriving quickly at the laboratory may not have reached this temperature. Verify and record sample temperature upon receipt either through the use of a control water sample bottle or thermometer.

[22] Standard Methods for the Examination of Water and Wastewater, 23nd Edition (2017).

Item	Test Method and Description

Maximum Holding Time	Hold source water, stream pollution, recreational water, and wastewater samples at ≤ 6°C during a maximum transport time of 6 hours. Do not freeze. Record sample receipt time and temperature in sample receipt files. Refrigerate these samples upon receipt in the laboratory and process within 2 hours. When transport conditions necessitate delays in delivery of samples longer than 6 hours, consider using either field laboratory facilities located at the site of collection or delayed incubation procedures. Holding Times - 8 Hours[23] to 24 Hours[24]; @ 0 to 6°C (Refrigeration Temperature).
Storage & Transportation	After collection, sample handling should be minimized. Field Technicians should use extreme care to ensure that samples are not contaminated during storage. Environmental and wastewater samples are typically stored in coolers. To reduce the risk of cross contamination, sample containers should be placed inside of sealed, plastic bags before being placed in the cooler(s). If ice is required for preservation of the samples, the ice should be contained in a plastic bag or some equivalent container to prevent the potential for cross contamination of the samples by water produced from melting ice. If ice is emptied into cooler(s) (not contained) the cooler(s) should be checked regularly and water should be drained as needed. Custody of samples will be maintained. Samples will be transported to the analytical laboratory by field technician. All samples must therefore be transported to the laboratory in this manner. At the laboratory samples must be stored at ±6°C, in dark (refrigerator).

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Quality Assurance/Control	□ 5-Tube, 8-Tube, 10-Tube Duplicate analyses, □ Method Blank, □ Positive Controls, Negative Controls, □ Routine and Random Duplicates/Triplicates. □ Determine Method Detection Limit for sample analyte. □ Instrument Operational Range – Upper and Lower Limits □ Calibration & Verification Procedures and Standards. □ Equipment Maintenance and Preventative Maintenance Procedures.

[23] Table FS1000-4, 40 CFR Part 136 TABLE II: Required Containers, Preservation Techniques, and Holding Times, Revision Date: March 1, 2014.

[24] EPA Guidelines: Water and wastewater sampling. www.epa.sa.gov.au/files/8494_guide_wws.pdf.

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Table # 7: Methodology Listing – Total Petroleum Hydrocarbons – Matrix Water

Item	Test Method and Description
Test Method Reference	As outlined in US EPA[25] Method 1664, Revision B n-Hexane Extractable Material (HEM; Oil and Grease) and Silica Gel Treated n-Hexane Extractable Material (SGT-HEM; Non-polar Material) by Extraction and Gravimetry (Feb 2010).
Test Description	A 1-L sample is acidified to pH < 2 and serially extracted three times with n-hexane (85% minimum purity, 99.0% min. saturated C6 isomers, residue less than 1 mg/L) in a separatory funnel. The extract is dried over sodium sulphate. The solvent is distilled from the extract and the HEM is desiccated and weighed. Quality is assured through calibration and testing of the extraction, distillation, and gravimetric systems.

Sample Collection & Preservation	Collect 1 Liter samples in borosilicate wide-mouth glass bottles, with PTFE-lined screw cap. Fill sample to shoulder level of bottle. All samples must be acidified and/or verified in the lab to pH < 2 immediately prior to analysis. If analysis is to be delayed for more than four hours, adjust the sample in the field to pH<2 with HCl or H2SO4 solution at the time of collection and refrigerate to 0-6 °C.
Maximum Holding Time	Preserved – 28 Days
Storage & Transportation	After collection, sample handling should be minimized. Field Technicians should use extreme care to ensure that samples are not contaminated during storage. Environmental and wastewater samples are typically stored in coolers. To reduce the risk of cross contamination, sample containers should be placed inside of sealed, plastic bags before being placed in the cooler(s). If ice is required for preservation of the samples, the ice should be contained in a plastic bag or some equivalent container to prevent the potential for cross contamination of the samples by water produced from melting ice. If ice is emptied into cooler(s) (not contained) the cooler(s) should be checked regularly and water should be drained as needed. Custody of samples will be maintained. Samples will be transported to the analytical laboratory by field technician. All samples must therefore be transported to the laboratory in this manner. At the laboratory samples must be stored at ≤ 6°C, in dark (refrigerator).
Quality Assurance/Control	□ Duplicate analyses, spike and recovery technique, and standard reference material. □ Method Blank, Laboratory Fortified Blank. □ Routine and Random Duplicates/Triplicates. □ Determine Method Detection Limit for sample analyte. □ Instrument Operational Range – Upper and Lower Limits □ Calibration & Verification Procedures and Standards. □ Equipment Maintenance and Preventative Maintenance Procedures.

[25] US EPA – United States Environmental Protection Agency.

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Table # 8: Methodology Listing – Total Petroleum Hydrocarbons/Total Oil & Grease Matrix Solid

Parameter	Test Method and Description
Test Method Reference and Description	As outlined in **US EPA Method 9071B**, n-Hexane Extractable Material (HEM) for Sludge, Sediment, and Solid Samples. Method 9071 may be used to quantify low concentrations of oil and grease in soil, sediments, sludges, and other solid materials amenable to chemical drying and solvent extraction with n-hexane. "Oil and grease" is a conventional pollutant under 40 CFR 401.16 and generally refers to substances, including biological lipids and mineral hydrocarbons that have similar physical characteristics and common solubility in an organic extracting solvent. As such, oil and grease is an operationally defined parameter, and the results will depend entirely on the extracting solvent and method of extraction. Method 9071 employs n-hexane as the extraction solvent with Soxhlet extraction and the results of this method are appropriately termed "n-hexane extractable material (HEM)." As outlined in **US EPA 3540C – Soxhlet Extraction Method.** Method 3540 is a procedure for extracting non-volatile and semi volatile organic compounds from solids such as soils, sludges, and wastes. The Soxhlet extraction process ensures intimate contact of the sample matrix with the extraction solvent. The solid sample is mixed with anhydrous sodium sulfate, placed in an extraction thimble or between two plugs of glass wool, and extracted using an appropriate solvent in a Soxhlet extractor. The extract is then dried, concentrated (if necessary), and, as necessary, exchanged into a solvent compatible with the clean-up or determinative step being employed. As outlined in **5520F – Hydrocarbons (TPH).** Silica gel has the ability to adsorb polar materials. If a solution of hydrocarbons and fatty materials in a nonpolar solvent is mixed with silica gel, the fatty acids are removed selectively from solution. The materials not eliminated by silica gel adsorption are designated hydrocarbons by this test.
Holding Time	14 days until extraction; 40 days after extraction.

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Quality/Assurance Control Measures	□ Duplicate/Triplicate analyses, □ Method Blank, Laboratory Fortified Blank. □Routine and Random Duplicates/Triplicates. □ Determine Method Detection Limit for sample analyte. □ Instrument Operational Range – Upper and Lower Limits □ Calibration & Verification Procedures and Standards. □ Equipment Maintenance and Preventative Maintenance Procedures.

Table # 9: Methodology Listing – TCLP[26] Extractable Metals – Matrix Solid

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Item	Test Method and Description
Test Method Reference	As outlined in SMEWW[19] Method # 5210 A, B, 5-Day BOD Test Method. (Approved by Standard Methods Committee, 2016). Quantification of the relative oxygen requirements after 5 Days of incubating diluted samples at 20 ± 1ºC.
Test Description	The method consists of filling with diluted and seeded sample, to overflowing, an airtight bottle of specified size and incubating it at the specified temperature for 5 days. Dissolved oxygen is measured initially and after incubation, and the BOD is computed from the difference between initial and final DO. Because the initial DO is determined shortly after the dilution is made, all oxygen uptake occurring after this measurement is included in the BOD measurement.
Sample Collection & Preservation, Maximum Holding Time	Collect samples in polyethylene, fluoropolymer, or glass containers. Samples for BOD analysis may degrade significantly during storage between collection and analysis, resulting in low BOD values. Collect samples in polyethylene, fluoropolymer, or glass containers. Volume for minimum sample collection 500 mLs. Sample collection as a grab. If analysis is begun within 2 hours of collection, cold storage is unnecessary. If analysis is not started within 2 hours of sample collection, keep sample at or below 4°C from the time of collection. Begin analysis within 6 hours of collection.

Storage & Transportation	After collection, sample handling should be minimized. Field Technicians should use extreme care to ensure that samples are not contaminated during storage. Environmental and wastewater samples are typically stored in coolers. To reduce the risk of cross contamination, sample containers should be placed inside of sealed, plastic bags before being placed in the cooler(s). If ice is required for preservation of the samples, the ice should be contained in a plastic bag or some equivalent container to prevent the potential for cross contamination of the samples by water produced from melting ice. If ice is emptied into cooler(s) (not contained) the cooler(s) should be checked regularly and water should be drained as needed. Custody of samples will be maintained. Samples will be transported to the analytical laboratory by field technician. All samples must therefore be transported to the laboratory in this manner. At the laboratory samples must be stored at ≤ 6°C, in dark (refrigerator).

[26] Toxicity characteristic leaching procedure.

[27] SMEWW – Standard Methods for the Examination of Water and Wastewater, American Public Health Association, 2017, 23rd Editorial Revision.

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5.9 – SAMPLE HANDLING AND TRANSPORTATION METHODS

Sample collection and preservation shall be performed in conformance with Part 1060 of the 23rd Edition (2017) of "Standard Methods for the Examination of Water and Wastewater" and the following guidelines.

Analysis in the field is required for some parameters because of possible sample deterioration during transport to a laboratory, leading to potential erroneous results. Among the parameters requiring field testing are pH and Temperature. These tests may be performed as stand-alone tests or in conjunction with additional sampling requirements. Personnel who will be performing any field testing must have been trained and demonstrated proficiency in the Standard Operating Procedure for that test.

To obtain reproducible results laboratories must use standardized procedures for the preparation of samples. It is important to ensure that no bias is introduced in the analytical results. For example, certain gasworks contaminants can be driven off or modified during drying or handling procedures. Volatile organics may evaporate, PAHs are photosensitive, aerobic biodegradation of phenols may be accelerated, sulphide and cyanide may volatilise as the acid gases, metal complex cyanides can photodissociate to release free cyanide and oxidation may occur, for example, of sulphur to sulphate or to decompose cyanides.

5.10 Field Testing

Field testing is performed using the same analytical methods as a fixed laboratory. Data generatedfor compliance must meet the same rigorous quality control standards as a fixed laboratory. In addition, the environmental and site conditions must be recorded to ensure that future data comparability is based on the same test conditions. Temperature, pH, DO and Turbidity samples should be collected on site and logged in. Any result that appears unusual should be rerun at the site to assure that the first reading was correct. These environmental conditions are more constant in a fixed laboratory but they are extremely variable in the field.

5.11 CHAIN of CUSTODY (CoC)

Chain of Custody: Samples must be sent with a completed chain-of-custody/analytical request form (temperature reading should include on this form or Field Log Form), signed by the Client Represented and Field Technician/Sampler. The following information must be completed on the chain-of-custody form:

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- Client's Name.
- Project Name.
- Project Number.
- Sampled By (Person who performed the sampling procedure).
- Client Sample Identification (List of all samples taken) with corresponding date, time and temperature of the sample
- Sample Temperature
- Requested Analyses (Contract Lab)
- Matrix (water)
- Number of containers
- Plant Condition
- Weather Conditions
- Any other comments to be noted at time of sampling
- Important information regarding the sample e.g. appearance
- Relinquished By (Signature by OPS)

- Received By (Signature by Contract Lab Representative).

5.12 SHIPPING SAMPLES

The shipping or delivery to the laboratory must take into account the holding time for any specific parameter to be tested. There must be enough time allowed for the for the samples to be taken, prepared, shipped and received by the laboratory before the holding time expires.
Samples must be packed upright in a cooler surrounded by ice or ice packs. The samples that are most likely to deteriorate must be closest to the ice packs. Glass sample bottles must be wrapped in bubble wrap or some other protective wrapping to prevent breakage. Labels must be checked to ensure they are legible before wrapping.

6.0 Records

- TRG – Risk Assesment Procedure
- TRG – JSA Procedure
- Chain of Custody Forms

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APPENDIX G WASTE FACILITY ASSESSMENT QUESTIONAIRE

WASTE FACILITY ASSESSMENT QUESTIONNAIRE

Name of Facility:	
City/State/Country:	
EMID:	
Auditor:	
Audit Date:	

Notes to Recipient:

i. Please keep answers as brief as possible
ii. If any questions are not applicable to your facility, please enter **N/A - not applicable**.

Questionnaire completed	Name	
on behalf of facility by:	Position	
	Date	

SAFETY CONSIDERATIONS FOR THE SITE VISIT: Please identify any potential safety hazards that should be considered for the site visit and identify all PPE requirements for the site visit.

WASTE TYPE ☐ **Hazardous** ☐ **Non-Hazardous**

FACILITY TYPE

☐ Battery Recycler	☐ Incineration	☐ Storage/Transporter
☐ Catalyst Regeneration	☐ Landfill/Landfarm	☐ Thermal Treatment
☐ Cement Kiln	☐ Oil Recycler	☐ Wastewater Treatment
☐ Commercial Injection Well	☐ Soil Treatment	☐ Other:
☐ Drum Reconditioning	☐ Solidification	

Contents

A. General Information
B. Waste Receipt / Analysis
C. Wastewater / Runoff Control
D. Specific Unit Operations - Complete as applicable

- **D1 - Tank/Impoundment Storage**
- **D2 - Container/Bulk Storage/Handling**
- **D3 - Waste Handling or Processing (Transfer / Treatment / Recycling)**
- **D4 - Thermal Treatment**
- **D5 - Landfill**

E. Regulatory Compliance
F. Soil / Groundwater / Water Supply Protection
G. Management Systems
H. Safety
I. Location
J. Community Relations
K. Security
L. Financial/Insurance

A. GENERAL INFORMATION

1.	Name of Facility:	
2.	EMID:	
3.	Address:	
4.	Lat/Long/GPS Coordinates:	
5.	Phone:	
6.	Fax:	
7.	Facility Contact Names:	
8.	Facility Contact Title:	
9.	Facility Contact Email:	
10.	Facility Website:	
11.	Parent Company:	
12.	Owner of land:	
13.	Term of lease *(expiry date):*	
14.	Number of employees:	

Site History:

15. List previous operators at the site, date site use began, dates site changed owners/operators, types of facilities at site prior to current use. Also provide the history of any reported releases, explosions, fires, spills, remediation, etc.

16. List any significant plant/equipment changes/improvements in facilities during last 5 years, as well as any changes planned for the next 5 years.

17. On-site Activities: *(tick all that apply)*

Treatment	Recovery / Recycle	Disposal / Other
☐ Acid/Base Neutralization	☐ Cement kiln	☐ Incineration
☐ Biological treatment	☐ Composting	☐ Landfill - hazardous
☐ Catalytic decomposition	☐ Distillation	☐ Landfill - non hazardous
☐ Chemical fixation	☐ Drum reconditioning	☐ Landfill - municipal
☐ Chemical treatment	☐ Fuel blending	☐ Wastewater Treatment
☐ Filtration	☐ Recovery - oils	☐ Storage / Transfer
☐ Flocculation / Precipitation	☐ Recovery – metals/e-waste	☐ Bulking / Transfer
☐ Oxidation / Reduction	☐ Recovery - solvents	☐ Injection Disposal
☐ Soil Washing	☐ Recovery – acids	☐ Impoundments
☐ Thermal Treatment	☐ Regeneration - Thermal	☐ Radioactive Waste
☐ Land Treatment	☐ Regeneration - Catalyst	

Other - Please specify:

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18. List the types of waste that can be accepted at the facility *(and attach copy of permit list)*. Also list wastes that are specifically prohibited.

☐ Acid / Caustics	☐ Construction Debris	☐ NORM/TENORM
☐ Activated Carbon	☐ Contaminated Solids/Debris	☐ PCBs
☐ Amines	☐ Crude Oil	☐ Pigging Waste
☐ Asbestos	☐ Drilling Fluids/Mud	☐ Radioactive Waste
☐ Batteries	☐ Filter Media/Cartridges	☐ Soil
☐ Biological Sludge	☐ Glycol	☐ Tank/Other Bottoms
☐ Catalyst	☐ Lab Packs/Used Chems	☐ Used Oil/Oily Sludges
☐ Combustible Liquids	☐ Lamps/E-Waste	☐ Wastewaters
☐ Containers	☐ Mercury	☐ Others:

19. Provide the following information regarding waste quantities received and processed/treated:

Provide estimate of current annual waste throughput:	
Provide maximum annual waste processing/disposal capacity:	
Provide permitted annual waste processing/disposal capacity:	
Provide potential future expansion capacity:	

20. Method of receipt of all wastes *(tick all that apply)*

☐ Tanker / Tank Container	☐ Vacuum Truck	☐ Barge
☐ Goods Vehicle / Trailer	☐ Rail	☐ Other *(please specify)*
☐ Tipper Truck	☐ Ship	

21. Does the Company provide waste transportation services? Yes ☐ No ☐

If yes, provide transport permit number, number of trucks, geography of operation, & percentage of waste shipments transported by company vs. subcontractors. If no, state how waste is transported to the site.

B. WASTE RECEIPT/ANALYSIS

Incoming Waste Pre-qualification Assessment and Analysis:

22. Is the generator required to complete a waste profile form? Yes ☐ No ☐
(*Describe the waste prequalification procedures, including sampling requirements)*

23. What parties review and approve the waste streams prior to shipment to the facility? (*Include onsite, corporate, and Regulatory Agency, as appropriate)*

Acceptance of Waste onsite

24. Which of the following activities must be completed as part of the on-arrival waste acceptance and receiving procedures: *(Tick all that apply)*

- ☐ Check of delivery documentation
- ☐ Collect/analyze samples from load
- ☐ On-site laboratory analyses
- ☐ Waste passes across a weigh scale
- ☐ Visual inspection of waste contents
- ☐ Off-site laboratory analyses
- ☐ Check compatibility with waste already in intended storage / reaction vessel
- ☐ Compare load analysis results with pre-qualification analysis results
- ☐ Other *(please specify)*

25. What percentage of incoming waste deliveries are checked and/or analyzed at receipt?

– Tank Containers	
– Bulk Containers	
– Packages *(e.g. drums)*	

26. Briefly describe how the facility tracks the incoming and transferred waste streams on-site throughout the facility from arrival through to final treatment/disposal/transfer. *(Include the names of any paperwork forms or computer programs used)*

27. Briefly describe how rejected or non-conforming wastes are handled

28. Briefly describe how operating records are managed and retained *(Include duration of records storage, paper or electronic retainage, etc.)*

Transfer and Residual Waste Generation and Management:

29. Does the facility transfer wastes or produce any residual wastes that require further treatment, recycling, or disposal at another facility? Yes ☐ No ☐

If yes, how are those facilities selected? *(Tick all that apply)*

- ☐ Checks that facility has appropriate permits
- ☐ Questionnaire sent to facility prior to use
- ☐ On-site visit to inspect facility prior to use

What aspects are considered during selection? *(Tick all that apply)*

- ☐ S, H, & E Performance
- ☐ Management Systems
- ☐ Facility design and operations

- ☐ Checks / interviews with Regulatory Agency
- ☐ Checks that the hauler has appropriate permits
- ☐ Use of a scoring process to compare facilities
- ☐ Other (please specify)
- ☐ Emissions to air / water / land
- ☐ Regulatory Compliance history
- ☐ Facility location
- ☐ Community Relations

30. List all incoming/residual wastes shipped off-site for transfer, treatment, disposal, or recycling:

Waste	Haz/Non-haz	Destination Facility (include City, State)

Comments:

31. Does the facility use a screening process to select third party waste haulers:

Delivering waste to the facility? Yes ☐ No ☐
Removing / transferring waste from the facility? Yes ☐ No ☐

If yes, briefly describe the procedure and parameters used.

C. WASTEWATER/RUNOFF CONTROL

Wastewater

32. Does the facility produce any wastewater, which is then discharged? Yes ☐ No ☐

If yes, describe the source of the wastewater and how it is handled prior to discharge. Also describe if the discharge is covered under a permit?

33. Briefly describe any sampling (frequency and analysis) of wastewater water prior to discharge.

34. Have any violations / warnings been received for not meeting discharge criteria? Yes ☐ No ☐
If yes briefly describe ,and state what action was taken to prevent recurrence

35. Is there any onsite treatment or pretreatment of the wastewater? Yes ☐ No ☐
If yes, which of the following treatment processes are used? (tick all that apply)

- ☐ Physical Separation
- ☐ Chemical Neutralization
- ☐ Biological Treatment

☐ Electrochemical separation ☐ Membrane Filter ☐ UV / Peroxide oxidation
☐ Activated carbon Filter ☐ Sand Filter ☐ Dissolved Air Flotation
☐ Air Pollution Controls ☐ Other (please specify)

Rainwater Runoff

36. Is rainwater falling on active and non-active areas of the site collected? Yes ☐ No ☐
If yes, please briefly describe the collection, treatment, and discharge system.

D1. TANK/IMPOUNDMENT STORAGE

☐ NOT APPLICABLE – NO TANK/IMPOUNDMENT STORAGE AT THIS FACILITY

37. Do all tanks carry visible signs displaying the hazards of the materials they contain? Yes ☐ No ☐

38. Describe the number of AST tanks, types of wastes/products in storage, and the types of secondary containment, overspill, and leak prevention and detection measures employed.

39. Briefly explain how any tank vapors are controlled and abated.

40. Are there any underground structures in use? Yes ☐ No ☐
If yes, describe the structures (tanks, sumps, pipelines, etc.), types of wastes/ Products in storage/conveyance, construction, types of secondary containment/spill prevention Measures and how they are monitored for leak detection (frequency and method).

41. Are any liquids (wastes/stormwater) stored in open surface impoundments? Yes ☐ No ☐
If yes, please describe these impoundments, including type of liquids stored, Impoundment size & volume, liner system, and leak detection systems.

D2. CONTAINER/BULK SOLID STORAGE/HANDLING

☐ NOT APPLICABLE – NO CONTAINER/BULK SOLIDS STORAGE/HANDLING AT THIS FACILITY

42. Briefly describe the design and operation of all container storage areas *(tick all that apply and provide further description of containment, spill prevention, runoff and air pollution controls employed)*

Inside warehouse	☐
Under fixed roof	☐
Under tarpaulin	☐
Is an automatic fire alarm installed?	Yes ☐ No ☐
Are automatic fire suppression facilities installed?	Yes ☐ No ☐
Are any air pollution controls installed?	Yes ☐ No ☐

43. Are all containers:

In good condition?	Yes ☐ No ☐
Kept securely closed?	Yes ☐ No ☐
Marked to identify contents?	Yes ☐ No ☐
Segregated by waste type?	Yes ☐ No ☐

44. Are bulk waste solids received and stored at the facility? Yes ☐ No ☐
If yes, briefly describe the design and operation of all bulk waste storage areas, and include a description of any water and air pollution controls as well as spill and leak prevention aspects.

45. Are storage areas inspected for leaks or spills? Yes ☐ No ☐
If yes, describe by whom, method and frequency.

46. Is there any restriction on the length of time that waste is allowed to be stored? Yes ☐ No ☐
Also describe the average waste storage time and oldest waste in storage.

47. Briefly describe how the age of the inventory is managed.
Also describe the quantity of waste currently in storage vs. total storage/processing capacity.

D3. WASTE HANDLING OR PROCESSING

☐ NOT APPLICABLE – NO WASTE HANDLING OR PROCESSING AT THIS FACILITY

48. Please briefly describe unit design and operation for any waste handling and processing (including transfer / consolidation / treatment / recycling) conducted at the facility *(or attach flow plan and*

supplement with description). Include a description of any containment, spill/leak prevention measures and water and air pollution controls.

49. Please list each product generated / regenerated from waste processing and its destined use *(e.g. heavy oils for fuel)*

Recovered product	Destined use	Analyzed for quality?	Made to a Specification?
		Yes ☐ No ☐	Yes ☐ No ☐
		Yes ☐ No ☐	Yes ☐ No ☐

Comments:

D4. THERMAL TREATMENT

☐ NOT APPLICABLE – NO THERMAL TREATMENT AT THIS FACILITY

50. What type of furnace is used?

☐ Rotary Kiln ☐ Fluid Bed ☐ Multiple Hearth ☐ Single Hearth

51. Is a gas incinerator *(afterburner)* fitted? Yes ☐ No ☐

52. Please list the emission abatement equipment used *(tick all that apply)*

☐ Filter baghouse ☐ Electrostatic precipitator ☐ Cyclone
☐ Wet Scrubber *(state liquor):*
☐ Dry Scrubber *(state adsorbent):*
☐ Other *(please specify)*

53. Please briefly describe the thermal treatment facilities showing how all major equipment and processes are controlled. Attach flow plan and supplement with a description. Include how furnace feed is controlled, how operating temperatures are maintained/controlled, and what conditions result in an automatic shutdown.

54. Describe the type and frequency of air emissions monitoring:

	Measurement Frequency
SOx	
NOx	
CO	

	Measurement Frequency
Particulates	
PCB	
PAH / PNA	

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HCl		Heavy metals	
VOC		Dioxins	

Also describe any stack testing (frequency, analyses, results, etc.)

55. Describe how thermal treatment solid and liquid residual wastes are managed.

D5. LANDFILL

☐ NOT APPLICABLE – NO LANDFILL DISPOSAL AT THIS FACILITY

56. Please describe the landfill operations, including size of current landfill disposal cells, historic disposal cells, and current disposal rate. Estimate the remaining operating life of the facility.

57. Is waste pretreated at the site prior to placement in the landfill? Yes ☐ No ☐
If yes, briefly describe process

58. Please describe construction of cells currently in use: *(provide cross section if available).* Also describe the construction of historic/closed cells.

59. Describe how leachate is managed and treated:

60. Briefly describe how landfill gas is monitored and/or handled.

61. Briefly describe what measures are in place to prevent odors, wind dispersal of waste, litter and dust?

E. REGULATORY COMPLIANCE

62. List all Regulatory Agency Permits held by the facility:

Permit Reference Number	Expiry date (if applicable)	Enforcing Agency	Frequency of site inspections by Agency

Comments:

63. During the last 5 years have there been any incidents or releases of pollutants to the environment that were required to be reported to a Regulatory Agency? Yes ☐ No ☐
(Include releases both inside and outside of containment)

If yes, please briefly describe the incidents and state what measures the facility has taken to prevent recurrences?

64. During the last 5 years have there been any regulatory deficiencies, notices of violations, regulatory orders, fines or penalties issued by the Regulatory Agency? Yes ☐ No ☐

If yes, briefly describe the areas of non-compliance and state what measures the facility has taken to prevent recurrences? Describe frequency of regulatory inspections and provide inspection dates.

65. List any current outstanding, unresolved, or incomplete actions, relating to compliance with permit conditions or remediation requirements, including due dates for completion.

66. List any regulatory issues associated with any remediation or corrective actions.

67. Has the facility or its management been the focus of any criminal investigations for violating any regulations/laws, including environmental laws/regulations? Yes ☐ No ☐

If yes, please briefly describe the circumstances and state what measures the facility has taken to prevent recurrences?

68. Are there any proposed or pending new government regulations that could affect site operations? Yes ☐ No ☐

If yes, please briefly describe the new regulations and how they will effect site operations?

F. SOIL/GROUNDWATER/WATER SUPPLY PROTECTION

69. Describe the source of water supply for the facility, and other residential, industrial, agricultural users within 10km. Indicate if the source is groundwater or surface water, and provide the proximity of the water source to the facility, including whether it is upgradient or downgradient to the facility.

70. Briefly describe the geological cross-section beneath the site – include the description of all aquifers underlying the site, depth to the water table and depth to water supply aquifers. Also include the direction of groundwater flow.

71. Briefly describe the groundwater monitoring program in place at the facility (*number of wells, frequency of sampling, parameters analyzed)*

72. Has contamination been detected in either groundwater or soil? Yes ☐ No ☐
If Yes, briefly describe contaminants and extent of contamination

73. Has a corrective action program for either groundwater or soil at the facility been initiated or proposed? *(include assessments)* Yes ☐ No ☐
If yes, briefly describe:

G. MANAGEMENT SYSTEMS

74. Management Experience Summary – Provide information for all key management staff and health/safety/ environmental staff:

Name	Title	Number of Years of On-site Experience	Total Number of Years in Waste Business

75. What is the percentage of employee turnover in the last five years? Provide the reason(s) for recent employee turnover, especially those related to management/environmental staff turnover.

76. Does the facility employ off-site environmental resources to support its operations (3rd party consultants, corporate resources, etc.)? Yes ☐ No ☐

If yes, provide name of entity and support/services provided.

77. Does the facility have management systems accredited to the following Standards? (Provide data or indicate “None”)

Standard	Certificate Number	Accreditation Body	Expiry Date
ISO 9001			
ISO 14001			
EMAS			
Other (please specify)			

78. Do the management procedures include informing ExxonMobil of any changes that could affect handling of ExxonMobil waste at the facility? Yes ☐ No ☐

Briefly describe any such changes that are underway, or planned with regard to equipment, processing, capacity or type of wastes handled.

79. Briefly describe the types of any daily, weekly, or monthly inspections conducted at the facility. Indicate what types of operations are subject to inspections and if the inspections are documented.

80. Are site reviews/audits conducted periodically addressing the following areas?

	Frequency	By Whom (indicate off-site/on-site staff)
Safety		
Health / Industrial hygiene		
Environmental Performance		

81. Briefly describe how on site personnel training needs are determined and managed. Provide list of typical training topics, how often training is conducted, and approximately how many hours each employee receives annually.

H. SAFETY

82. During the last 5 years have there been any fires, explosions, etc. at the facility? Yes ☐ No ☐

If yes, please briefly describe the incidents (include date, cause, and consequences) and state what measures the facility has taken to prevent recurrences?

83. Briefly describe the facility safety program, including the frequency of safety meetings, safety inspections, safety training (internal/external), safety committee functions, etc.

84. Does the facility operate a permit to work system? Yes ☐ No ☐
If Yes, which of the following activities are covered?

☐ General *(cold)* Work ☐ Hot work ☐ Electrical Work
☐ Other (please specify) ☐ Confined Space Entry ☐ Working at height

85. Have job safety/risk assessments been conducted for all activities at the facility? Yes ☐ No ☐
If yes, please briefly explain the process used and how PPE is selected. Describe the typical PPE used at the facility.

86. Do staff undergo routine medical checks? Yes ☐ No ☐
If yes, describe the frequency and types of tests conducted

87. Does the facility operate a 'near miss' reporting system? Yes ☐ No ☐
If Yes, describe the process used to act upon reducing potential hazards

88. Does the facility have any of the following Emergency control equipment? *(tick all that apply)*

☐ Hand held fire extinguishers ☐ Spill / decontamination materials
☐ Automatic fire detection and alarm ☐ Onsite firewater storage
☐ Automatic fire suppression systems ☐ Onsite firewater hydrants/hoses

Describe briefly the fire protection and detection systems at the facility.

89. Does the facility have a written contingency or emergency response plan? Yes ☐ No ☐
If yes, does the plan include: *(tick all that apply)*

☐ Emergency procedures ☐ Emergency Coordinator name & contact details

- ☐ Evacuation plan for facility personnel
- ☐ List of Emergency equipment at facility
- ☐ Location of all Emergency equipment
- ☐ Arrangements with local Emergency services
- ☐ Contact Numbers for Emergency services

90. When was the plan last updated (Month/Year)?

91. Is the facility Emergency response plan coordinated with community plans? Yes ☐ No ☐

92. Are live exercises conducted to test the plan effectiveness? Yes ☐ No ☐
If yes, how frequently? Provide the date and scenario of the last exercise.

93. Have the local Emergency services taken part in Emergency preparedness drills at or with the facility? Yes ☐ No ☐

94. Does the facility monitor injury statistics? Yes ☐ No ☐
If Yes, please complete the relevant table entries for the last 3 years

	Current Year	Last Year	Previous Year
Number of first aid injuries onsite			
Number of lost time injuries onsite			
Number of fatalities onsite			
Number of employees onsite			
Total Man-hours worked onsite			

For fatalities, provide brief description of event. For first aid and lost time injuries, describe the type of injuries that have occurred.

I. LOCATION

95. Describe land use immediately bordering facility in all directions *(e.g. industrial, agricultural, and residential).*
If industrial, state types of industry and overall size of adjacent industrial area (km2).

96. Provide an estimate of the total population living and working within 1.5 km and 5 km of the facility.

97. Around the facility, please list the following that are found nearby (within 5 km):

Nature of residence (e.g., low density, village, town, city)	Distance from facility	Direction

Surface Water (e.g., drainage, river, lake, etc.)	Distance from facility	Direction
Sensitive Receptor (hospitals, schools, nature reserves, etc.)	Distance from facility	Direction
Natural Hazards (floodplain, earthquake zone, wildfire, etc.)	Distance from facility	Direction

98. Briefly describe any buffer zone(s), if any, between the operational portion of the site and the areas described above.

99. Are there any contaminated sites, landfills, or other businesses conducting hazardous/dangerous activities adjacent to or within 1 km of the facility? *If yes, briefly describe:* Yes ☐ No ☐

100. Has the facility been impacted by any contamination or other hazards originating from adjacent properties or from other sites within 1 km of the facility? Yes ☐ No ☐
If yes, briefly describe the impact on site operations over the last five years:

J. COMMUNITY RELATIONS

101. Does the facility have any community programs or support community events? Yes ☐ No ☐
If yes, briefly describe:

102. Has the facility received any complaints from the local community? Yes ☐ No ☐
Number received year to date
Number received last 5 years

103. Briefly describe the source and nature of complaints, and the action taken to resolve the issue with the community.

104. Has there been public opposition to any of the facility permit applications or activities in the past 5 years? Yes ☐ No ☐

If yes, please briefly describe the nature of opposition, the opposing parties and the action taken to resolve the issue with the community.

105. Has the facility been the subject of any media coverage *(positive or negative)* in the past 5 years? Yes ☐ No ☐

K. SECURITY

106. Is there an artificial or natural barrier around the facility? *(e.g. fence)* Yes ☐ No ☐

If yes, please describe the height and type of barrier and extent of facility barrier *(% of property line):*

107. Is access to the facility controlled? Yes ☐ No ☐
If yes, which of the following measures are used? *(tick all that apply)*

	During working hours	Outside working hours
Entrance gates locked	☐	☐
Entrance gates manned	☐	☐
CCTV / Camera surveillance at entrance gates	☐	☐
CCTV / Camera surveillance along boundary	☐	☐
CCTV / Camera surveillance within facility	☐	☐
Security Guards at entrance gates	☐	☐
Security Guard patrols along boundary	☐	☐
Warning signage at each entrance	☐	
Warning signage along boundary	☐	

Provide additional details regarding the type of surveillance, access controls, and signage:

L. FINANCIALS/INSURANCE

Financials

108. Provide the following financial information for the facility/or parent company.

	Current Year	Previous Year
Total Assets		
Total Liabilities		
Owners Equity (total assets-total liabilities)		
Debt to Equity Ratio (total liabilities/equity)		
Current Assets		
Current Liabilities		
Current Ratio (current assets/current liabilities)		
Total Sales		

Comments:

EXXONMOBIL USE ONLY

109. Estimate the number of current customers:
Estimated number of multi-national company/ Fortune 500 list customers:
List 5-10 representative multi-national/Fortune 500 company customers:

110. Is there any regulatory requirement to maintain any type of financial assurance in the event of site closure? Yes ☐ No ☐

If yes, please briefly describe what site activities are covered by financial assurance.

111. List any financial assurance coverage applicable to this facility.

Coverage Amount for Closure	
Coverage Amount for Post Closure	
Financial instrument (insurance, bond, etc.)	

112. Is the financial assurance coverage updated annually? Yes ☐ No ☐
If no, please indicate when the financial assurance coverage was last updated.

113. With respect to other potential financial liabilities, does the facility/parent company:

- Anticipate future remediation/cleanup at this site? Yes ☐ No ☐
- Have responsibility for closure/remediation/clean-up of other sites? Yes ☐ No ☐
- Have any involvement in current or pending legal proceedings? Yes ☐ No ☐

If yes to any of these questions, please briefly describe the nature of the liabilities and provide a cost estimate for resolving the liabilities.

<u>Insurance</u>

114. Does the site have any insurance covering environmental or pollution damage caused by the site's operations? Yes ☐ No ☐
If yes, enter following details

Insurance Company:	
Policy No:	
Expiry Date:	
Amount of Limits	

Comments:

APPENDIX H ESTIMATED WASTE VOLUMES

This section includes the methodology (planning bases and assumptions) for waste volume estimates expected to be generated during the period 2021–2046. These volumes include total wastes (hazardous and non-hazardous), total hazardous wastes and total non-hazardous wastes.

Esso Exploration and Production Guyana Limited (EEPGL) has excluded from this waste forecasting effort the relatively small volumes of waste likely to be generated from approved projects such as the EEPGL's Fiber Optic Cable Project and EEPGL's Guyana Office Complex Project. Waste volumes generated from EEPGL's leased office at Duke Street are also excluded. Offshore discharged effluent volumes were also excluded from the 2021–2046 forecast, as these are managed off-shore and do not require onshore facilities for waste management.

Additionally, marine vessels tank clean out (VTCO) waste is currently not included in this Study. VTCO waste continues to be transported to and treated in Trinidad as there is currently no treatment capacity in Guyana for that waste stream. However, commencing in the 3Q2021, the Sustainable Environmental Services (SES) operation is expected to commence and the treatment of a small batch of VTCO wastes will be tested. If successful, another trial test is anticipated for a larger batch in late 2021. The SES operations are expected to expand VTCO treatment capabilities and capacity in Guyana in the future. However, given the uncertainty of when VTCO treatment operations will commence in Guyana, no VTCO waste volumes were included in the forecasting.

Residual waste volumes generated from third party waste management facilities (Tiger Rentals Guyana [TRG], and in the future SES) that send those wastes to the Haags Bosch Landfill (HBL) are also excluded from the forecast. TRG generates its own non-hazardous waste from its treatment processes and operations, and has multiple customers in addition to EEPGL. The total residual wastes generated by TRG are not known to EEPGL. However, approximately 75 percent of EEPGL's non-hazardous wastes that are handled by TRG is transported to the HBL based on EEPGL's Annual Environmental Reports.

The classification of wastes as hazardous is defined by the Environmental Protection (Hazardous Waste Management) Regulations 2000 and, based on instructions from the Guyana Environmental Protection Agency (EPA), the Basel Convention classification scheme. Wastes defined in the Basel Convention Annex VIII are considered as hazardous wastes for this Study.

Based on the waste classification defined by the Basel Convention Annex VIII, the following classified hazardous wastes are generated from EEPGL operations:

- A1010 (metal wastes)
- A1160 (lead-acid batteries, whole or crushed)
- A1170 (unsorted batteries)
- A3020 (mineral oils)
- A4020 (clinical)
- A4060 (waste oils/water, hydrocarbons/water mixtures, emulsions)
- A4090 (acidic or basic solutions)
- A4140 (off spec or outdated chemicals)
- A4160 (spent activated carbon)

The estimated waste volumes incorporate the Government of the Guyana (GoG) Approved Projects for 2021–2046 as well as Theoretical Projects introduced to the GoG but not approved. Approved Projects are based on EEPGL's latest planning assumptions. Theoretical Projects are

based on limited planning assumptions primarily due to the variability of drilling well counts. Section 5, Estimated Waste Volumes, outlines the approved and theoretical scopes as the following:

Approved Scope

- Liza Phase 1 (LP1)—17 operating wells and 1 floating, production, storage and offloading (FPSO) vessel (14 wells completed—FPSO in operation);
- Liza Phase 2 (LP2)—30 Development Wells (Dev Wells) and 1 FPSO (4 wells completed and subsea installation underway);
- Payara—41 Dev Wells and 1 FPSO (well drilling to commence later in 2021—no FPSO operations to date); and
- Exploration and Appraisal (E&A) Operations—25 E&A Wells (well drilling underway).

Theoretical Scope

- 8 FPSOs;
- 281 Dev Wells; and
- 111 E&A Wells.

The factors not quantified, but that could potentially impact the estimated waste volumes forecast for 2021–2046 include:

- Efficiency differences among drill ships;
- Waste minimization and source reduction initiatives;
- Treatment technologies to be developed;
- Changes to schedule for drilling of wells;
- Additional waste service provider's treatment facilities coming online;
- Different oil production capacities of FPSOs;
- Equipment turnaround or production interruption on FPSOs;
- Waste destruction efficiency differences for equipment among waste service providers;
- Well completion complexities;
- New discoveries; and
- Pandemics.

EEPGL's 2020 Environmental Report includes waste generation data from the LP1 and LP2 Projects, and included those wastes generated from the offshore assets only, i.e., drill ships, installation, FPSO support, and other marine vessels.

The following technical assumptions were also made to develop the waste volume forecasts and planning bases:

- E&A Well waste does not include well tests;
- E&A and Dev Wells take 2 months to drill;
- Waste generated from Redtail-1 is representative of average waste generated for approved E&A Wells, and the average of Redtail-1 and Tanager-1 waste volumes are representative of average waste generated for theoretical E&A Wells;

- E&A Well counts are based on planning assumptions;
- Average of waste generated from LIZ_2W6 (water injection well), LIZ_2P4 (production well), and LIZ_1G4 (gas injection well) is representative of average waste generated for development wells;
- Stabroek economic modeling is utilized to determine 38 wells per FPSO required for high gas to oil ratio and 45 wells per FPSO for oil to determine the theoretical development well count;
- Development wells that were spud in 2020 but not completed before 2021 were included in the well count;
- Drilling of theoretical development wells started 2 years prior to startup;
- Maximum of 8 rigs per year for theoretical development drilling;
- Data from the 2020 Environmental Report were used to obtain average volumes of waste per FPSO, 5 installation vessels, 4 FPSO supporting vessels, and 1 logistics vessel that are representative of waste per unit for future years;
- 5 installation vessels are required for the year of each FPSO startup;
- 4 FPSO supporting vessels are required per FPSO in operation;
- 3.5 logistic vessels per drill rig and on average 4.5 wells per drill rig (utilized EEPGL's current drilling schedule that only forecasts through 2022);
- All liquid mud plant (LMP) waste is considered hazardous;
- 138.67 tonnes of LMP waste per well (based on historical operational experience); and
- Waste stream volumes generated from treatment processes at waste service provider facilities include other generators' waste (e.g., Schlumberger/MI-Swaco, Halliburton and Baker Hughes) so volumes for oil debris, batteries, and oily water are not included.

The planning bases used to calculate the estimated waste volume forecast are displayed in Tables 1-6 below. Partial wells and vessels represent a well that was only partially completed in that year and a vessel that was only active for a certain amount of time that year.

- Table 1—Estimated Number of Waste Generation by Source (units) for 2021–2046 (Approved Projects Scope)
- Table 2—Estimated Waste Volume Generated per Well Type (tonnes/well) (Approved Projects Scope)
- Table 3—Estimated Annual Waste Volume Generated per Offshore Activity (tonnes/unit) (Approved Projects Scope)
- Table 4—Estimated Number of Waste Generation Source (units) for 2021–2046 (Theoretical Projects Scope)
- Table 5—Estimated Waste Volume Generated per Well Type (tonnes/well) (Theoretical Projects Scope)

- Table 6—Estimated Annual Waste Volume Generated per Offshore Activity (tonnes/unit) (Theoretical Projects Scope)

Note that repetitive waste volumes or estimated waste volumes of zero in later years is due to insufficient data for accurate projections that far into the future.

Table 1: Estimated Number of Waste Generation by Source (units) for 2021–2046 (Approved Projects Scope)

Year	E&A Wells	FPSOs	Development Wells	Installation vessels	FPSO Supporting Vessels	Logistics Vessels
2021	20	2	17	5	8	28
2022	5	2	17	0	8	17
2023	0	3	17	5	12	13
2024	0	3	7	0	12	5
2025	0	3	7	0	12	5
2026	0	3	7	0	12	5
2027	0	3	0	0	12	0
2028	0	3	0	0	12	0
2029	0	3	0	0	12	0
2030	0	3	0	0	12	0
2031	0	3	0	0	12	0
2032	0	3	0	0	12	0
2033	0	3	0	0	12	0
2034	0	3	0	0	12	0
2035	0	3	0	0	12	0
2036	0	3	0	0	12	0
2037	0	3	0	0	12	0
2038	0	3	0	0	12	0
2039	0	3	0	0	12	0
2040	0	3	0	0	12	0
2041	0	3	0	0	12	0
2042	0	3	0	0	12	0
2043	0	3	0	0	12	0
2044	0	3	0	0	12	0
2045	0	3	0	0	12	0
2046	0	3	0	0	12	0

Table 2: Estimated Waste Volume Generated per Well Type (tonnes/well) (Approved Projects Scope)

	Hazardous	Non-Hazardous	Total
E&A Well	15	51	65
Dev Well	28	35	63

Table 3: Estimated Annual Waste Volume Generated per Offshore Activity (tonnes/unit) (Approved Projects Scope)

	Hazardous	Non-Hazardous	Total
1 FPSO	110	100	210
5 Installation Vessels	842	214	1,056
4 FPSO Supporting Vessels	66	15	21
1 Logistics Vessel	0.00	29	29

Table 4: Estimated Number of Waste Generation Source (units) for 2021–2046 (Theoretical Projects Scope)

Year	E&A Wells	FPSOs	Development Wells	Installation vessels	FPSO Supporting Vessels	Logistics Vessels
2021	20	2	17	5	8	28
2022	24	2	17	0	8	32
2023	18	3	48	5	12	51
2024	16	3	48	0	12	50
2025	12	4	48	5	16	47
2026	7	5	48	5	20	43
2027	7	6	48	5	24	43
2028	7	7	8	5	28	12
2029	0	8	0	5	32	0
2030	0	8	0	0	32	0
2031	0	8	0	0	32	0
2032	0	8	0	0	32	0
2033	0	8	0	0	32	0
2034	0	8	0	0	32	0
2035	0	8	0	0	32	0
2036	0	8	0	0	32	0
2037	0	8	0	0	32	0
2038	0	8	0	0	32	0
2039	0	8	0	0	32	0
2040	0	8	0	0	32	0

Year	E&A Wells	FPSOs	Development Wells	Installation vessels	FPSO Supporting Vessels	Logistics Vessels
2041	0	8	0	0	32	0
2042	0	8	0	0	32	0
2043	0	8	0	0	32	0
2044	0	8	0	0	32	0
2045	0	8	0	0	32	0
2046	0	8	0	0	32	0

Table 5: Estimated Waste Volume Generated per Well Type (tonnes/well) (Theoretical Projects Scope)

	Hazardous	Non-Hazardous	Total
E&A Well	31	47	78
Dev Well	28	35	63

Table 6: Estimated Annual Waste Volume Generated per Offshore Activity (tonnes/unit) (Theoretical Projects Scope)

	Hazardous	Non-Hazardous	Total
1 FPSO	110	100	210
5 Installation Vessels	842	214	1,056
4 FPSO Supporting Vessels	66	15	81
1 Logistics Vessel	0.00	299	299

APPENDIX I SAFETY DATA SHEETS FOR WASTE PROFILES

Safety Data Sheet Index

EPA Waste Profile Sheet Number	Waste Stream	Safety Data Sheets	Hyperlink
20140506-009	Drill Cuttings/Mud Slops	Barite	https://www.aplng.com.au/content/dam/aplng/compliance/msds/BARITE%20SDS.pdf
		Calcium Chloride	
		Ecotrol RD	
		EMI-1926	
		Lime	
		Escaid 110	
		RHETHIK	
		SUREMUL	
		VG-PLUS	
20140506-011	Chemical Sacks	Calcium Chloride	
		Caustic Soda	
		Deepclean	
		Defoam X	
		Duo Vis	
		Duramod	
		Ecotrol RD	
		Escaid 110	
		HRP	
		KI- 3924	
		Lime	
		M-I Gel	
		Microbar	
		Monoethylene Glycol (MEG)	
		Myacide	
		Novamod	
		Nut Plug (All Grades)	
		Pecan Nut Plug (All grades)	
		Polypac (All Grades)	
		Potassium Chloride	
		Rhebuild	
		RheCon (EMI-1926)	
		Rheduce	
		Rheflat	
		Rheguard Mud System	
		Rhemul	
		Rhethin	
		Safe-Break Prime	
		Safe-Break	
		Safe-Carb (all Grades)	https://ofmp-media.azureedge.net/media/miswaco/documents/safe-carbsds_v1.pdf
		Safe-Cor C	
		Safe-Cor	
		Safe-Scav CA	

EPA Waste Profile Sheet Number	Waste Stream	Safety Data Sheets	Hyperlink
		Safe-Scav NA	
		Salt Saturated Mud System	
		SAPP	
		Seal-N-Peel (Ca Br2)	
		Seal-N- Peel (Kcl-Nacl-Nabr)	
		Soda Ash	
		Sodium Bromide Brine	
		Sodium Bromide	
		Sourscav	
		Surewet	
		VG-Plus	
		VG-Supreme	
		Walnut Nutplug (All Grades)	
		Water Based Mud (Generic)	
201440506-012	Casing Protectors	4421 Kendex OCTG	https://www.protectivesupplies.com/datasheets/87_MSDS.pdf
		Best O Life 72733	
		Jet-Lube API- Modified – Casing	https://docs.jetlube.com/documents/SDS+-+Central+Repository-/SDS's+REPOSITORY/United+States/English/Jet-Lube/API-Modified_SDS_USA_En.pdf
20140506-015	Acid Solutions	Hydrochloric Acid	https://ashtachemicals.com/wp-content/uploads/2020/05/Safety-Data-Sheet_Hydrochloric-Acid.pdf
20140506-016	Aerosol Cans	WD 40	https://files.wd40.com/pdf/WD-40+Aerosol+CAN+GHS+SDS+(Button+Top)+(11-21-19).pdf
20140506-017	AFFF	Ansulite 1	https://www.safetyemporium.com/content/sds/sds_Ansulite_AFC1B.pdf
20140506-018	Batteries	BBI - Lead Acid Batteries	
		Sonardyne 641-0127 Compatt 6 Battery Pack Lithium	https://www.swe.com/media/files/files/7eaf7b8f/SDS_LiSOCl2_Saft_eng_Oct_2015_Rev11.pdf
20140506-020	Chemical Contaminated Water	ACP22005A	
		AFMR19017A	
		ASPH17544SP	
		MISC17477A	
		PC-191T	
		Oceanic HW443 R	
20140506-021	Completion Fluids/ Contaminated Brine	Crude Oil Sweet	
		Deepclean	
20140506-023	Fluorescent Bulbs	Fluorescent Bulbs	https://lightbulbdepot.com/common/images/msds/SDS_1621.pdf
20140506-024	Fuel	Jet Fuel	https://www.swe.com/media/files/files/7eaf7b8f/SDS_LiSOCl2_Saft_eng_Oct_2015_Rev11.pdf

EPA Waste Profile Sheet Number	Waste Stream	Safety Data Sheets	Hyperlink
		MGO	http://algoma.msdsworld.com/msds/English/34260.pdf
20140506-025	Lube Oil	Shell Gadinia 30	
20140506-027	Oily Water	Shell Gadinia 30	
		NGL No 2 Diesel Fuel Low Sulfur All Grades	http://www.nglenergypartners.com/wp-content/uploads/NGL_NO2_DIESEL_FUEL_LOW_SULFUR_ALL_GRADES_GHS_MSDS_1_3_2012.pdf
20140506-028	Paint/Paint Consumables	Primer Paint	
		Tuf Coat Paint	
20145060-036	Hydraulic Oil/Glycol	Shell Tellus S2	https://www.makino.com/makino-us/media/general/Shell-Tellus-S2-M-22-32-46-68.pdf?ext=.pdf
		Ethylene Glycol	
		Monoethylene Glycol	
20145060-038	Waste Mineral Oil	Mineral Oil	
20145060-039	Refrigerant	Freon R134A	
20145060-040	Caustic	Lime	
		Sodium Hypochlorite	https://www.unil.ch/cig/files/live/sites/cig/files/FAQ/Safety/PDF/MSDS/Sodium%20hypochlorite-msds.pdf

Safety Data Sheets: Barite, Calcium Chloride, Ecotrol RD, EMI-1926, Lime; Escaid 110; RHETHIK; SUREMUL; and VG-PLUS

Waste Stream: Drill Cuttings/Mud Slops

EPA Waste Profile Sheet Number: 20140506-009

Safety Data Sheet
BARITE (ALL GRADES)

1. Identification of the substance/preparation and of the Company/undertaking

1.1 Product identifier

Product name	BARITE (ALL GRADES)
Product code	MI11207
REACH Registration Name	Exempt Annex V ENTRY 7.
Denmark Pr. no.	1154758

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended use	Weighting agent.
Uses advised against	Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier identification
M-I Drilling Fluids UK Limited
C/O Schlumberger
Enterprise Drive
Westhill Industrial Estate
Westhill, AB32 6TQ
Scotland UK
+47 51577424
MISDS@slb.com

1.4 Emergency Telephone Number

Emergency telephone - (24 Hour) Australia +61 2801 44558, Asia Pacific +65 3158 1074, China +86 10 5100 3039, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, New Zealand +64 9929 1483, USA 001 281 561 1600

2. Hazards identification

2.1 Classification of the substance or mixture

Regulation (EC) No. 1272/2008

Health hazards	Not classified
Environmental hazards	Not classified
Physical Hazards	Not classified

2.2 Label Elements

Signal word
None

Hazard statements
This product is not classified as hazardous therefore no (H) hazard statements assigned.

Precautionary Statements - EU (§28, 1272/2008)
This product is not classified as hazardous therefore has no (P) precautionary statements assigned.

Classification according to EU Directives 67/548/EEC or 1999/45/EC

Indication of danger
Not classified

Contains
Crystalline silica (impurity)

For the full text of the R-phrases and H-Statements mentioned in this Section, see Section 16.

2.3 Other data

Not classified as PBT/vPvB by current EU criteria

Australian statement of hazardous/dangerous nature
Classified as Non-Hazardous according to the criteria of NOHSC.
NON-HAZARDOUS SUBSTANCE. NON-DANGEROUS GOODS.

3. Composition/information on ingredients

3.1 Substances

Component	EC-No.	CAS-No	Weight % - range	Classification (67/548)	Classification (Reg. 1272/2008)	REACH registration number
Crystalline silica (impurity)	238-878-4	14808-60-7	1-5	Xn; R48/20	STOT Rep. 2 - H373	Exempt

3.2 Mixtures

Not Applicable

Comments
The product contains other ingredients which do not contribute to the overall classification.

This product contains a small quantity of quartz, crystalline silica. Prolonged and repeated exposure to concentrations of crystalline silica exceeding the workplace exposure limit (WEL) may lead to chronic lung disease such as silicosis. IARC Monographs, Vol. 68, 1997, concludes that there is sufficient evidence that inhaled crystalline silica in the form of quartz or cristobalite from occupational sources causes cancer in humans. IARC Classification Group I.

4. First aid measures

4.1 First Aid

Inhalation — If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion — Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Get medical attention if symptoms occur.

Skin contact — Wash off immediately with soap and plenty of water removing all contaminated clothes and shoes. Get medical attention immediately if symptoms occur.

Eye contact — Remove contact lenses. Promptly wash eyes with lots of water while lifting eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

4.2 Most important symptoms and effects, both acute and delayed

General advice — The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Main symptoms

Inhalation — Please see Section 11. Toxicological Information for further information.

Ingestion — Please see Section 11. Toxicological Information for further information.

Skin contact — Please see Section 11. Toxicological Information for further information.

Eye contact — Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician — Treat symptomatically.

5. Fire-fighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing media appropriate for surrounding material.

Extinguishing media which shall not be used for safety reasons
None known.

5.2 Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
None known.

Hazardous combustion products
Thermal decomposition can lead to release of irritating gases and vapours.

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. See also section 8. Do not breathe dust.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and materials for containment and cleaning up

Methods for Containment
Prevent further leakage or spillage if safe to do so.

Methods for cleaning up
Sweep up and shovel into suitable containers for disposal. After cleaning, flush away traces with water. Avoid generating or breathing dust. Product is slippery if wet.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Avoid dust formation. Do not breathe dust. Material becomes slippery when wet. Use caution if wet.

Hygiene measures
Use good work and personal hygiene practices to avoid exposure. Do no eat, drink or smoke when using this product. Wash thoroughly after handling. Remove contaminated clothing.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions	Ensure adequate ventilation. Keep airborne concentrations below exposure limits.
Storage	Keep containers tightly closed in a dry, cool and well-ventilated place. Avoid wet and humid conditions.

Storage class Chemical storage.

Packaging material Use specially constructed containers only

7.3 Specific end uses

See also Section 1.2.

8. Exposure controls/personal protection

8.1 Control parameters

Exposure limits No biological limit allocated

Component	EU OEL - Third List	Austria	Australia	Denmark
Crystalline silica (impurity)	Not determined	Not determined	0.1 mg/m³ TWA	0.1mg/m³

Component	Finland	France	Germany	Hungary
Crystalline silica (impurity)	Not determined	0.1 mg/m³	Not determined	Not determined

Component	New Zealand	Italy	Netherlands	Norway
Crystalline silica (impurity)	0.2 mg/m³ TWA Known or presumed human carcinogen	Not determined	0.075 mg/m³	0.3 mg/m³ TWA total dust 0.1 mg/m³ TWA respirable dust 0.9 mg/m³ STEL total dust 0.3 mg/m³ STEL respirable dust Carcinogen

Component	Poland	Portugal	Romania	Russia
Crystalline silica (impurity)	2 mg/m³ TWA >50% free crystalline silica total inhalable dust 0.3 mg/m³ TWA >50% free crystalline silica respirable dust 4.0 mg/m³ TWA 2% to 50% free crystalline silica total inhalable dust 1.0 mg/m³ TWA 2% to 50% free crystalline silica respirable dust	0.025 mg/m³ TWA respirable fraction	Not determined	1 mg/m³ MAC 3 mg/m³ STEL 1 mg/m³ TWA aerosol Fibrogenic substance

Component	Spain	Switzerland	Turkey	UK
Crystalline silica (impurity)	0.1 mg/m³ VLA-ED respirable fraction	0.15 mg/m³ MAK respirable	Not determined	0.3 mg/m³ STEL calculated respirable 0.1 mg/m³ TWA respirable

8.2 Exposure controls

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering measures to reduce exposure
Ensure adequate ventilation. Mechanical ventilation or local exhaust ventilation is required.

Personal protective equipment

Eye protection	It is good practice to wear goggles when handling any chemical. Tightly fitting safety goggles.
Hand protection	Use protective gloves made of:, Frequent change is advisable, Neoprene, PVC, Nitrile.
Respiratory protection	Respirator must be worn if exposed to dust, Suitable mask with particle filter P3 (European Norm 143).
Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.

Hygiene measures Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state	Solid
Appearance	Powder
Odour	Odourless
Colour	tan - Gray
Odor threshold	Not applicable

Property	Values	Remarks
pH	No information available	

pH @ dilution		
Melting/freezing point	1580 °C	
Boiling point/range	No information available	
Flash Point	No information available	
Evaporation rate	No information available	
Flammability (solid, gas)	Not Applicable	
Flammability Limits in Air		
Upper flammability Limit	Not applicable	
Lower flammability limit	Not applicable	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	No information available	
Bulk density	1920 - 2400 kg/m³	
Relative density	4.10 - 4.25	@ 20°C.
Water solubility	Insoluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	
Viscosity, dynamic	No information available	
Log Pow	Not determined	

Explosive properties	Not Applicable
Oxidizing properties	None known.

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	None
Density VALUE	No information available

10. Stability and reactivity

10.1 Reactivity

No specific reactivity hazards associated with this product.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerisation does not occur.

10.4 Conditions to avoid

Avoid dust formation. Avoid wet and humid conditions.

10.5 Incompatible materials

No materials to be especially mentioned.

10.6 Hazardous decomposition products

See also section 5.2.

11. Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Product information This product contains a small quantity of quartz, crystalline silica. Prolonged and repeated exposure to concentrations of crystalline silica exceeding the workplace exposure limit (WEL) may lead to chronic lung disease such as silicosis.

Respirable quartz <0.3% . Report number: N0600517.

Inhalation Inhalation of dust in high concentration may cause irritation of respiratory system.

Eye contact May cause slight irritation.

Skin contact Prolonged contact may cause redness and irritation.

Ingestion Ingestion may cause stomach discomfort.

Unknown acute toxicity Not Applicable.

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Crystalline silica (impurity)	= 500 mg/kg (Rat)	No data available	No data available

Sensitisation This product does not contain any components suspected to be sensitizing.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity Crystalline silica dust is listed by IARC in Group 1 as known to cause lung cancer in humans, if inhaled.

Reproductive toxicity This product does not contain any known or suspected reproductive hazards.

Routes of exposure Inhalation.

Routes of entry Inhalation.

Specific target organ toxicity (single exposure) Not classified

Specific target organ toxicity (repeated exposure) Not classified.

Target organ effects Lungs.

Aspiration hazard No hazard from product as supplied.

12. Ecological information

12.1 Toxicity

Listed on PLONOR list of OSPAR

The product component(s) are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Toxicity to algae
This product is not considered toxic to algae.

Toxicity to fish
This product is not considered toxic to fish.

Toxicity to daphnia and other aquatic invertebrates
This product is not considered toxic to invertebrates.

Component	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Crystalline silica (impurity)	No information available	No information available	No information available

12.2 Persistence and degradability

The product is not biodegradable.

12.3 Bioaccumulative potential

Does not bioaccumulate.

12.4 Mobility in soil

Mobility
Insoluble in water.

12.5 Results of PBT and vPvB assessment

Not classified as PBT/vPvB by current EU criteria.

12.6 Other adverse effects.

None known.

13. Disposal considerations

13.1 Waste treatment methods

Waste from residues / unused products	Dispose of in accordance with local regulations.
Contaminated packaging	Empty containers should be transported/delivered using a registered waste carrier for local recycling or waste disposal.
EWC waste disposal No.	According to the European Waste Catalogue, Waste Codes are not product specific, but application specific. Waste codes should be assigned by the user based on the application for which the product was used. The following Waste Codes are only suggestions: EWC waste disposal No: 01 05 07

14. Transport information

The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA,ADR/RID/ADG).

14.1 UN number
Not regulated

14.2 Proper shipping name
Not regulated

14.3. Hazard class(es)

ADR/RID/ADN Hazard class	Not regulated
IMDG Hazard class	Not regulated
ICAO Hazard class/division	Not regulated

14.4 Packing group

ADR/RID/ADN Packing Group	Not regulated
IMDG Packing group	Not regulated
ICAO Packing group	Not regulated

14.5 Environmental hazard
No

14.6 Special precautions
Not Applicable

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
Please contact MISDS@slb.com for info regarding transport in Bulk.

15. Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Germany, Water Endangering Classes (VwVwS)	Water endangering class = nwg
New Zealand hazard classification	Not classified.
HSNO approval no.	Not required.
Group number	Not required.

Commission Regulation (EU) No 453/2010 of 20 May 2010 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH). Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC, including amendments.

This safety data sheet complies with the requirements of Regulation (EC) No. 1272/2008.

National Code of Practice for the Preparation of Material Safety Data Sheets 2nd Edition [NOHSC: 2011 (2003)].

National Occupational Health and Safety Commission's Approved Criteria for Classifying Hazardous Substances [NOHSC:1008 (2004) 3rd Edition].

National Occupational Health and Safety Commission's Exposure Standards for Atmospheric Contaminants in the occupational Environment [NOHSC:1003 (1995)].

Safe Work Australia.

Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP).

ADG Code – Australian Dangerous Goods Code.

Dutch Mining Regulations: In accordance with Mining Regulations 9.2 and Chapter 4 of the Working Conditions Decree.

International inventories

USA, Toxic Substances Control Act inventory (TSCA)	Complies
European Union - EINECS and ELINCS	Complies
Canada, Domestic Substance List (DSL)	Complies
Philippines (PICCS)	Complies
Inventory - Japan - Existing and New Chemicals list	Complies
China (IECSC)	Complies
Australia (AICS)	Complies

Korea (KECL)	Complies
Inventory - New Zealand - Inventory of Chemicals (NZIoC)	Complies

Contact REACH@miswaco.slb.com for REACH information.

15.2 Chemical Safety Report

No information available

16. Other information

Prepared by	Global Regulatory Compliance - Chemicals (GRC - Chemicals) , Anne Karin (Anka) Fosse
Supercedes date	17/Nov/2014
Revision date	19/Mar/2015
Version	10
The following sections have been revised	2,, 3,, 16, Updated according to GHS/CLP.

Text of R phrases mentioned in Section 3

R48/20 - Harmful: danger of serious damage to health by prolonged exposure through inhalation

Full text of H-Statements referred to under sections 2 and 3

This product is not classified as hazardous therefore no (H) hazard statements assigned.
H373 - May cause damage to organs through prolonged or repeated exposure if inhaled

Disclaimer
The information contained herein is considered in good faith as reliable of the date issued and is based upon on measurements, tests or data derived from supplier's own study or furnished by others. In providing this SDS information, Supplier makes no express or implied warranties as to the information or product; merchantability or fitness of purpose; any express or implied warranty; or non-infringement of intellectual property rights; and supplier assumes no responsibility for any direct, special or consequential damages, results obtained, or the activities of others. To the maximum extent permitted by law, supplier's warranty obligations and buyer's sole remedies are as stated in separate agreement between the parties.

SDS no. 12556
Version 3
Revision date 03/Feb/2015
Supersedes date 26/Jul/2013

Safety Data Sheet
Calcium chloride (all grades)

1. Identification

1.1 Product identifier

Product name Calcium chloride (all grades)

Product code 12556

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Drilling fluid additive. SDS covers all grades.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.

P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals) , Mike McDowell

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Australia +61 2801 44558, Asia Pacific +65 3158 1074, China +86 10 5100 3039, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, New Zealand +64 9929 1483, USA 001 281 561 1600

2. Hazards identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Acute oral toxicity	Category 4
Serious eye damage/eye irritation	Category 2

Environmental hazards Not classified

Physical Hazards Not classified

2.2 Label elements

Signal word
WARNING

Hazard statements
H302 - Harmful if swallowed
H319 - Causes serious eye irritation

Precautionary statements

P264 - Wash face, hands and any exposed skin thoroughly after handling
P270 - Do not eat, drink or smoke when using this product
P280 - Wear protective gloves/ protective clothing/ eye protection/ face protection
P301 + P312 - IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P330 - Rinse mouth
P337 + P313 - If eye irritation persists: Get medical advice/attention
P501 - Dispose of contents/ container to an approved waste disposal plant

Unknown acute toxicity 0% of the mixture consists of ingredient(s) of unknown toxicity.

3. Composition/information on Ingredients

3.1 Substances

3.2 Mixtures

Component	CAS-No	Weight % - range
Calcium chloride	10043-52-4	60 - 100

Comments
The exact percentage (concentration) of composition has been withheld as a trade secret

4. First aid measures

4.1 First-Aid Measures

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Seek medical attention if irritation occurs.

Skin contact Wash off immediately with soap and plenty of water removing all contaminated clothes and shoes. Get medical attention immediately if symptoms occur.

Eye contact Remove contact lenses. Promptly wash eyes with lots of water while lifting eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

4.2 Most important symptoms and effects, both acute and delayed

General advice The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Main symptoms

Inhalation Please see Section 11. Toxicological Information for further information.

Ingestion Please see Section 11. Toxicological Information for further information.

Skin contact Please see Section 11. Toxicological Information for further information.

Eye contact Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician Treat symptomatically

5. Fire-fighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing media appropriate for surrounding material.

Extinguishing media which shall not be used for safety reasons
None known.

5.2 Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
None known.

Hazardous combustion products
Calcium oxide, Metal fumes.

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Evacuate non-essential personnel. Use personal protective equipment. Avoid dust formation. Do not breathe dust.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment.

6.3 Methods and materials for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so.

Methods for cleaning up
Sweep up and shovel into suitable containers for disposal. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and storage

7.1 Precautions for safe handling

Handling
Avoid contact with skin and eyes. Avoid dust formation.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions	Ensure adequate ventilation. Keep airborne concentrations below exposure limits.
Storage precautions	Keep containers tightly closed in a dry, cool and well-ventilated place. Protect from moisture Avoid contact with: Strong oxidizing agents Strong acids.

8. Exposure controls/personal protection

8.1 Control parameters

Exposure limits **NUI = Nuisance dust, TWA 4mg/m³ Respirable Dust, 10mg/m³ Total Dust.**

Component	ACGIH TLV	OSHA PEL
Calcium chloride	Not Determined	Not Determined

8.2 Exposure controls

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering measures to reduce exposure
Ensure adequate ventilation.

Personal protective equipment

Eye protection	Tightly fitting safety goggles.
Hand protection	Repeated or prolonged contact:, Use protective gloves made of:, Nitrile, Neoprene gloves, Rubber gloves.

Respiratory protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent. If exposed to airborne mist/aerosol of this product, use at least a NIOSH-approved N95 half-mask disposable or re-usable particulate respirator. In work environments containing oil mist/aerosol, use at least a NIOSH-approved P95 half-mask disposable or reuseable particulate respirator. This product contains nitrogen compounds which may, in some circumstances, form ammonia or amine compounds. If exposed to ammonia or amine compounds from this product use a NIOSH/MSHA-approved respirator with an Ammonia/Methylamine cartridge.
Skin and body protection	Wear suitable protective clothing, Provide eyewash station.
Hygiene measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state	Solid
Appearance	Powder Dust
Color	Off-white
Odor	Odorless
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH	Not applicable	
pH @ dilution	7 - 10	5% sol
Melting/freezing point	772 °C	
Boiling point/range	> 1600 °C	
Flash point	No information available	PMCC
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not Applicable	
Flammability Limits in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	No information available	
Bulk density	No information available	
Water solubility	Soluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	
Log Pow	No information available	
Explosive properties	Not Applicable	
Oxidizing properties	None known.	

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	None
Density	No information available

10. Stability and reactivity

10.1 Reactivity

No specific reactivity hazards associated with this product.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Avoid contact with water and moist air - product is hygroscopic.

10.5 Incompatible materials

Metals. Strong oxidizing agents. Strong acids.

10.6 Hazardous decomposition products

Calcium oxide. Metal fumes.

11. Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Inhalation Inhalation of dust may cause shortness of breath, tightness of the chest, a sore throat and cough.

Eye contact Causes serious eye irritation.

Skin contact Prolonged contact may cause redness and irritation.

Ingestion Ingestion may cause stomach discomfort.

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Calcium chloride	= 1000 mg/kg (Rat)	= 2630 mg/kg (Rat)	No data available

Component	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Calcium chloride	No data available	No data available	No data available	No data available

Sensitization This product does not contain any components suspected to be sensitizing.

Mutagenic effects This substance has no evidence of mutagenic properties.

Carcinogenicity This substance has no evidence of carcinogenic properties.

Reproductive toxicity	None known.
Developmental toxicity	Not known to cause birth defects or have a deleterious effect on a developing fetus.
Routes of exposure	Skin contact. Inhalation. Eye contact.
Routes of entry	No route of entry noted.
Specific target organ toxicity (single exposure)	Not classified
Specific target organ toxicity (repeated exposure)	Not classified.
Neurological effects	None known.
Target organ effects	Cardiovascular system.
Aspiration hazard	No hazard from product as supplied.

12. Ecological information

12.1 Toxicity

Toxicity to algae
See component information below.

Toxicity to fish
See component information below.

Toxicity to daphnia and other aquatic invertebrates
See component information below.

Component	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Calcium chloride 10043-52-4 (60 - 100)	10650 mg/L LC50 (Lepomis macrochirus) = 96 h	No information available	52 mg/L EC50 (Daphnia magna) = 48 h

12.2 Persistence and degradability

Not Applicable - Inorganic chemical.

12.3 Bioaccumulative potential

Not Applicable - Inorganic chemical.

12.4 Mobility in soil

Soluble in water.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal considerations

13.1 Waste treatment methods

Disposal Method Disposal should be made in accordance with federal, state and local regulations.

Contaminated packaging Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1 UN Number

UN No. (DOT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG)	Not regulated
UN No. (ICAO)	Not regulated

14.2 Proper shipping name

Not regulated for transportation by DOT, TDG, IMDG and ICAO/IATA.

14.3 Hazard class(es)

DOT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG Hazard class	Not regulated
ICAO Hazard class/division	Not regulated

14.4 Packing group

DOT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG Packing group	Not regulated
ICAO Packing group	Not regulated

14.5 Environmental hazard

Marine pollutant No

14.6 Special precautions

Not Applicable

15. Regulatory information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
European Union (EINECS and ELINCS)	Complies

Philippines (PICCS)	Complies
Japan (ENCS)	Complies
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories
Immediate (acute) health hazard.

Component	SARA 302 / TPQs	SARA 313	CERCLA RQ
Calcium chloride	N/A	N/A	N/A

State Comments
Proposition 65: This product is not known to contain chemicals considered by the State of California's Safe Drinking Water and Toxic Enforcement Act of 1986 as causing cancer and/or reproductive toxicity at levels that are expected to pose a significant risk under anticipated use conditions.

Canadian Classification

16. Other information

Supersedes date	26/Jul/2013
Revision date	03/Feb/2015
Version	3
The following sections have been revised	All sections. Updated according to GHS/CLP.

HMIS classification

Health	2
Flammability	0
Physical hazard	0
PPE	E

N/A - Not Applicable, N/D - Not Determined.

Disclaimer
The information contained herein is considered in good faith as reliable of the date issued and is based upon on measurements, tests or data derived from supplier's own study or furnished by others. In providing this SDS information, Supplier makes no express or implied warranties as to the information or product; merchantability or fitness of purpose; any express or implied warranty; or non-infringement of intellectual property rights; and supplier assumes no responsibility for any direct, special or consequential damages, results obtained, or the activities of others. To the maximum extent permitted by law, supplier's warranty obligations and buyer's sole remedies are as stated in separate agreement between the parties.

Safety Data Sheet
ECOTROL* RD

1. Identification

1.1 Product identifier

Product name ECOTROL* RD

Product code PID10792

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Drilling fluid additive.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
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Telephone: 1-780-962-8221

E-mail address sdsmi@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals) , Bethicia Prasek

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : 0800-720-8000 0800-777-2323 (WGRA)

2. Hazards identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards Not classified

Environmental hazards Not classified

Physical Hazards

Combustible dust	Category 1

2.2 Label elements

Signal word
WARNING

Hazard statements
H232 - May form combustible dust concentrations in air

Precautionary statements
P240 - Ground/bond container and receiving equipment
P241 - Use explosion-proof electrical/ ventilating/ lighting/ equipment
P243 - Take precautionary measures against static discharge

Hazards not otherwise classified
None known

Unknown acute toxicity Not applicable.

3. Composition/information on Ingredients

3.1 Substances

Not applicable

3.2 Mixtures

Chemical Name	CAS No	Weight-%
Polymer	Proprietary	60 - 100
Synthetic amorphous silica	112926-00-8	1 - 5

Comments
The exact percentage (concentration) of composition has been withheld as a trade secret
Proprietary component(s) in section 3 of this SDS does not/do not trigger application of trade secret exemption under Hazardous Materials Information Review Act (HMIRA). The proprietary component in this product contributes to combustible dust classification.

4. First aid measures

4.1 First-Aid Measures

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Seek medical attention if irritation occurs.

Skin contact Wash off immediately with soap and plenty of water while removing all contaminated

clothes and shoes. Get medical attention immediately if symptoms occur.

Eye contact Promptly wash eyes with lots of water while lifting eye lids. Remove contact lenses. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

4.2 Most important symptoms and effects, both acute and delayed

General advice The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Main symptoms

Inhalation Please see Section 11. Toxicological Information for further information.

Ingestion Please see Section 11. Toxicological Information for further information.

Skin contact Please see Section 11. Toxicological Information for further information.

Eye contact Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician Treat symptomatically

5. Fire-fighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Fog, Alcohol Foam, CO_2, Dry Chemical.

Extinguishing media which must not be used for safety reasons
None known.

5.2 Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
Suspended dust may present a dust explosion hazard.

Hazardous combustion products
Carbon oxides (COx).

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment identified in Section 8. Keep unnecessary personnel away. Avoid contact with the skin and the eyes. Prevent further leakage or spillage if safe to do so. Avoid dust formation. Suspended dust may present a dust explosion

hazard. Avoid breathing dust; if exposed to high dust concentration, leave area immediately.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Cover powder spill with plastic sheet or tarp to minimize spreading.

Methods for cleaning up
Sweep up and shovel into suitable containers for disposal. After cleaning, flush away traces with water. Take precautionary measures against static discharges. Use non-sparking tools and equipment. Avoid dust formation.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Avoid dust formation. Fine dust dispersed in air may ignite. Avoid breathing dust; if exposed to high dust concentration, leave area immediately. Take precautionary measures against static discharges.

Hygiene measures
Use good work and personal hygiene practices to avoid exposure. Do not eat, drink or smoke when using this product.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Ensure adequate ventilation. Provide appropriate exhaust ventilation at places where dust is formed. Keep airborne concentrations below exposure limits.

Storage precautions Follow safe warehousing practices regarding palletizing, banding, shrink-wrapping and/or stacking. Keep away from open flames, hot surfaces and sources of ignition. Keep containers tightly closed in a dry, cool and well-ventilated place.

8. Exposure controls/personal protection

8.1 Control parameters

Exposure limits **Control as an ACGIH particulate not otherwise specified (PNOS): 10 mg/m³ (Inhalable); 3 mg/m³ (Respirable) and an OSHA particulate not otherwise regulated (PNOR): 15 mg/m³ (Total); 5 mg/m³ (Respirable).**

Chemical Name	ACGIH TLV	OSHA PEL
Polymer	Not determined	Not determined
Synthetic amorphous silica	10 mg/m³	20 mppcf; (80)(%SiO2) mg/m³

Synthetic amorphous silica
OSHA - Final PELs - Table Z-3 Mineral Dusts
20 mppcf TWA; (80)/(% SiO2) mg/m³ TWA

8.2 Exposure controls

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering measures to reduce exposure
Ensure adequate ventilation.

Personal protective equipment

Eye protection	Tightly fitting safety goggles.
Hand protection	Wear chemical resistant gloves such as nitrile or neoprene.
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne mist/aerosol of this product, use an organic vapor cartridge with a P-95 pre-filter attached. In work environments containing oil mist/aerosol, use an organic vapor cartridge with a P-95 pre-filter attached.If exposed to vapors from this product, use a NIOSH/MSHA-approved respirator with an organic vapor cartridge.
Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state	Solid
Appearance	Powder
Color	White
Odor	Odorless
Odor threshold	Not applicable

Property	Values	Remarks
pH	Not applicable	
pH @ dilution		No information available
Melting / freezing point	No information available	
Boiling point/range	No information available	
Flash point	Not applicable	PMCC
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	0 mmHg	
Vapor density	Not applicable	
Specific gravity	1.03	
Bulk density	No information available	
Water solubility	Insoluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	

Dynamic viscosity	No information available
log Pow	Not determined
Explosive properties	Suspended dust may present a dust explosion hazard
Oxidizing properties	None known.

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	None
Density	No information available

10. Stability and reactivity

10.1 Reactivity

Dust may form explosive mixture in air.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Heat, flames and sparks.

10.5 Incompatible materials

Strong oxidizing agents.

10.6 Hazardous decomposition products

Carbon oxides (COx).

11. Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Inhalation	Inhalation of dust may cause shortness of breath, tightness of the chest, a sore throat and cough. Harmful: danger of serious damage to health by prolonged exposure through inhalation.
Eye contact	Dust may cause mechanical irritation.
Skin contact	Repeated exposure may cause skin dryness or cracking.
Ingestion	Irritant; may cause pain or discomfort to mouth, throat and stomach.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation

Polymer	No data available	No data available	No data available
Synthetic amorphous silica	No data available	No data available	> 2.2 mg/L (Rat) 1 h

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Polymer	No data available	No data available	No data available	No data available
Synthetic amorphous silica	No data available	No data available	No data available	No data available

Sensitization Not classified.

Mutagenic effects No evidence of mutagenic properties.

Carcinogenicity No evidence of carcinogenic properties.

Reproductive toxicity No evidence of toxicity to reproduction.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of exposure Inhalation. Skin contact. Eye contact.

Routes of entry No route of entry noted.

Specific target organ toxicity - Single exposure Not classified

Specific target organ toxicity - Repeated exposure Not classified.

Aspiration hazard Not applicable.

12. Ecological information

12.1 Toxicity

Toxicity to algae
No product level data available. See component information below.

Toxicity to fish
No product level data available. See component information below.

Toxicity to daphnia and other aquatic invertebrates
No product level data available. See component information below.

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Polymer	No information available	No information available	No information available
Synthetic amorphous silica	= 5000 mg/L LC50 Brachydanio rerio 96 h	= 440 mg/L EC50 Pseudokirchneriella subcapitata 72 h	= 7600 mg/L EC50 Ceriodaphnia dubia 48 h

12.2 Persistence and degradability

No product level data available.

12.3 Bioaccumulative potential

No data available.

12.4 Mobility in soil

No information available.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known. Check for additional information in sect. 7.

13. Disposal considerations

13.1 Waste treatment methods

Disposal Method	Disposal should be made in accordance with federal, state and local regulations.
Contaminated packaging	Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

Not regulated

UN No. (DOT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG)	Not regulated
UN No. (ICAO)	Not regulated

14.2. UN proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG Hazard class	Not regulated
ICAO Hazard class/division	Not regulated

14.4 Packing group

DOT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG Packing group	Not regulated
ICAO Packing group	Not regulated

14.5 Environmental hazard

Marine pollutant	No

14.6 Special precautions
Not applicable

14.7 Transport in bulk according to Annex I/II of MARPOL 73/78 and the IBC Code
Please contact MISDS@slb.com for info regarding transport in Bulk.

15. Regulatory information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
European Union (EINECS and ELINCS)	Does not Comply
Philippines (PICCS)	Does not Comply
Japan (ENCS)	Does not Comply
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

IMPORTS, Canada
No import volume restrictions.

-

SARA 311/312 Hazard Categories
Fire Hazard (Combustible Dust)

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Polymer	N/A	N/A	N/A
Synthetic amorphous silica	N/A	N/A	N/A

State Comments
Proposition 65: This product is not known to contain chemicals considered by the State of California's Safe Drinking Water and Toxic Enforcement Act of 1986 as causing cancer and/or reproductive toxicity at levels that are expected to pose a significant risk under anticipated use conditions.

Canadian Classification

This Safety Data Sheet has been prepared in compliance with the Hazardous Products Regulations.

16. Other information

Supersedes date	05/May/2016
Revision date	29/Mar/2017
Version	9
This SDS has been revised in the	1, 2, 9, 14, 15, 16. Updated according to WHMIS 2015.

following section(s)

HMIS classification

Health	1
Flammability	1
Physical hazard	0
PPE	E

N/A - Not Applicable, N/D - Not Determined.

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Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

SDS no. PID20342
Version 2
Revision date 08/Aug/2018
Supersedes date None

Safety Data Sheet
EMI-1926

1. Identification of the Substance/Preparation and of the Company/Undertaking

1.1 Product identifier

Product name EMI-1926

Product code PID20342

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Wetting agent.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
200 - 125, 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-780-962-8221

E-mail address sdsmi@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Australia +61 2801 44558, Asia Pacific +65 3158 1074, China +86 10 5100 3039, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, New Zealand +64 9929 1483, USA 001 281 561 1600

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Acute toxicity - Oral	Category 5

Skin corrosion/irritation	Category 3
Serious eye damage/eye irritation	Category 1

Environmental hazards

Physical Hazards

2.2 Label elements

Signal word
DANGER

Hazard Statements
H303 - May be harmful if swallowed
H316 - Causes mild skin irritation
H318 - Causes serious eye damage

Precautionary Statements
P280 - Wear eye protection/ face protection
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a POISON CENTER or doctor/physician

P310 - Immediately call a POISON CENTER or doctor/physician
P332 + P313 - If skin irritation occurs: Get medical advice/attention
P312 - Call a POISON CENTER or doctor/physician if you feel unwell

Unknown acute toxicity 0% of the mixture consists of ingredient(s) of unknown toxicity.

3. Composition/information on Ingredients

3.1 Substances

Chemical Name	CAS No	Weight-%
Polyethylene glycol oleyl ether	9004-98-2	80 - 100

3.2 Mixtures

Not applicable

Comments
The exact percentage (concentration) of composition has been withheld as a trade secret

4. First Aid Measures

4.1 First aid measures

Inhalation	Move to fresh air. If breathing has stopped, begin artificial respiration. If breathing is difficult, (trained personnel should) give oxygen. Obtain medical attention.
Ingestion	Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Seek medical attention.
Skin contact	Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Seek medical attention if irritation occurs.
Eye Contact	Immediately flush eyes with water for at least 15 minutes. Get medical attention. If easy to do, remove contact lenses. Continue to rinse for at least 15 minutes. Immediate medical attention is required.

4.2. Most important symptoms and effects, both acute and delayed

General advice	The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.
Symptoms	
Inhalation	Please see Section 11. Toxicological Information for further information.
Ingestion	Please see Section 11. Toxicological Information for further information.
Skin contact	Please see Section 11. Toxicological Information for further information.
Eye contact	Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician	Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Water Fog, Alcohol Foam, CO_2, Dry Chemical.

Extinguishing media which must not be used for safety reasons
None known, Do not use a solid water stream as it may scatter and spread fire.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
Heating of containers may cause pressure rise, with risk of bursting.

Hazardous combustion products
Carbon monoxide, carbon dioxide and unburned hydrocarbons (smoke), Nitrogen oxides (NOx).

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Do not get in eyes, on skin, or on clothing. Use personal protective equipment. See also section 8. Solutions extremely slippery when spilled.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Dike far ahead of liquid spill for later disposal.

Methods for cleaning up
Contain and collect spillage with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local/national regulations (see Section 13).

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Avoid contact with skin and eyes. Do not breathe vapors or spray mist. Avoid spills and splashing during use. Keep away from open flames, hot surfaces and sources of ignition.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands and face before breaks and immediately after handling the product. Do not eat, drink or smoke during work.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Ensure adequate ventilation. Keep airborne concentrations below exposure limits.

Storage precautions Keep containers tightly closed in a dry, cool and well-ventilated place. Avoid frost. Avoid contact with:. Acids. Oxidizing agents.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Exposure limits

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits - TWAs (CMPs)	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits - TWAs (LMPE-PPTs)
Polyethylene glycol oleyl ether	Not determined	Not determined	Not determined	Not determined	Not determined

IDLH (Immediately Dangerous to Life or Health)

Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Polyethylene glycol oleyl ether 9004-98-2	Not detemined

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation. Provide mechanical general and/or local exhaust ventilation to prevent release of vapor or mist into work environment.

Personal protective equipment

Eye protection	Tightly fitting safety goggles.
Hand protection	Use protective gloves made of: Nitrile Neoprene Be aware that liquid may penetrate the gloves. Frequent change is advisable.
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne mist/aerosol of this product, use an organic vapor cartridge with a P-95 pre-filter attached. In work environments containing oil mist/aerosol, use an organic vapor cartridge with a P-95 pre-filter attached.If exposed to vapors from this product, use a NIOSH/MSHA-approved respirator with an organic vapor cartridge.
Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before breaks and immediately after handling the product, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Liquid
Appearance	Cloudy
Color	Off-white
Odor	Characteristic
Odor threshold	Not applicable

Property	Values	Remarks
pH		
pH @ dilution	5.0 - 7.0	3% aqueous solution
Melting / freezing point		
Boiling point/range	No information available	
Flash point	> 100 °C / > 212 °F	PMCC

Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	0.92 (approximately)	@ 60 °C
Bulk density	No information available	
Water solubility	Dispersible	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	
log Pow	No information available	
Explosive properties	No information available	
Oxidizing properties	No information available	

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	No information available
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

No data available.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Avoid frost. Avoid heat, flames and other sources of ignition.

10.5 Incompatible materials

Acids. Oxidizing agents.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation	Inhalation of vapors in high concentration may cause irritation of respiratory system.

Eye contact Causes serious eye damage.

Skin contact May cause irritation. Prolonged skin contact may defat the skin and produce dermatitis.

Ingestion MAY BE HARMFUL IF SWALLOWED. Ingestion causes irritation of upper respiratory system and gastrointestinal disturbance.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Polyethylene glycol oleyl ether	= 2700 mg/kg (Rat)	No data available	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Polyethylene glycol oleyl ether	No data available	No data available	No data available	No data available

Sensitization Not classified.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity This product does not contain any known or suspected carcinogens.

Reproductive toxicity This product does not contain any known or suspected reproductive hazards.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of exposure Skin contact. Inhalation. Ingestion. Eye contact.

Routes of entry Inhalation. Skin absorption.

Specific target organ toxicity - Single exposure Not classified

Specific target organ toxicity - Repeated exposure Not classified.

Aspiration hazard Not classified.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
See component information below.

Toxicity to fish
See component information below.

Toxicity to daphnia and other aquatic invertebrates
See component information below.

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Polyethylene glycol oleyl ether	No information available	No information available	No information available

12.2 Persistence and degradability

Not readily biodegradable. Inherently biodegradable.

12.3 Bioaccumulative potential

No product level data available.

12.4 Mobility

Soluble in water.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

The product component(s) are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method	Disposal should be made in accordance with federal, state and local regulations.
Contaminated packaging	Do not re-use empty containers. Empty containers should be taken for local recycling, recovery or waste disposal. Do not burn, or use a cutting torch on, the empty drum.

14. Transport information

14.1. UN number

UN No. (DOT)	Not regulated
UN No. (MT/ANTT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG/ANTAQ)	Not regulated
UN No. (ICAO/ANAC)	Not regulated

14.2. UN proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class	Not regulated
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated

14.4 Packing group

DOT/ANTT Packing group	Not regulated
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated

14.5 Environmental hazard
No

14.6 Special precautions
Not applicable

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Does not comply
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH
All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Polyethylene glycol oleyl ether	N/A	N/A	N/A

California Proposition 65

This product does not contain chemical[s] which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

16. Other Information

Revision date	08/Aug/2018
Version	2
This SDS has been revised in the following section(s)	3, 16
HMIS classification	

Health	3
Flammability	1
Physical hazard	0
PPE	X

N/A - Not Applicable, N/D - Not Determined.

Disclaimer

The information contained herein is considered in good faith as reliable of the date issued and is based upon on measurements, tests or data derived from supplier's own study or furnished by others. In providing this SDS information, Supplier makes no express or implied warranties as to the information or product; merchantability or fitness of purpose; any express or implied warranty; or non-infringement of intellectual property rights; and supplier assumes no responsibility for any direct, special or consequential damages, results obtained, or the activities of others. To the maximum extent permitted by law, supplier's warranty obligations and buyer's sole remedies are as stated in separate agreement between the parties.

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Safety Data Sheet
LIME

1. Identification

1.1 Product identifier

Product name LIME

Product code PID904

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Drilling fluid additive.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.

P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
200 - 125, 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-780-962-8221

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals) , Bethicia Prasek

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Australia +61 2801 44558, Asia Pacific +65 3158 1074, China +86 10 5100 3039, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, New Zealand +64 9929 1483, USA 001 281 561 1600

2. Hazards identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Skin corrosion/irritation	Category 2
Serious eye damage/eye irritation	Category 1

Environmental hazards Not classified

Physical Hazards Not classified

2.2 Label elements

Signal word
DANGER

Hazard statements
H315 - Causes skin irritation
H318 - Causes serious eye damage
H335 - May cause respiratory irritation

Precautionary statements
P280 - Wear eye protection/ face protection
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a POISON CENTER or doctor/ physician

Supplementary precautionary statements
P264 - Wash face, hands and any exposed skin thoroughly after handling
P302 + P352 - IF ON SKIN: Wash with plenty of soap and water
P321 - Specific treatment (see supplemental first aid instructions on this label)
P332 + P313 - If skin irritation occurs: Get medical advice/ attention
P362 - Take off contaminated clothing and wash before reuse
P280 - Wear protective gloves/ protective clothing/ eye protection/ face protection
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a POISON CENTER or doctor/physician
P261 - Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray
P271 - Use only outdoors or in a well-ventilated area
P304 + P340 - IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing
P312 - Call a POISON CENTER or doctor/physician if you feel unwell
P403 + P233 - Store in a well-ventilated place. Keep container tightly closed
P501 - Dispose of contents/ container to an approved waste disposal plant

Unknown acute toxicity 0% of the mixture consists of ingredient(s) of unknown toxicity.

3. Composition/information on Ingredients

3.1 Substances

Component	CAS-No	Weight % - range
Calcium hydroxide	1305-62-0	100

3.2 Mixtures

Not Applicable

Comments
The exact percentage (concentration) of composition has been withheld as a trade secret

4. First aid measures

4.1 First-Aid Measures

Inhalation Move to fresh air. If breathing is difficult, (trained personnel should) give oxygen. If not breathing, give artificial respiration. Get medical attention immediately if symptoms occur.

Ingestion Do not induce vomiting. If conscious, give 2 glasses of water. Get immediate medical attention.

Skin contact Take off contaminated clothing and shoes immediately. Rinse immediately with plenty of water for at least 30 minutes. Get immediate medical attention.

Eye contact Rinse immediately with plenty of water, also under the eyelids. Remove contact lenses. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

4.2 Most important symptoms and effects, both acute and delayed

Main symptoms

Inhalation Please see Section 11. Toxicological Information for further information.

Ingestion Please see Section 11. Toxicological Information for further information.

Skin contact Please see Section 11. Toxicological Information for further information.

Eye contact Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated. Do not give chemical antidotes. Asphyxia from glottal edema may occur. Marked decrease in blood pressure may occur with moist rales, frothy sputum, and high pulse pressure

5. Fire-fighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Fog, Alcohol Foam, CO_2, Dry Chemical.

Extinguishing media which shall not be used for safety reasons
None known.

5.2 Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
None known.

Hazardous combustion products
Calcium oxide.

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

6. Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Wear suitable protective equipment. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Prevent further leakage or spillage if safe to do so.

6.2 Environmental precautions

Prevent product from entering drains.

Environmental exposure controls
No information available.

6.3 Methods and materials for containment and cleaning up

Methods for containment
Cover powder spill with plastic sheet or tarp to minimize spreading and keep powder dry.

Methods for cleaning up
Avoid dust formation. Sweep up and shovel into suitable containers for disposal.

6.4 Reference to other sections

No information available.

7. Handling and storage

7.1 Precautions for safe handling

Handling
Do not get in eyes, on skin or on clothing. Avoid breathing dust; if exposed to high dust concentration, leave area immediately.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Keep away from direct sunlight. Protect from moisture.

Storage precautions Keep containers tightly closed in a dry, cool and well-ventilated place.

8. Exposure controls/personal protection

8.1 Control parameters

Component Information

Component	ACGIH TLV	OSHA PEL
Calcium hydroxide 1305-62-0 (100)	5 mg/m³	5 mg/m³ (resp); 15 mg/m³ (total)

8.2 Exposure controls

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering measures to reduce exposure
Ensure adequate ventilation, especially in confined areas.

Personal protective equipment

Eye protection	Tightly fitting safety goggles.
Hand protection	Neoprene, Nitrile.
Respiratory protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent. If exposed to airborne particles of this product use at least a NIOSH-approved N95 half-mask disposable or re-useable particulate respirator. In work environments containing oil mist/aerosol use at least a NIOSH-approved P95 half-mask disposable or re-useable particulate respirator.
Skin and body protection	Wear suitable protective clothing and gloves.
Hygiene measures	Wash hands before breaks and immediately after handling the product, Remove and wash contaminated clothing before re-use.

9. Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state	Solid powder
Appearance	Opaque
Color	White
Odor	Odorless
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH	No information available	
pH @ dilution	12.4	
Melting/freezing point	No information available	
Boiling point/range	No information available	
Flash point	No information available	PMCC
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not Applicable	
Flammability Limits in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	2.08 - 2.34	
Bulk density	No information available	
Water solubility	Slightly soluble in water.	
Solubility in other solvents	Partly miscible	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	
Log Pow	No information available	

Explosive properties	No information available
Oxidizing properties	No information available

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	No information available
Density	No information available

10. Stability and reactivity

10.1 Reactivity

No specific reactivity hazards associated with this product.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Avoid extreme temperatures.

10.5 Incompatible materials

Acids.

10.6 Hazardous decomposition products

Calcium oxide.

11. Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Inhalation	Irritating to respiratory system.
Eye contact	Causes burns. Corrosive to the eyes and may cause severe damage including blindness.
Skin contact	Causes skin irritation.
Ingestion	Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation.

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Calcium hydroxide	= 7340 mg/kg (Rat)	No data available	No data available

Component	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Calcium hydroxide	No data available	No data available	No data available	No data available

Sensitization	This product does not contain any components suspected to be sensitizing.
Mutagenic effects	No evidence of mutagenic properties.
Carcinogenicity	No evidence of carcinogenic properties.
Reproductive toxicity	No evidence of toxicity to reproduction.
Developmental toxicity	Not known to cause birth defects or have a deleterious effect on a developing fetus.
Routes of exposure	Skin contact. Inhalation. Eye contact.
Routes of entry	No route of entry noted.
Specific target organ toxicity (single exposure)	Not classified
Specific target organ toxicity (repeated exposure)	Not classified.
Aspiration hazard	Not Applicable.

12. Ecological information

12.1 Toxicity

Toxicity to algae
See component information below.

Toxicity to fish
See component information below.

Toxicity to daphnia and other aquatic invertebrates
See component information below.

Component	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Calcium hydroxide	= 160 mg/L LC50 Gambusia affinis 96 h	No information available	No information available

12.2 Persistence and degradability

No product level data available.

12.3 Bioaccumulative potential

No product level data available.

12.4 Mobility in soil

No information available.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal considerations

13.1 Waste treatment methods

Disposal Method	Disposal should be made in accordance with federal, state and local regulations.
Contaminated packaging	Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1 UN Number

UN No. (DOT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG)	Not regulated
UN No. (ICAO)	Not regulated

14.2 Proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG Hazard class	Not regulated
ICAO Hazard class/division	Not regulated

14.4 Packing group

DOT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG Packing group	Not regulated
ICAO Packing group	Not regulated

14.5 Environmental hazard

No

14.6 Special precautions

Not Applicable

15. Regulatory information

International inventories

USA (TSCA)	Complies

Canada (DSL)	Complies
European Union (EINECS and ELINCS)	Complies
Philippines (PICCS)	Does not Comply
Japan (ENCS)	Complies
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Does not Comply

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories
Immediate (acute) health hazard.

Component	SARA 302 / TPQs	SARA 313	CERCLA RQ
Calcium hydroxide	N/A	N/A	N/A

State Comments
Proposition 65: This product is not known to contain chemicals considered by the State of California's Safe Drinking Water and Toxic Enforcement Act of 1986 as causing cancer and/or reproductive toxicity at levels that are expected to pose a significant risk under anticipated use conditions.

Canadian Classification

This Safety Data Sheet has been prepared in compliance with the Hazardous Products Regulations.

16. Other information

Supersedes date	17/Jun/2015
Revision date	25/Sep/2015
Version	9
The following sections have been revised:	1, 14, 15, 16.

HMIS classification

Health	3
Flammability	0
Physical hazard	0

N/A - Not Applicable, N/D - Not Determined.

Disclaimer
The information contained herein is considered in good faith as reliable of the date issued and is based upon on measurements, tests or data derived from supplier's own study or furnished by others. In providing this SDS information, Supplier makes no express or implied warranties as to the information or product; merchantability or fitness of purpose; any express or implied warranty; or non-infringement of intellectual property rights; and supplier assumes no responsibility for any direct, special or consequential damages, results obtained, or the activities of others. To the maximum extent permitted by law, supplier's warranty obligations and buyer's sole remedies are as stated in separate agreement between the parties.

SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: **ESCAID™ 110 FLUID**
Product Description: Dearomatized Hydrocarbons

Intended Use: Drilling muds, oil-based

COMPANY IDENTIFICATION

Supplier: **EXXONMOBIL CHEMICAL COMPANY**
SDS – LOC. 106
22777 Springwoods Village Parkway
Spring, TX 77389-1425 USA

24 Hour Health Emergency	(800) 726-2015
Transportation Emergency Phone	(800) 424-9300 or (703) 527-3887 CHEMTREC
Product Technical Information	(832) 624-8500
Supplier General Contact	(832) 624-8500

SECTION 2 HAZARDS IDENTIFICATION

This material is hazardous according to regulatory guidelines (see (M)SDS Section 15).

CLASSIFICATION:

Flammable liquid: Category 4.
Aspiration toxicant: Category 1.

LABEL:
Pictogram:

Signal Word: Danger

Hazard Statements:
H227: Combustible liquid. H304: May be fatal if swallowed and enters airways.

Precautionary Statements:
P210: Keep away from flames and hot surfaces. -- No smoking. P280: Wear protective gloves and eye / face protection.P301 + P310: IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. P331: Do NOT induce vomiting. P370 + P378: In case of fire: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish.P403 + P235: Store in a well-ventilated place. Keep cool. P405: Store locked up.P501: Dispose of contents and container in accordance with local regulations.

Contains: DISTILLATES (PETROLEUM), HYDROTREATED LIGHT

Other hazard information:

HAZARD NOT OTHERWISE CLASSIFIED (HNOC): None as defined under 29 CFR 1910.1200.

PHYSICAL / CHEMICAL HAZARDS

Material can accumulate static charges which may cause an ignition. Material can release vapors that readily form flammable mixtures. Vapor accumulation could flash and/or explode if ignited. Combustible.

HEALTH HAZARDS

May be irritating to the eyes, nose, throat, and lungs. Repeated exposure may cause skin dryness or cracking.

ENVIRONMENTAL HAZARDS

No significant hazards.

NFPA Hazard ID:	Health:	1	Flammability:	2	Reactivity:	0
HMIS Hazard ID:	Health:	1*	Flammability:	2	Reactivity:	0

NOTE: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

This material is defined as a complex substance.

Hazardous Substance(s) or Complex Substance(s) required for disclosure

Name	CAS#	Concentration*	GHS Hazard Codes
DISTILLATES (PETROLEUM), HYDROTREATED LIGHT	64742-47-8	100 %	H227, H304

* All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume. Concentration values may vary.

As per paragraph (i) of 29 CFR 1910.1200, formulation is considered a trade secret and specific chemical identity and exact percentage (concentration) of composition may have been withheld. Specific chemical identity and exact percentage composition will be provided to health professionals, employees, or designated representatives in accordance with applicable provisions of paragraph (i).

SECTION 4 FIRST AID MEASURES

INHALATION

Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

SKIN CONTACT

Wash contact areas with soap and water. Remove contaminated clothing. Launder contaminated clothing before reuse.

EYE CONTACT

Flush thoroughly with water. If irritation occurs, get medical assistance.

INGESTION

Seek immediate medical attention. Do not induce vomiting.

NOTE TO PHYSICIAN

If ingested, material may be aspirated into the lungs and cause chemical pneumonitis. Treat appropriately.

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

Appropriate Extinguishing Media: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

Inappropriate Extinguishing Media: Straight Streams of Water

FIRE FIGHTING

Fire Fighting Instructions: Evacuate area. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Firefighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

Unusual Fire Hazards: Combustible. Hazardous material. Firefighters should consider protective equipment indicated in Section 8.

Hazardous Combustion Products: Incomplete combustion products, Oxides of carbon, Smoke, Fume

FLAMMABILITY PROPERTIES

Flash Point [Method]: 83°C (181°F) [ASTM D-93]
Flammable Limits (Approximate volume % in air): LEL: 0.6 UEL: 5.0
Autoignition Temperature: 228°C (442°F) [ASTM E659]

SECTION 6 ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations. US regulations require reporting releases of this material to the environment which exceed the applicable reportable quantity or oil spills which could reach any waterway including intermittent dry creeks. The National Response Center can be reached at (800)424-8802.

PROTECTIVE MEASURES

Avoid contact with spilled material. Warn or evacuate occupants in surrounding and downwind areas if required due to toxicity or flammability of the material. See Section 5 for fire fighting information. See the

Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for advice on the minimum requirements for personal protective equipment. Additional protective measures may be necessary, depending on the specific circumstances and/or the expert judgment of the emergency responders.

For emergency responders: Respiratory protection: half-face or full-face respirator with filter(s) for organic vapor and, when applicable, H2S, or Self Contained Breathing Apparatus (SCBA) can be used depending on the size of spill and potential level of exposure. If the exposure cannot be completely characterized or an oxygen deficient atmosphere is possible or anticipated, SCBA is recommended. Work gloves that are resistant to aromatic hydrocarbons are recommended. Note: gloves made of polyvinyl acetate (PVA) are not water-resistant and are not suitable for emergency use. Chemical goggles are recommended if splashes or contact with eyes is possible. Small spills: normal antistatic work clothes are usually adequate. Large spills: full body suit of chemical resistant, antistatic material is recommended.

SPILL MANAGEMENT

Land Spill: Stop leak if you can do it without risk. Recover by pumping or with suitable absorbent.

Water Spill: Stop leak if you can do it without risk. Warn other shipping. Remove from the surface by skimming or with suitable absorbents. Seek the advice of a specialist before using dispersants.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS

Large Spills: Dike far ahead of liquid spill for later recovery and disposal. Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7 HANDLING AND STORAGE

HANDLING

Avoid contact with skin. Prevent small spills and leakage to avoid slip hazard. Material can accumulate static charges which may cause an electrical spark (ignition source). When the material is handled in bulk, an electrical spark could ignite any flammable vapors from liquids or residues that may be present (e.g., during switch-loading operations). Use proper bonding and/or ground procedures. However, bonding and grounds may not eliminate the hazard from static accumulation. Consult local applicable standards for guidance. Additional references include American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practice on Static Electricity) or CENELEC CLC/TR 50404 (Electrostatics - Code of practice for the avoidance of hazards due to static electricity).

Loading/Unloading Temperature: [Ambient]

Transport Temperature: [Ambient]
Transport Pressure: [Ambient]

Static Accumulator: This material is a static accumulator. A liquid is typically considered a nonconductive, static accumulator if its conductivity is below 100 pS/m (100x10E-12 Siemens per meter) and is considered a semiconductive, static accumulator if its conductivity is below 10,000 pS/m. Whether a liquid is nonconductive or semiconductive, the precautions are the same. A number of factors, for example liquid temperature, presence of contaminants, anti-static additives and filtration can greatly influence the conductivity of a liquid.

STORAGE

The type of container used to store the material may affect static accumulation and dissipation. Keep container closed. Handle containers with care. Open slowly in order to control possible pressure release. Store in a cool, well-ventilated area. Storage containers should be grounded and bonded. Fixed storage containers, transfer containers and associated equipment should be grounded and bonded to prevent accumulation of static charge.
Storage Temperature: [Ambient]
Storage Pressure: [Ambient]

Suitable Containers/Packing: Drums; Tank Cars; Tank Trucks; Barges
Suitable Materials and Coatings (Chemical Compatibility): Carbon Steel; Stainless Steel; Teflon; Polyethylene; Polypropylene
Unsuitable Materials and Coatings: Butyl Rubber; Polystyrene; Ethylene-proplyene-diene monomer (EPDM); Natural Rubber

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMIT VALUES

Exposure limits/standards (Note: Exposure limits are not additive)

Substance Name	Form	Limit / Standard			NOTE	Source
DISTILLATES (PETROLEUM), HYDROTREATED LIGHT		TWA	400 mg/m3	100 ppm	N/A	OSHA Z1
DISTILLATES (PETROLEUM), HYDROTREATED LIGHT	Vapor.	RCP - TWA	1200 mg/m3	165 ppm	Total Hydrocarbons	ExxonMobil

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

No biological limits allocated.

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:
Adequate ventilation should be provided so that exposure limits are not exceeded. Use explosion-proof ventilation equipment.

PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:

Half-face filter respirator

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:

If prolonged or repeated contact is likely, chemical resistant gloves are recommended. If contact with forearms is likely, wear gauntlet style gloves.

Eye Protection: If contact is likely, safety glasses with side shields are recommended.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:

If prolonged or repeated contact is likely, chemical, and oil resistant clothing is recommended.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

ENVIRONMENTAL CONTROLS

Comply with applicable environmental regulations limiting discharge to air, water and soil. Protect the environment by applying appropriate control measures to prevent or limit emissions.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Note: Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications. Contact the Supplier for additional information.

GENERAL INFORMATION

Physical State: Liquid
Form: Clear
Color: Colorless
Odor: Slight
Odor Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 15.6 °C): 0.8 [With respect to water] [Calculated]
Density (at 15.6 ºC): 800 kg/m³ (6.68 lbs/gal, 0.8 kg/dm³) [ASTM D4052]
Flammability (Solid, Gas): N/A
Flash Point [Method]: 83°C (181°F) [ASTM D-93]
Flammable Limits (Approximate volume % in air): LEL: 0.6 UEL: 5.0
Autoignition Temperature: 228°C (442°F) [ASTM E659]
Boiling Point / Range: 207°C (405°F) - 237°C (459°F) [ASTM D86]
Decomposition Temperature: N/D

Vapor Density (Air = 1): 5.9 at 101 kPa [In-house method]
Vapor Pressure: 0.01 kPa (0.08 mm Hg) at 20 °C [Calculated]
Evaporation Rate (n-butyl acetate = 1): 0.01 [In-house method]
pH: N/A
Log Pow (n-Octanol/Water Partition Coefficient): > 4 [Estimated]
Solubility in Water: Negligible
Viscosity: 1.7 cSt (1.7 mm2/sec) at 40 °C | 2.5 cSt (2.5 mm2/sec) at 20°C [Calculated]
Oxidizing Properties: See Hazards Identification Section.

OTHER INFORMATION

Freezing Point: N/D
Melting Point: N/A
Pour Point: -39°C (-38°F) [ASTM D5950]
Molecular Weight: 172 G/MOLE [Calculated]
Hygroscopic: No
Coefficient of Thermal Expansion: 0.00074 per Deg C [Calculated]

SECTION 10 STABILITY AND REACTIVITY

REACTIVITY: See sub-sections below.

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: Avoid heat, sparks, open flames and other ignition sources.

MATERIALS TO AVOID: Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

POSSIBILITY OF HAZARDOUS REACTIONS: Hazardous polymerization will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

INFORMATION ON TOXICOLOGICAL EFFECTS

Hazard Class	Conclusion / Remarks
Inhalation	
Acute Toxicity: (Rat) 4 hour(s) LC50 > 5000 mg/m3 (Vapor)	Minimally Toxic. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 403
Irritation: No end point data for material.	Negligible hazard at ambient/normal handling temperatures.
Ingestion	
Acute Toxicity (Rat): LD50 > 5000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 401
Skin	
Acute Toxicity (Rabbit): LD50 > 5000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 402
Skin Corrosion/Irritation: Data available.	May dry the skin leading to discomfort and dermatitis. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 404
Eye	
Serious Eye Damage/Irritation: Data	May cause mild, short-lasting discomfort to eyes. Based on test

available.	data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 405
Sensitization	
Respiratory Sensitization: No end point data for material.	Not expected to be a respiratory sensitizer.
Skin Sensitization: Data available.	Not expected to be a skin sensitizer. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 406
Aspiration: Data available.	May be fatal if swallowed and enters airways. Based on physico-chemical properties of the material.
Germ Cell Mutagenicity: Data available.	Not expected to be a germ cell mutagen. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 471 473 474 476 478 479
Carcinogenicity: Data available.	Not expected to cause cancer. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 453
Reproductive Toxicity: Data available.	Not expected to be a reproductive toxicant. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 413 414 415
Lactation: No end point data for material.	Not expected to cause harm to breast-fed children.
Specific Target Organ Toxicity (STOT)	
Single Exposure: No end point data for material.	Not expected to cause organ damage from a single exposure.
Repeated Exposure: Data available.	Not expected to cause organ damage from prolonged or repeated exposure. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 408 413

OTHER INFORMATION

For the product itself:

Vapor/aerosol concentrations above recommended exposure levels are irritating to the eyes and respiratory tract, may cause headaches, dizziness, anesthesia, drowsiness, unconsciousness and other central nervous system effects including death.

Prolonged and/or repeated skin contact with low viscosity materials may defat the skin resulting in possible irritation and dermatitis.

Small amounts of liquid aspirated into the lungs during ingestion or from vomiting may cause chemical pneumonitis or pulmonary edema.

The following ingredients are cited on the lists below: None.

--REGULATORY LISTS SEARCHED--

1 = NTP CARC	3 = IARC 1	5 = IARC 2B
2 = NTP SUS	4 = IARC 2A	6 = OSHA CARC

SECTION 12 ECOLOGICAL INFORMATION

The information given is based on data available for the material, the components of the material, and similar materials.

ECOTOXICITY

Material -- Not expected to be harmful to aquatic organisms.
Material -- Not expected to demonstrate chronic toxicity to aquatic organisms.

PERSISTENCE AND DEGRADABILITY

Biodegradation:

Material -- Expected to be readily biodegradable.

Hydrolysis:

Material -- Transformation due to hydrolysis not expected to be significant.

Photolysis:

Material -- Transformation due to photolysis not expected to be significant.

Atmospheric Oxidation:

Material -- Expected to degrade rapidly in air

OTHER ECOLOGICAL INFORMATION

VOC (EPA Method 24): 6.676 lbs/gal

ECOLOGICAL DATA

Ecotoxicity

Test	Duration	Organism Type	Test Results
Aquatic - Acute Toxicity	48 day(s)	Daphnia magna	EL0 1000 mg/l
Aquatic - Acute Toxicity	96 hour(s)	Oncorhynchus mykiss	LL0 1000 mg/l
Aquatic - Acute Toxicity	72 hour(s)	Pseudokirchneriella subcapitata	EL0 1000 mg/l

Persistence, Degradability and Bioaccumulation Potential

Media	Test Type	Duration	Test Results
Water	Ready Biodegradability	28 day(s)	Percent Degraded 69

SECTION 13 DISPOSAL CONSIDERATIONS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS

Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products.

REGULATORY DISPOSAL INFORMATION

RCRA Information: The unused product, in our opinion, is not specifically listed by the EPA as a hazardous waste (40 CFR, Part 261D), nor is it formulated to contain materials which are listed as hazardous wastes. It does not exhibit the hazardous characteristics of ignitability, corrosivity or reactivity and is not formulated with contaminants as determined by the Toxicity Characteristic Leaching Procedure (TCLP). However, used

product may be regulated.

Empty Container Warning Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

SECTION 14 TRANSPORT INFORMATION

LAND (DOT): Not Regulated for Land Transport

Footnote: Testing (ASTM D4206) has shown product does not sustain combustion.

LAND (TDG): Not Regulated for Land Transport

SEA (IMDG): Not Regulated for Sea Transport according to IMDG-Code

Marine Pollutant: No

AIR (IATA): Not Regulated for Air Transport

SECTION 15 REGULATORY INFORMATION

OSHA HAZARD COMMUNICATION STANDARD: This material is considered hazardous in accordance with OSHA HazCom 2012, 29 CFR 1910.1200.

Listed or exempt from listing/notification on the following chemical inventories: AICS, DSL, ENCS, IECSC, KECI, PICCS, TCSI, TSCA

SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302

CERCLA: This material is not subject to any special reporting under the requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). CERCLA petroleum exclusion applies for this product. Contact local authorities to determine if other reporting requirements apply.

CWA / OPA: This product is classified as an oil under Section 311 of the Clean Water Act (40 CFR 110) and the Oil Pollution Act of 1990. Discharge or spills which produce a visible sheen on either surface water, or in waterways/sewers which lead to surface water, must be reported to the National Response Center at 800-424-8802.

SARA (311/312) REPORTABLE GHS HAZARD CLASSES: Aspiration Hazard, Flammable (gases, aerosols, liquids, or solids)

SARA (313) TOXIC RELEASE INVENTORY: This material contains no chemicals subject to the supplier notification

requirements of the SARA 313 Toxic Release Program.

The following ingredients are cited on the lists below:

Chemical Name	CAS Number	List Citations
DISTILLATES (PETROLEUM), HYDROTREATED LIGHT	64742-47-8	4, 17, 18

--REGULATORY LISTS SEARCHED--

1 = ACGIH ALL	6 = TSCA 5a2	11 = CA P65 REPRO	16 = MN RTK
2 = ACGIH A1	7 = TSCA 5e	12 = CA RTK	17 = NJ RTK
3 = ACGIH A2	8 = TSCA 6	13 = IL RTK	18 = PA RTK
4 = OSHA Z	9 = TSCA 12b	14 = LA RTK	19 = RI RTK
5 = TSCA 4	10 = CA P65 CARC	15 = MI 293	

Code key: CARC=Carcinogen; REPRO=Reproductive

SECTION 16 OTHER INFORMATION

N/D = Not determined, N/A = Not applicable

KEY TO THE H-CODES CONTAINED IN SECTION 3 OF THIS DOCUMENT (for information only):
H227: Combustible liquid; Flammable Liquid, Cat 4
H304: May be fatal if swallowed and enters airways; Aspiration, Cat 1

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:
Section 01: Company Mailing Address information was deleted.
Section 01: Company Mailing Address information was modified.

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DGN: 4400260HUS (1019199)

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Safety Data Sheet
RHETHIK*

1. Identification

1.1 Product identifier

Product name RHETHIK*

Product code PID11728

This product may not be distributed or used in Canada.

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Drilling fluid additive.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.

P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

E-mail address sdsmi@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Australia +61 2801 44558, Asia Pacific +65 3158 1074, China +86 10 5100 3039, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, New Zealand +64 9929 1483, USA 001 281 561 1600

2. Hazards identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Acute oral toxicity	Category 4
Skin corrosion/irritation	Category 2
Serious eye damage/eye irritation	Category 1
Skin sensitization	Sub-Category 1B
Specific target organ toxicity (repeated exposure)	Category 2

Environmental hazards

Chronic aquatic toxicity	Category 2

Physical Hazards Not classified

2.2 Label elements

Signal word
DANGER

Hazard statements
H302 - Harmful if swallowed
H315 - Causes skin irritation
H317 - May cause an allergic skin reaction
H318 - Causes serious eye damage
H373 - May cause damage to organs through prolonged or repeated exposure
H411 - Toxic to aquatic life with long lasting effects

Precautionary statements
P260 - Do not breathe dust/fume/gas/mist/vapors/spray
P280 - Wear protective gloves/ protective clothing/ eye protection/ face protection
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a POISON CENTER or doctor/ physician

P264 - Wash face, hands and any exposed skin thoroughly after handling
P270 - Do not eat, drink or smoke when using this product
P272 - Contaminated work clothing should not be allowed out of the workplace
P273 - Avoid release to the environment
P301 + P312 - IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell
P302 + P352 - IF ON SKIN: Wash with plenty of soap and water
P309 + P311 - IF exposed or if you feel unwell: Call a POISON CENTER or doctor/ physician
P314 - Get medical advice/attention if you feel unwell
P330 - Rinse mouth
P333 + P313 - If skin irritation or rash occurs: Get medical advice/ attention
P362 - Take off contaminated clothing and wash before reuse
P391 - Collect spillage
P501 - Dispose of contents/container in accordance with local regulations.

Unknown acute toxicity 19.5% of the mixture consists of ingredient(s) of unknown toxicity.

3. Composition/information on Ingredients

3.1 Substances

Not Applicable

3.2 Mixtures

Component	CAS-No	Weight % - range
Diethylene glycol	111-46-6	60 - 100
Ethoxylated amine	Proprietary	10 - 30

Diethylenetriamine	111-40-0	0.1 - 1

Comments
The product contains other ingredients which do not contribute to the overall classification. The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret

4. First aid measures

4.1 First-Aid Measures

Inhalation Move to fresh air. If breathing has stopped, begin artificial respiration. If breathing is difficult, (trained personnel should) give oxygen. Obtain medical attention.

Ingestion Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Seek medical attention.

Skin contact Wash off immediately with soap and plenty of water removing all contaminated clothes and shoes. Get medical attention immediately if symptoms occur.

Eye contact Remove contact lenses. Promptly wash eyes with lots of water while lifting eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

4.2 Most important symptoms and effects, both acute and delayed

General advice The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Main symptoms

Inhalation Please see Section 11. Toxicological Information for further information.

Ingestion Please see Section 11. Toxicological Information for further information.

Skin contact Please see Section 11. Toxicological Information for further information.

Eye contact Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician Treat symptomatically

5. Fire-fighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Fog, Alcohol Foam, CO_2, Dry Chemical.

Extinguishing media which shall not be used for safety reasons
None known, Do not use a solid water stream as it may scatter and spread fire.

5.2 Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
Heating of containers may cause pressure rise, with risk of bursting.

Hazardous combustion products
When heated strongly or burned, oxides of carbon and harmful organic chemical fumes are released, Nitrogen oxides (NOx), Ammonia.

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Do not breathe vapors or spray mist. Do not get in eyes, on skin, or on clothing. Use personal protective equipment. Keep away from sources of ignition - No smoking. Evacuate non-essential personnel. If spilled, take caution, as material can cause surfaces to become very slippery.

6.2 Environmental precautions

As local regulations may vary; all waste must be disposed/recycled/reclaimed in accordance with federal, state, and local environmental control regulations.

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and materials for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Dike far ahead of liquid spill for later disposal.

Methods for cleaning up
Contain and collect spillage with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local/national regulations (see Section 13).

6.4 Reference to other sections

See section 13 for more information.

7. Handling and storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Do not handle until all safety precautions have been read and understood. Avoid contact with skin and eyes. Do not breathe vapors or spray mist. Wear personal protective equipment. Avoid spills and splashing during use. Keep away from heat, sparks and open flame. No smoking.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions	Ensure adequate ventilation. Keep airborne concentrations below exposure limits.
Storage precautions	Keep containers tightly closed in a dry, cool and well-ventilated place. Avoid frost. Avoid contact with: Acids Aldehydes Ketones Copper alloys

8. Exposure controls/personal protection

8.1 Control parameters

Exposure limits

Component	ACGIH TLV	OSHA PEL
Diethylene glycol	Not Determined	Not Determined
Ethoxylated amine	Not Determined	Not Determined
Diethylenetriamine	1 ppm	1 ppm

8.2 Exposure controls

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering measures to reduce exposure
Ensure adequate ventilation.

Personal protective equipment

Eye protection	Tightly fitting safety goggles.
Hand protection	Use protective gloves made of:, Neoprene gloves, Be aware that liquid may penetrate the gloves. Frequent change is advisable.
Respiratory protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne mist/aerosol of this product, use an organic vapor cartridge with a P-95 pre-filter attached. In work environments containing oil mist/aerosol, use an organic vapor cartridge with a P-95 pre-filter attached.If exposed to vapors from this product, use a NIOSH/MSHA-approved respirator with an organic vapor cartridge.
Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene measures	Wash hands before breaks and immediately after handling the product, Remove and wash contaminated clothing before re-use.

9. Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state	Liquid
Appearance	Transparent
Color	Light yellow
Odor	Amine
Odor threshold	Not applicable

Property	Values	Remarks
pH		
pH @ dilution	> 9	10 g/L
Melting/freezing point		
Boiling point/range	> 204 °C / >399 °F	
Flash point	> 95 °C / > 203 °F	PMCC
Evaporation rate (BuAc =1)	No information available -	
Flammability (solid, gas)	Not Applicable	
Flammability Limits in Air		Not applicable
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	0.9 - 1.1	
Bulk density	No information available	
Water solubility	Slightly soluble in water.	

Solubility in other solvents	No information available
Autoignition temperature	No information available
Decomposition temperature	No information available
Kinematic viscosity	200 - 600
Dynamic viscosity	No information available
Log Pow	No information available
Explosive properties	Not Applicable
Oxidizing properties	None known.

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	None
Density	No information available

10. Stability and reactivity

10.1 Reactivity

No data available.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Avoid frost. Avoid heat, flames and other sources of ignition.

10.5 Incompatible materials

Acids. Ketones. Aldehydes. Copper alloys. Brass. Halogenated compounds.

10.6 Hazardous decomposition products

See also section 5.2.

11. Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Inhalation	May cause irritation of respiratory tract. Harmful: danger of serious damage to health by prolonged exposure through inhalation.
Eye contact	Causes serious eye damage.
Skin contact	Causes skin irritation. May cause an allergic skin reaction.
Ingestion	Harmful if swallowed. Ingestion causes irritation of upper respiratory system and gastrointestinal disturbance. May cause adverse cardiac effects, blood disturbances, and metabolic acidosis.

Toxicology data for the components

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Diethylene glycol	= 12565 mg/kg (Rat)	= 11890 mg/kg (Rabbit)	No data available
Ethoxylated amine	= 750 mg/kg (Rat)	No data available	No data available
Diethylenetriamine	= 1080 mg/kg (Rat)	= 672 mg/kg (Rabbit)	= 70 mg/L (Rat) 4 h

Component	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Diethylene glycol	No data available	No data available	No data available	No data available
Ethoxylated amine	No data available	No data available	No data available	No data available
Diethylenetriamine	No data available	No data available	No data available	No data available

Sensitization May cause allergic skin reaction.

Mutagenic effects This substance has no evidence of mutagenic properties.

Carcinogenicity This substance has no evidence of carcinogenic properties.

Reproductive toxicity None known.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of exposure Skin contact. Inhalation. Ingestion. Eye contact.

Routes of entry Ingestion. Inhalation.

Specific target organ toxicity (single exposure) Not classified

Specific target organ toxicity (repeated exposure) Category 2.

Target organ effects Kidney. Respiratory system.

Aspiration hazard Not classified.

12. Ecological information

12.1 Toxicity

Toxicity to algae
See component information below.

Toxicity to fish
See component information below.

Toxicity to daphnia and other aquatic invertebrates
See component information below.

Component	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Diethylene glycol	= 75200 mg/L LC50 Pimephales promelas 96 h	No information available	= 84000 mg/L EC50 Daphnia magna 48 h
Ethoxylated amine	No information available	No information available	No information available
Diethylenetriamine	= 1014 mg/L LC50 Poecilia reticulata 96 h = 248 mg/L LC50 Poecilia reticulata 96 h = 430 mg/L LC50 Leuciscus idus 96 h	= 592 mg/L EC50 Desmodesmus subspicatus 96 h = 345.6 mg/L EC50 Pseudokirchneriella subcapitata 96 h = 1164 mg/L EC50 Pseudokirchneriella subcapitata 72 h	= 16 mg/L EC50 Daphnia magna 48 h = 37 mg/L EC50 Daphnia magna 24 h

12.2 Persistence and degradability

No product level data available.

12.3 Bioaccumulative potential

Bioaccumulation is unlikely.

12.4 Mobility in soil

Slightly soluble in water.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal considerations

13.1 Waste treatment methods

Disposal Method	Disposal should be made in accordance with federal, state and local regulations.
Contaminated packaging	Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1 UN Number

Not regulated

UN No. (DOT)	UN3082
UN No. (TDG)	UN3082
UN/ID No. (ADR/RID/ADN/ADG)	UN3082
UN No. (IMDG)	UN3082
UN No. (ICAO)	UN3082

14.2 Proper shipping name

ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (contains Alkyl amines, ethoxylated),

14.3 Hazard class(es)

DOT Hazard class	9
TDG Hazard class	9
ADR/RID/ADN/ADG Hazard class	9
IMDG Hazard class	9
ICAO Hazard class/division	9

14.4 Packing group

DOT Packing group	PG III
TDG Packing group	PG III
ADR/RID/ADN/ADG Packing group	PG III
IMDG Packing group	PG III
ICAO Packing group	PG III

14.5 Environmental hazard

Marine pollutant — Yes, (Alkyl amines, ethoxylated)

14.6 Special precautions

Not Applicable

15. Regulatory information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies.
European Union (EINECS and ELINCS)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Does not Comply
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories

Immediate (acute) health hazard. Delayed (chronic) health hazard.

Component	SARA 302 / TPQs	SARA 313	CERCLA RQ
Diethylene glycol	N/A	N/A	N/A
Ethoxylated amine	N/A	N/A	N/A
Diethylenetriamine	N/A	N/A	N/A

State Comments

Proposition 65: This product is not known to contain chemicals considered by the State of California's Safe Drinking Water and Toxic Enforcement Act of 1986 as causing cancer and/or reproductive toxicity at levels that are expected to pose a significant risk under anticipated use conditions.

This product may not be distributed or used in Canada.

16. Other information

Supersedes date	12/Dec/2014
Revision date	02/Nov/2016
Version	6
The following sections have been revised:	All sections. Updated according to GHS/CLP.

HMIS classification

Health	2*

Flammability	1
Physical hazard	1
PPE	H

N/A - Not Applicable, N/D - Not Determined.

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

SDS no. PID11774
Version 11
Revision date 09/Mar/2018
Supersedes date 31/Jan/2017

Safety Data Sheet
SUREMUL*

1. Identification of the Substance/Preparation and of the Company/Undertaking

1.1 Product identifier

Product name SUREMUL*

Product code PID11774

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Emulsifier.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
200 - 125, 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-780-962-8221

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : 0800-720-8000/0800-777-2323 (WGRA)

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Serious eye damage/eye irritation	Category 2
Skin sensitization	Category 1 Sub-Category 1B

Environmental hazards Not classified

Physical Hazards

Flammable Liquids	Category 4

2.2 Label elements

Signal word
WARNING

Hazard Statements
H317 - May cause an allergic skin reaction
H319 - Causes serious eye irritation
H227 - Combustible liquid

Precautionary statements
P261 - Avoid breathing dust/fume/gas/mist/vapors/spray
P264 - Wash face, hands and any exposed skin thoroughly after handling
P280 - Wear protective gloves and eye/face protection
P302 + P352 - IF ON SKIN: Wash with plenty of soap and water
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P501 - Dispose of contents/container in accordance with local, regional, national, and international regulations as applicable

P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking
P272 - Contaminated work clothing should not be allowed out of the workplace
P333 + P313 - If skin irritation or rash occurs: Get medical advice/attention
P337 + P313 - If eye irritation persists: Get medical advice/attention
P363 - Wash contaminated clothing before reuse
P370 + P378 - In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish
P403 + P235 - Store in a well-ventilated place. Keep cool

Hazards not otherwise classified
None known

Unknown acute toxicity Not applicable.

3. Composition/information on Ingredients

3.1 Substances

Not applicable

3.2 Mixtures

Chemical Name	CAS No	Weight-%
Fatty acids, tall-oil, reaction products with diethylenetriamine, maleic anhydride, tetraethylenepentamine and triethylenetetramine	68990-47-6	60 - 100

2-[2-(2-butoxyethoxy)ethoxy]ethanol	143-22-6	10 - 30
Hydrocarbons, alkanes C14-C17	Proprietary	5 - 10
Hydrocarbons, alkanes C10-C14	Proprietary	5 - 10

Comments
The product contains other ingredients which do not contribute to the overall classification. The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret

HMIRA Registration Number: 11094 **Filing Date:** 31/Jan/2017

4. First Aid Measures

4.1 First aid measures

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Seek medical attention if irritation occurs.

Skin contact Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Seek medical attention.

Eye Contact Remove contact lenses, if worn. Promptly wash eyes with lots of water while lifting eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

General advice The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible. Seek medical attention for all burns, regardless how minor they may seem.

Symptoms

Inhalation Please see Section 11. Toxicological Information for further information.

Ingestion Please see Section 11. Toxicological Information for further information.

Skin contact Please see Section 11. Toxicological Information for further information.

Eye contact Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Water Fog, Alcohol Foam, CO_2, Dry Chemical.

Extinguishing media which must not be used for safety reasons
None known.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
Combustible liquid. Heating of containers may cause pressure rise, with risk of bursting. Vapors may accumulate in confined areas (basement, tanks, hopper/tank cars, etc.).

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Do not breathe vapors or spray mist. Avoid contact with the skin and the eyes. Use personal protective equipment. See also section 8. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Solutions extremely slippery when spilled. Extinguish all ignition sources. Avoid sparks, flames, heat and smoking.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Dike far ahead of liquid spill for later disposal.

Methods for cleaning up
Contain and collect spillage with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local/national regulations (see Section 13). Take precautionary measures against static discharges. Use non-sparking tools and equipment.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Do not breathe vapors or spray mist. Avoid spills and splashing during use. Persons susceptible to allergic reactions should not handle this product. Take precautionary measures against static discharges. Keep away from heat, sparks and open flame. No smoking.

Hygiene measures
Do not eat, drink or smoke during work. Wash thoroughly after handling.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions	Ensure adequate ventilation. Keep airborne concentrations below exposure limits.
Storage precautions	Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from open flames, hot surfaces and sources of ignition. Avoid contact with: Combustible

materials

Packaging materials Use specially constructed containers only.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Exposure limits

Oil mist (mineral) workplace exposure limits are currently under review by legislative authorities. This workplace exposure limit (WEL) standard is applicable to highly refined mineral oils and is provided as a guidance limit only LT. EXP = 5mg/m³ and ST. EXP = 10mg/m³.
No biological limit allocated

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits - TWAs (CMPs)	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits - TWAs (LMPE-PPTs)
Fatty acids, tall-oil, reaction products with diethylenetriamine, maleic anhydride, tetraethylenepentamine and triethylenetetramine	Not determined	Not determined	Not determined	Not determined	Not determined
2-[2-(2-butoxyethoxy)ethoxy]ethanol	Not determined	Not determined	Not determined	Not determined	Not determined
Hydrocarbons, alkanes C14-C17	Not determined	Not determined	Not determined	Not determined	Not determined
Hydrocarbons, alkanes C10-C14	Not determined	Not determined	Not determined	Not determined	Not determined

IDLH (Immediately Dangerous to Life or Health)
Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Fatty acids, tall-oil, reaction products with diethylenetriamine, maleic anhydride, tetraethylenepentamine and triethylenetetramine 68990-47-6	-
2-[2-(2-butoxyethoxy)ethoxy]ethanol 143-22-6	-
Hydrocarbons, alkanes C14-C17	-
Hydrocarbons, alkanes C10-C14	-

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation. Provide mechanical general and/or local exhaust ventilation to prevent release of vapor or mist into work environment.

Personal protective equipment

Eye protection	Tightly fitting safety goggles.
Hand protection	Impervious gloves made of: Nitrile Neoprene PVC Break through time >480 minutes Glove thickness >=0.4 mm Be aware that liquid may penetrate the gloves. Frequent change is advisable.
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne mist/aerosol of this product, use an organic vapor cartridge with a P-95 pre-filter attached. In work environments containing oil mist/aerosol, use an organic vapor cartridge with a P-95 pre-filter attached.If exposed to vapors from this product, use a NIOSH/MSHA-approved respirator with an organic vapor cartridge.
Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Liquid
Appearance	Viscous
Color	Amber
Odor	Hydrocarbon-like
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH		
pH @ dilution		
Melting / freezing point	No information available	
Boiling point/range	> 150 °C / > 302 °F	
Flash point	> 65 °C / > 150 °F	Closed cup
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	0.88 - 0.95	
Bulk density	No information available	
Water solubility	Insoluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	> 20.5 cSt	@ 40 °C
Dynamic viscosity	500-1500 cP	@ 25 °C
log Pow	No information available	
Explosive properties	No information available	
Oxidizing properties	No information available	

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	No information available
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

No data available.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Avoid contact with heat, sparks, open flame, and static discharge. Do not freeze.

10.5 Incompatible materials

Combustible materials. Oxidizing agents.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation	Inhalation of vapors in high concentration may cause irritation of respiratory system.
Eye contact	Causes serious eye irritation.
Skin contact	May cause an allergic skin reaction.
Ingestion	Ingestion may cause stomach discomfort.

LD50 Oral > 2000 mg/kg (rat) Calculated (Product)

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Fatty acids, tall-oil, reaction products with diethylenetriamine, maleic anhydride, tetraethylenepentamine and triethylenetetramine	> 2020 mg/kg (Rat) Literature data	> 2000 mg/kg (Rat) OECD 402 - Duration: 24h - Literature data	No data available
2-[2-(2-butoxyethoxy)ethoxy]ethanol	= 5300 mg/kg (Rat) Litterature data	> 2000 mg/kg (Rabbit)	No data available
Hydrocarbons, alkanes C14-C17	> 5250 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	> 5.8 mg/L (Rat) 4 h
Hydrocarbons, alkanes C10-C14	> 3990 mg/kg (Rat)	= 3980 mg/kg (Rabbit)	> 5.6 mg/L (Rat) 4 h

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP

Fatty acids, tall-oil, reaction products with diethylenetriamine, maleic anhydride, tetraethylenepentamine and triethylenetetramine	No data available	No data available	No data available	No data available
2-[2-(2-butoxyethoxy)ethoxy]ethanol	No data available	No data available	No data available	No data available
Hydrocarbons, alkanes C14-C17	No data available	No data available	No data available	No data available
Hydrocarbons, alkanes C10-C14	No data available	No data available	No data available	No data available

Sensitization May cause sensitization by skin contact.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity This product does not contain any known or suspected carcinogens.

Reproductive toxicity This product does not contain any known or suspected reproductive hazards.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of exposure Skin contact. Eye contact. Inhalation.

Routes of entry Skin contact.

Specific target organ toxicity - Single exposure Not classified

Specific target organ toxicity - Repeated exposure Not classified.

Aspiration hazard Not classified.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
This product is not considered toxic to algae.

Toxicity to fish
This product is not considered toxic to fish.

Toxicity to daphnia and other aquatic invertebrates
This product is not considered toxic to invertebrates.

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Fatty acids, tall-oil, reaction products with diethylenetriamine, maleic anhydride, tetraethylenepentamine and triethylenetetramine	OECD 203 Fish LC50 > 100 mg/l - Duration h: 96 Literature data	OECD 201 Algae EC50 > 100 mg/l - Duration h: 72 Literature data	OECD 202 Daphnia magna NOEC = 100 mg/l - Duration h: 48 Literature data
2-[2-(2-butoxyethoxy)ethoxy]ethanol	2200 - 4600 mg/L LC50 Leuciscus idus 96 h = 2400 mg/L LC50 Pimephales promelas 96 h	> 500 mg/L EC50 Desmodesmus subspicatus 72 h	> 500 mg/L EC50 Daphnia magna 48 h
Hydrocarbons, alkanes C14-C17	No information available	No information available	No information available
Hydrocarbons, alkanes C10-C14	No information available	No information available	= 0.02856 mg/L EC50 Daphnia magna 48 h

12.2 Persistence and degradability

No product level data available.

12.3 Bioaccumulative potential

No product level data available.

12.4 Mobility

Insoluble in water.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method	Disposal should be made in accordance with federal, state and local regulations.
Contaminated packaging	Do not re-use empty containers. Empty containers should be taken for local recycling, recovery or waste disposal. Dispose of in accordance with local regulations. Do not burn, or use a cutting torch on, the empty drum. Empty containers may contain flammable or explosive vapors.

14. Transport information

14.1. UN number

UN No. (DOT)	NA1993
UN No. (MT/ANTT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG/ANTAQ)	Not regulated
UN No. (ICAO/ANAC)	Not regulated

14.2. UN proper shipping name

Combustible liquid, n.o.s., (contains Hydrocarbons blend),

Not regulated for US ground transport in non-bulk containers (<119 gallons).

14.3 Hazard class(es)

DOT Hazard class	Combustible liquid
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated

14.4 Packing group

DOT/ANTT Packing group	PG III
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated

IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated

14.5 Environmental hazard
No

14.6 Special precautions
Not applicable

14.7 Transport in bulk according to Annex I/II of MARPOL 73/78 and the IBC Code
Please contact SDS@slb.com for info regarding transport in Bulk.

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Volume restriction. This product contains chemical(s) which is/are not listed on DSL but is/are listed on the NDSL.
Philippines (PICCS)	Complies
Japan (ENCS)	Does not comply
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH
All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

IMPORTS, Canada
This product contains chemical(s) which is/are not listed on DSL but is/are listed on the NDSL. Possible import volume restrictions apply. For details contact the Corporate info in SECTION 1.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Fatty acids, tall-oil, reaction products with diethylenetriamine, maleic anhydride, tetraethylenepentamine and triethylenetetramine	N/A	N/A	N/A
2-[2-(2-butoxyethoxy)ethoxy]ethanol	N/A	N/A	N/A
Hydrocarbons, alkanes C14-C17	N/A	N/A	N/A
Hydrocarbons, alkanes C10-C14	N/A	N/A	N/A

California Proposition 65

This product does not contain chemical[s] which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Canadian Classification

This Safety Data Sheet has been prepared in compliance with the Hazardous Products Regulations.

16. Other Information

Supersedes date	31/Jan/2017
Revision date	09/Mar/2018
Version	11
This SDS has been revised in the following section(s)	3. Composition/information on Ingredients
HMIS classification	
Health	2
Flammability	2
Physical hazard	0
PPE	X

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Disclaimer
The information contained herein is considered in good faith as reliable of the date issued and is based upon on measurements, tests or data derived from supplier's own study or furnished by others. In providing this SDS information, Supplier makes no express or implied warranties as to the information or product; merchantability or fitness of purpose; any express or implied warranty; or non-infringement of intellectual property rights; and supplier assumes no responsibility for any direct, special or consequential damages, results obtained, or the activities of others. To the maximum extent permitted by law, supplier's warranty obligations and buyer's sole remedies are as stated in separate agreement between the parties.

SDS no. PID1709
Version 12
Revision date 29/Mar/2017
Supersedes date 24/Oct/2016

Safety Data Sheet
VG-PLUS*

1. Identification

1.1 Product identifier

Product name VG-PLUS*

Product code PID1709

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Drilling fluid additive. Viscosifier.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
200 - 125, 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-780-962-8221

E-mail address sdsmi@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals) , Bethicia Prasek

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : 0800-720-8000 0800-777-2323 (WGRA)

2. Hazards identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Carcinogenicity	Category 1A
Specific target organ toxicity - Repeated exposure	Category 2

Environmental hazards Not classified

Physical Hazards

Combustible dust	Category 1

2.2 Label elements

Signal word
DANGER

Hazard statements
H350i - May cause cancer by inhalation
H373 - May cause damage to organs through prolonged or repeated exposure if inhaled
H232 - May form combustible dust concentrations in air

Precautionary statements
P201 - Obtain special instructions before use
P260 - Do not breathe dust/fume/gas/mist/vapors/spray
P281 - Use personal protective equipment as required
P308 + P313 - IF exposed or concerned: Get medical advice/attention
P314 - Get medical advice/ attention if you feel unwell

P202 - Do not handle until all safety precautions have been read and understood
P240 - Ground/bond container and receiving equipment
P241 - Use explosion-proof electrical/ ventilating/ lighting/ equipment
P243 - Take precautionary measures against static discharge
P501 - Dispose of contents/ container to an approved waste disposal plant

Hazards not otherwise classified
None known

Unknown acute toxicity Not applicable.

3. Composition/information on Ingredients

3.1 Substances

Not applicable

3.2 Mixtures

Chemical Name	CAS No	Weight-%
Organophilic clay	Proprietary	60 - 100
Crystalline silica (impurity)	14808-60-7	1 - 5

Comments
The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret

Proprietary component(s) in section 3 of this SDS does not/do not trigger application of trade secret exemption under Hazardous Materials Information Review Act (HMIRA). The proprietary component in this product contributes to combustible dust classification.

Crystalline silica is the most widely occurring of all minerals. The most common form of silica is sand. The International Agency for Research on Cancer (IARC) has designated crystalline silica in the form of quartz or cristobalite a Group 1 (carcinogenic to humans). This designation was based on an increased risk of lung cancer among crystalline silica exposed workers. IARC did note that carcinogenicity of crystalline silica in humans was not detected in all industrial circumstances studied. Further, carcinogenicity of crystalline silica may be dependent on inherent characteristics of the crystalline silica or external factors affecting its biological activity or distribution of polymorphs. (IARC Vol. 68, 1997, p. 41). The National Toxicology Program (NTP) classifies crystalline silica as "reasonably anticipated to cause cancer in humans" (6th Annual Report on Carcinogens, 1991). Long term inhalation of crystalline silica can also result in the lung disease, silicosis. Symptoms of this disease include coughing and shortness of breath. (NJ HSFS, January 1996) Percentages (concentrations) represented as a range are due to batch-to-batch variability.

4. First aid measures

4.1 First-Aid Measures

Inhalation — Move to fresh air. If breathing is difficult, (trained personnel should) give oxygen. Get medical attention immediately if symptoms occur.

Ingestion — Do not induce vomiting without medical advice. Call a physician or Poison Control Center. Drink 1 or 2 glasses of water. Never give anything by mouth to an unconscious person. Get medical attention if symptoms occur.

Skin contact — Wash skin thoroughly with soap and water. Remove contaminated clothing and launder before reuse. Get medical attention if irritation persists.

Eye contact — Promptly wash eyes with lots of water while lifting eye lids. Remove contact lenses. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

4.2 Most important symptoms and effects, both acute and delayed

Main symptoms

Inhalation — Please see Section 11. Toxicological Information for further information.

Ingestion — Please see Section 11. Toxicological Information for further information.

Skin contact — Please see Section 11. Toxicological Information for further information.

Eye contact — Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician — Treat symptomatically

5. Fire-fighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Fog, Alcohol Foam, CO_2, Dry Chemical.

Extinguishing media which must not be used for safety reasons
None known.

5.2 Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
Dusts or fumes may form explosive mixtures in air. Suspended dust may present a dust explosion hazard.

Hazardous combustion products
Silicon oxide, Nitrogen oxides (NOx), Carbon oxides (COx).

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

6. Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Wear suitable protective equipment. Evacuate personnel to safe areas. Avoid dust formation. Suspended dust may present a dust explosion hazard. Avoid breathing dust; if exposed to high dust concentration, leave area immediately.

6.2 Environmental precautions

As local regulations may vary; all waste must be disposed/recycled/reclaimed in accordance with federal, state, and local environmental control regulations.
Large spills released to the environment may disturb the natural chemical balance of soil/fresh water. Do not allow material to contaminate ground water system.

Environmental exposure controls
Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Cover powder spill with plastic sheet or tarp to minimize spreading.

Methods for cleaning up
Shovel into suitable container for disposal. Avoid dust formation. Powdered material may form explosive dust-air mixtures. Take precautionary measures against static discharges. Use non-sparking tools and equipment.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and storage

7.1 Precautions for safe handling

Handling
Do not handle until all safety precautions have been read and understood. Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes and clothing. Avoid breathing dust; if exposed to high dust concentration, leave area immediately. Wear personal protective equipment. Avoid dust formation. Fine dust dispersed in air may ignite. Take precautionary measures against static discharges.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Ensure adequate ventilation. Keep airborne concentrations below exposure limits. Use spark-proof tools and explosion-proof equipment.

Storage precautions Protect from moisture Store in original container. Follow safe warehousing practices regarding palletizing, banding, shrink-wrapping and/or stacking.

8. Exposure controls/personal protection

8.1 Control parameters

Component Information

Chemical Name	ACGIH TLV	OSHA PEL
Organophilic clay	Not determined	Not determined
Crystalline silica (impurity)	0.025 mg/m^3	total dust respirable fraction

Crystalline silica (impurity)

OSHA - Final PELs - Table Z-3 Mineral Dusts

(30)/(%SiO2 + 2) mg/m^3 TWA, total dust; (250)/(%SiO2 + 5) mppcf TWA, respirable fraction; (10)/(%SiO2 + 2) mg/m^3 TWA, respirable fraction

8.2 Exposure controls

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering measures to reduce exposure

Ensure adequate ventilation, especially in confined areas.

Personal protective equipment

Eye protection Tightly fitting safety goggles.

Hand protection Neoprene Nitrile

Respiratory Protection All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne mist/aerosol of this product, use an organic vapor cartridge with a P-95 pre-filter attached. In work environments containing oil mist/aerosol, use an organic vapor cartridge with a P-95 pre-filter attached.If exposed to vapors from this product, use a NIOSH/MSHA-approved respirator with an organic vapor cartridge.

Skin and body protection Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.

Hygiene measures Wash hands before breaks and immediately after handling the product, Remove and wash contaminated clothing before re-use.

9. Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state Solid

Appearance Opaque

Color Off-white

Odor Slight odor of fatty acid

Odor threshold Not applicable

Property	Values	Remarks
pH	Not applicable	
pH @ dilution		No information available
Melting / freezing point	No information available	
Boiling point/range	No information available	
Flash point	No information available	PMCC
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	1.5 - 1.7	
Bulk density	No information available	
Water solubility	Negligible	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	
log Pow	No information available	

Explosive properties	Suspended dust may present a dust explosion hazard
Oxidizing properties	No information available

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	No information available
Density	No information available

10. Stability and reactivity

10.1 Reactivity

Dust may form explosive mixture in air.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Avoid contact with heat, sparks, open flame, and static discharge. Avoid dust formation.

10.5 Incompatible materials

Strong oxidizing agents.

10.6 Hazardous decomposition products

Silicon oxide. Carbon oxides (COx). Nitrogen oxides (NOx).

11. Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Inhalation Inhalation of dust in high concentration may cause irritation of respiratory system. Harmful: danger of serious damage to health by prolonged exposure through inhalation. May cause cancer by inhalation. Repeated or prolonged inhalation of crystalline silica dust can cause delayed lung injury, and other diseases, including silicosis and lung cancer.

Eye contact Dust contact with the eyes can lead to mechanical irritation.

Skin contact Repeated exposure may cause skin dryness or cracking.

Ingestion Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Organophilic clay	No data available	No data available	No data available
Crystalline silica (impurity)	= 500 mg/kg (Rat)	No data available	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Organophilic clay	No data available	No data available	No data available	No data available
Crystalline silica (impurity)	Group 1; Monograph 100C [2012] Monograph 100C [2012] (listed under Crystalline silica inhaled in the form of quartz or cristobalite from occupational sources); Monograph 68 [1997] Group 1; Monograph 68 [1997]	A2 Suspected Human Carcinogen	Present	Known Human Carcinogen

Sensitization Not classified.

Mutagenic effects No evidence of mutagenic properties.

Carcinogenicity Contains a known or suspected carcinogen. Crystalline silica dust is listed by IARC in Group 1 as known to cause lung cancer in humans, if inhaled.

Reproductive toxicity No evidence of toxicity to reproduction.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of exposure Skin contact. Inhalation. Eye contact.

Routes of entry Inhalation.

Specific target organ toxicity - Single exposure Not classified

Specific target organ toxicity - Repeated exposure Category 2.

Target organ effects Respiratory system. Lungs.

Aspiration hazard Not applicable.

12. Ecological information

12.1 Toxicity

Toxicity to algae
See component information below.

Toxicity to fish
See component information below.

Toxicity to daphnia and other aquatic invertebrates
See component information below.

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Organophilic clay	No information available	No information available	No information available
Crystalline silica (impurity)	No information available	No information available	No information available

12.2 Persistence and degradability

No product level data available.

12.3 Bioaccumulative potential

No product level data available.

12.4 Mobility in soil

No information available.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal considerations

13.1 Waste treatment methods

Disposal Method Disposal should be made in accordance with federal, state and local regulations.

Contaminated packaging Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG)	Not regulated
UN No. (ICAO)	Not regulated

14.2. UN proper shipping name
The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG Hazard class	Not regulated
ICAO Hazard class/division	Not regulated

14.4 Packing group

DOT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG Packing group	Not regulated
ICAO Packing group	Not regulated

14.5 Environmental hazard
No

14.6 Special precautions
Not applicable

14.7 Transport in bulk according to Annex I/II of MARPOL 73/78 and the IBC Code
Please contact MISDS@slb.com for info regarding transport in Bulk.

15. Regulatory information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
European Union (EINECS and ELINCS)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Does not Comply
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

IMPORTS, Canada
No import volume restrictions.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories
Delayed (chronic) health hazard. Fire Hazard (Combustible Dust)

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Organophilic clay	N/A	N/A	N/A
Crystalline silica (impurity)	N/A	N/A	N/A

State Comments
Proposition 65: This product contains chemical(s) considered by the State of California's Safe Drinking Water and Toxic Enforcement Act of 1986 to cause cancer and/or reproductive toxicity. See table under U.S. Federal and State Regulations for the specific chemicals.

Crystalline silica (impurity)
Carcinogen

Canadian Classification

This Safety Data Sheet has been prepared in compliance with the Hazardous Products Regulations.

16. Other information

Supersedes date	24/Oct/2016
Revision date	29/Mar/2017
Version	12
This SDS has been revised in the following section(s)	1, 2, 3, 9, 15, 16. Updated according to WHMIS 2015.

HMIS classification

Health	1*
Flammability	1
Physical hazard	0
PPE	E

N/A - Not Applicable, N/D - Not Determined.

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The information contained herein is considered in good faith as reliable of the date issued and is based upon on measurements, tests or data derived from supplier's own study or furnished by others. In providing this SDS information, Supplier makes no express or implied warranties as to the information or product; merchantability or fitness of purpose; any express or implied warranty; or non-infringement of intellectual property rights; and supplier assumes no responsibility for any direct, special or consequential damages, results obtained, or the activities of others. To the maximum extent permitted by law, supplier's warranty obligations and buyer's sole remedies are as stated in separate agreement between the parties.

Safety Data Sheets Calcium Chloride; Caustic Soda; Deep clean; Defoam X; Duo Vis; Duramod; Ecotrol; Escaid 110; HRP; KI- 3924; Lime; M-I Gel; Microbar; Monoethylene Glycol (MEG); Myacide; Novamod; Nut Plug (All Grades); Pecan Nut Plug (All grades); Polypac (All Grades); Potassium Chloride; Rhebuild; RheCon (EMI-1926); Rheduce; Rheflat; Rheguard Mud System; Rhemul ; Rhethin; Safe-Break Prime; Safe-Break; Safe-Carb (all Grades); Safe-Cor C; Safe-Cor; Safe-Scav CA; Safe-Scav NA; Salt Saturated Mud System; SAPP; Seal-N-Peel (Ca Br2); Seal-N- Peel (Kcl-Nacl-Nabr); Soda Ash; Sodium Bromide Brine; Sodium Bromide; Sourscav; Surewet; VG-Plus; VG-Supreme; Walnut Nutplug (All Grades); Water Based Mud (Generic)

Waste Stream: Chemical Sacks

EPA Waste Profile Sheet Number: 20140506-011

SDS no. PID204
Version 1
Revision date 27/Oct/2020
Supersedes date None

Safety Data Sheet
CALCIUM CHLORIDE (All Grades)

1. Identification

1.1 Product identifier

Product name CALCIUM CHLORIDE (All Grades)

Product code PID204

Molecular weight 111

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Weighting agent.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Australia +61 2801 44558, Asia Pacific +65 3158 1074, China +86 10 5100 3039, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, New Zealand +64 9929 1483, USA 001 281 561 1600

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Serious eye damage/eye irritation	Category 2

Environmental hazards Not classified

Physical Hazards Not classified

2.2 Label elements

Signal word
WARNING

Hazard Statements
H319 - Causes serious eye irritation

Precautionary Statements
P264 - Wash face, hands and any exposed skin thoroughly after handling
P280 - Wear protective gloves, protective clothing, eye protection
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P337 + P313 - If eye irritation persists: Get medical advice/attention
P501 - Dispose of contents/container in accordance with local, regional, national, and international regulations as applicable

Unknown acute toxicity Not applicable.

3. Composition/information on Ingredients

3.1 Substances

Chemical Name	CAS No	Weight-%
Calcium chloride	10043-52-4	60-100

3.2 Mixtures

Not applicable

Comments
The exact percentage (concentration) of composition has been withheld as a trade secret.

4. First Aid Measures

4.1 First aid measures

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion Rinse mouth. Drink 1 or 2 glasses of water. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Seek medical attention if irritation occurs.

Skin contact Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention if irritation persists.

Eye Contact Promptly wash eyes with lots of water while lifting eye lids. Remove contact lenses, if

present and easy to do. Continue rinsing. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

General advice	The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.
Symptoms	
Inhalation	Please see Section 11. Toxicological Information for further information.
Ingestion	Please see Section 11. Toxicological Information for further information.
Skin contact	Please see Section 11. Toxicological Information for further information.
Eye contact	Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing media appropriate for surrounding material.

Extinguishing media which must not be used for safety reasons
None known.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
None known.

Hazardous combustion products
Chlorine, May release hydrogen gas (explosive) on contact with metals.

5.3 Advice for firefighters

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. See also section 8.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Cover powder spill with plastic sheet or tarp to minimize spreading.

Methods for cleaning up
Sweep up and shovel into suitable containers for disposal. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Avoid dust formation.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Ensure adequate ventilation. Keep airborne concentrations below exposure limits.

Storage precautions Keep containers tightly closed in a dry, cool and well-ventilated place. Protect from moisture. Avoid contact with:. Metals. Strong oxidizing agents. Strong acids.

Packaging materials Use specially constructed containers only.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Exposure limits **NUI = Nuisance dust, TWA 4mg/m³ Respirable Dust, 10mg/m³ Total Dust.**

Component Information

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits - TWAs (CMPs)	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits - TWAs (LMPE-PPTs)
Calcium chloride	Not determined	Not determined	Not determined	Not determined	Not determined

IDLH (Immediately Dangerous to Life or Health)
Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Calcium chloride 10043-52-4	Not detemined

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard

present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation. See section 7 for more information.

Personal protective equipment

Eye protection	Tightly fitting safety goggles.
Hand protection	Use protective gloves made of: Neoprene Nitrile Rubber Break through time >480 minutes Glove thickness 0.5 mm Frequent change is advisable
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne mist/aerosol of this product, use an organic vapor cartridge with a P-95 pre-filter attached. In work environments containing oil mist/aerosol, use an organic vapor cartridge with a P-95 pre-filter attached.If exposed to vapors from this product, use a NIOSH/MSHA-approved respirator with an organic vapor cartridge.
Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Solid
Appearance	Powder Dust
Color	Off-white
Odor	Odorless
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH	Not applicable	
pH @ dilution	7 - 10	5% sol
Melting point	772 °C / 1421.6 °F	
Boiling point	> 1600 °C / >2912 °F	
Flash point	No information available	PMCC
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	No information available	
Bulk density	No information available	
Water solubility	Soluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	
Partition Coefficient (n-octanol/water)	No information available	

Explosive properties	Not applicable
Oxidizing properties	None known.

9.2 Other information

Pour point	No information available
Molecular weight	111
VOC content(%)	None
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

No specific reactivity hazards associated with this product.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Avoid contact with water and moist air - product is hygroscopic.

10.5 Incompatible materials

Metals. Strong oxidizing agents. Strong acids.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation	Inhalation of dust may cause shortness of breath, tightness of the chest, a sore throat and cough.
Eye contact	Causes serious eye irritation.
Skin contact	Prolonged contact may cause redness and irritation.
Ingestion	Ingestion may cause stomach discomfort.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Calcium chloride	1000 mg/kg (rat)	5005 mg/kg (Rabbit)	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Calcium chloride	No data available	No data available	No data available	No data available

Delayed and immediate effects and chronic effects from short and long term exposure

Sensitization This product does not contain any components suspected to be sensitizing.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity This product does not contain any known or suspected carcinogens.

Reproductive toxicity This product does not contain any known or suspected reproductive hazards.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of Exposure Eye contact. Inhalation.

Routes of entry Inhalation.

Specific target organ toxicity - Single exposure Not classified

Specific target organ toxicity - Repeated exposure Not classified.

Aspiration hazard Not applicable.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
See component information below.

Toxicity to fish
See component information below.

Toxicity to daphnia and other aquatic invertebrates
See component information below.

Toxicology data for the components

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Calcium chloride	= 10650 mg/L LC50 Lepomis macrochirus 96 h	No information available	2,400 mg/L EC50 (Daphnia magna) = 48 h

12.2 Persistence and degradability

See component information below.

12.3 Bioaccumulative potential

See component information below.

12.4 Mobility

See component information below.

See component information below.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method	Disposal should be made in accordance with federal, state and local regulations.
Contaminated packaging	Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT)	Not regulated
UN No. (MT/ANTT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG/ANTAQ)	Not regulated
UN No. (ICAO/ANAC)	Not regulated
UN No. (DPC)	Not regulated

14.2. UN proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class	Not regulated
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated
DPC Hazard class	Not regulated

14.4 Packing group

DOT Packing group	Not regulated
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated
DPC Packing group	Not regulated

14.5 Environmental hazard

No

14.6 Special precautions
Not applicable

14.7 Transport in bulk according to Annex I/II of MARPOL 73/78 and the IBC Code
Please contact SDS@slb.com for info regarding transport in Bulk.

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Complies
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH
All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Calcium chloride	N/A	N/A	N/A

California Proposition 65

This product does not contain chemical[s] which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

16. Other Information

Revision date	27/Oct/2020
Version	1

Health	2
Flammability	0
Physical hazard	0
PPE	E

Disclaimer

The information contained herein is considered in good faith as reliable of the date issued and is based upon on measurements, tests or data derived from supplier's own study or furnished by others. In providing this SDS information, Supplier makes no express or implied warranties as to the information or product; merchantability or fitness of purpose; any express or implied warranty; or non-infringement of intellectual property rights; and supplier assumes no responsibility for any direct, special or consequential damages, results obtained, or the activities of others. To the maximum extent permitted by law, supplier's warranty obligations and buyer's sole remedies are as stated in separate agreement between the parties.

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SDS no. M002
Version 5
Revision date 18/Apr/2018
Supersedes date 17/Feb/2017

Safety Data Sheet
Caustic Soda M2

1. Identification of the Substance/Preparation and of the Company/Undertaking

1.1 Product identifier

Product name Caustic Soda M2

Product code M002

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Used as a fracturing additive in oilfield applications.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
Schlumberger Technology Corporation
110 Schlumberger Drive
Sugar Land, Texas 77478, USA
Telephone: 1-281-285-7873

Schlumberger Canada, Ltd.
200, 125 - 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-613-992-4624

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 595 3518/+1 866 928 0789 , Canada +1 800 579 7421 , Argentina: +54 11 5984 3690, Brazil : 0800-720-8000 /0800-777-2323 (WGRA)

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Skin corrosion/irritation	Category 1 Subcategory 1A
Serious eye damage/eye irritation	Category 1

Environmental hazards Not classified

Physical Hazards

Substances/mixtures corrosive to metal	Category 1

2.2 Label elements

Signal word
DANGER

Hazard Statements
H314 - Causes severe skin burns and eye damage
H290 - May be corrosive to metals

Precautionary Statements
P234 - Keep only in original container
P260 - Do not breathe dust/fume/gas/mist/vapors/spray
P264 - Wash face, hands and any exposed skin thoroughly after handling
P280 - Wear protective gloves/protective clothing/eye protection/face protection
P301 + P330 + P331 - IF SWALLOWED: Rinse mouth. Do NOT induce vomiting
P303 + P361 + P353 - IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
P304 + P340 - IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a POISON CENTER or doctor/physician
P363 - Wash contaminated clothing before reuse
P390 - Absorb spillage to prevent material damage
P406 - Store in corrosion resistant container with a resistant inner liner
P403 + P233 - Store in a well-ventilated place. Keep container tightly closed
P501 - Dispose of contents/container in accordance with local, regional, national, and international regulations as applicable

Hazards not otherwise classified
None known

Unknown acute toxicity Not applicable.

3. Composition/information on Ingredients

3.1 Substances

Chemical Name	CAS No	Weight-%
Sodium hydroxide	1310-73-2	100

3.2 Mixtures

Not applicable

Comments
No Comments

4. First Aid Measures

4.1 First aid measures

Inhalation Keep at rest. Move the exposed person to fresh air at once. If breathing is difficult, (trained personnel should) give oxygen. Seek medical attention at once.

Ingestion Do NOT induce vomiting. Rinse mouth. Risk of product entering the lungs on vomiting after ingestion. Never give anything by mouth to an unconscious person. Immediate medical attention is required.

Skin contact Get immediate medical attention. Promptly wash contaminated skin with soap or mild detergent and water. Promptly remove clothing if soaked through and wash as above. Burns: Flush with water immediately. While flushing, remove clothes which do not adhere to affected area. Call an ambulance. Continue flushing during transport to hospital. Chemical burns must be treated by a physician.

Eye Contact Get immediate medical attention. Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first five minutes, then continue rinsing eye.

4.2. Most important symptoms and effects, both acute and delayed

General advice Seek medical attention for all burns, regardless how minor they may seem. The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Symptoms

Inhalation Please see Section 11. Toxicological Information for further information.

Ingestion Please see Section 11. Toxicological Information for further information.

Skin contact Please see Section 11. Toxicological Information for further information.

Eye contact Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing media appropriate for surrounding material.

Extinguishing media which must not be used for safety reasons
Water.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
Reaction with water may generate much heat which will increase the concentration of fumes in the air. Contact with metals may evolve flammable hydrogen gas.

Hazardous combustion products
Thermal decomposition can lead to release of irritating gases and vapors, Sodium oxides.

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Do not get on skin or clothing. Wash thoroughly after handling. Avoid breathing dust; if exposed to high dust concentration, leave area immediately. Use personal protective equipment. See also section 8.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Cover powder spill with plastic sheet or tarp to minimize spreading.

Methods for cleaning up
Avoid dust formation. Sweep up and shovel into suitable containers for disposal. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes and clothing. Avoid handling causing generation of dust. Avoid breathing dust; if exposed to high dust concentration, leave area immediately. Never add water directly to this product - may cause vigorous reaction/boiling. Always dilute by carefully pouring the product into the water.

Hygiene measures
Use good work and personal hygiene practices to avoid exposure. Wash hands and face before breaks and immediately after handling the product. Remove contaminated clothing. Do not eat, drink or smoke when using this product.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Ensure adequate ventilation. Provide appropriate exhaust ventilation at places where dust is formed. Keep airborne concentrations below exposure limits.

Storage precautions Keep containers tightly closed in a dry, cool and well-ventilated place. Protect from moisture Water Metals Acids

Packaging materials Use specially constructed containers only.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits - TWAs (CMPs)	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits - TWAs (LMPE-PPTs)
Sodium hydroxide	2 mg/m³ C	2 mg/m³ TWA	Not determined	Not determined	Not determined

IDLH (Immediately Dangerous to Life or Health)
This product contains substance(s) classified as Immediately Dangerous to Life or Health (IDLH) by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Sodium hydroxide 1310-73-2	10 mg/m³ IDLH

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation. Local exhaust ventilation.

Personal protective equipment

Eye protection Tightly fitting safety goggles. Face-shield.

Hand protection Impervious gloves made of: Rubber gloves PVC Be aware that liquid may penetrate the gloves. Frequent change is advisable.

Respiratory Protection All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne particles of this product use at least a NIOSH-approved N95 half-mask disposable or re-useable particulate respirator. In work environments containing oil mist/aerosol use at least a NIOSH-approved P95 half-mask disposable or re-useable particulate respirator.

Skin and body protection Wear appropriate personal protective clothing to prevent skin contact, Eye wash and

emergency shower must be available at the work place.

Hygiene Measures Wash hands before breaks and immediately after handling the product, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Solid
Appearance	Flakes
Color	White
Odor	Odorless
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH	Not applicable	
pH @ dilution	13	10 g/L
Melting / freezing point	318 °C / 604 °F	
Boiling point/range	1390 °C / 2534 °F	
Flash point	No information available	
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	0.13 kPa	@ 739 °C
Vapor density	>1 (air = 1)	
Specific gravity	2.1	@ 20 °C
Bulk density	No information available	
Water solubility	Soluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	
log Pow	No information available	

Explosive properties	Not applicable
Oxidizing properties	None known.

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	None
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

Reacts violently with water. Corrosive to Metals.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Protect from moisture. Avoid dust formation. Water.

10.5 Incompatible materials

Acids. Metals. Water.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation Vapors may irritate throat and respiratory system.

Eye contact Causes serious eye damage.

Skin contact Causes severe skin burns.

Ingestion Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation.

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Sodium hydroxide	No data available	1350 mg/kg (Rabbit)	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Sodium hydroxide	No data available	No data available	No data available	No data available

Sensitization Not classified.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity This product does not contain any known or suspected carcinogens.

Reproductive toxicity This product does not contain any known or suspected reproductive hazards.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of exposure Skin contact. Inhalation. Eye contact.

Routes of entry Inhalation. Skin contact. Eye contact.

Specific target organ toxicity - Single exposure	Not classified
Specific target organ toxicity - Repeated exposure	Not classified.
Aspiration hazard	Not applicable.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
This product is not considered toxic to algae.

Toxicity to fish
This product is not considered toxic to fish.

Toxicity to daphnia and other aquatic invertebrates
This product is not considered toxic to invertebrates.

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Sodium hydroxide	= 45.4 mg/L LC50 Oncorhynchus mykiss 96 h	No information available	No information available

12.2 Persistence and degradability

Not Applicable - Inorganic chemical.

12.3 Bioaccumulative potential

Not Applicable - Inorganic chemical.

12.4 Mobility

Soluble in water.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method	Disposal should be made in accordance with federal, state and local regulations.
Contaminated packaging	Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT)	UN1823
UN No. (MT/ANTT)	UN1823
UN No. (TDG)	UN1823
UN/ID No. (ADR/RID/ADN/ADG)	UN1823
UN No. (IMDG/ANTAQ)	UN1823
UN No. (ICAO/ANAC)	UN1823
UN No. (DPC)	UN1823

14.2. UN proper shipping name

SODIUM HYDROXIDE, SOLID,

Product (RQ): 1000 lbs. (Sodium hydroxide)

(add RQ if shipped in containers >RQ for DOT only)

14.3 Hazard class(es)

DOT Hazard class	8
ANTT Hazard class	8
TDG Hazard class	8
ADR/RID/ADN/ADG Hazard class	8
IMDG/ANTAQ Hazard class	8
ICAO/ANAC Hazard class/division	8
DPC Hazard class	8

14.4 Packing group

DOT/ANTT Packing group	II
ANTT Packing group	II
TDG Packing group	II
ADR/RID/ADN/ADG Packing group	II
IMDG/ANTAQ Packing group	II
ICAO/ANAC Packing group	II
DPC Packing group	II

14.5 Environmental hazard

Marine pollutant	No

14.6 Special precautions

Not applicable

14.7 Transport in bulk according to Annex I/II of MARPOL 73/78 and the IBC Code

Please contact SDS@slb.com for info regarding transport in Bulk.

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Complies
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH
All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

IMPORTS, Canada
No import volume restrictions.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Sodium hydroxide	N/A	N/A	1000 lb final RQ 454 kg final RQ

California Proposition 65

This product does not contain chemical[s] which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Canadian Classification

This Safety Data Sheet has been prepared in compliance with the Hazardous Products Regulations.

16. Other Information

Supersedes date	17/Feb/2017
Revision date	18/Apr/2018
Version	5
This SDS has been revised in the following section(s)	All sections. Prepared in accordance with OSHA HAZCOM 2012. Prepared in accordance with WHMIS 2015
HMIS classification	

Health	3
Flammability	0
Physical hazard	1
PPE	X

N/A - Not Applicable, N/D - Not Determined.

Disclaimer

The information contained herein is considered in good faith as reliable of the date issued and is based upon on measurements, tests or data derived from supplier's own study or furnished by others. In providing this SDS information, Supplier makes no express or implied warranties as to the information or product; merchantability or fitness of purpose; any express or implied warranty; or non-infringement of intellectual property rights; and supplier assumes no responsibility for any direct, special or consequential damages, results obtained, or the activities of others. To the maximum extent permitted by law, supplier's warranty obligations and buyer's sole remedies are as stated in separate agreement between the parties.

SDS no. PID16970
Version 7
Revision date 05/Nov/2018
Supersedes date 01/Sep/2015

Safety Data Sheet
DEEPCLEAN*

1. Identification of the Substance/Preparation and of the Company/Undertaking

1.1 Product identifier

Product name DEEPCLEAN*

Product code PID16970

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Completion fluid additive.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

Schlumberger Canada, Ltd.
200, 125 - 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-613-992-4624

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : 0800-720-8000/0800-777-2323 (WGRA)

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Aspiration toxicity	Category 1
Acute toxicity - Oral	Category 4

Acute toxicity - Inhalation (Dusts/Mists)	Category 4
Skin corrosion/irritation	Category 2
Serious eye damage/eye irritation	Category 1
Skin sensitization	Category 1

Environmental hazards Not classified

Physical Hazards

Flammable Liquids	Category 4

2.2 Label elements

Signal word
DANGER

Hazard Statements
H302 - Harmful if swallowed
H304 - May be fatal if swallowed and enters airways
H315 - Causes skin irritation
H317 - May cause an allergic skin reaction
H318 - Causes serious eye damage
H332 - Harmful if inhaled
H227 - Combustible liquid

Precautionary Statements
P280 - Wear protective gloves and eye/face protection
P301 + P310 - IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
P302 + P352 - IF ON SKIN: Wash with plenty of soap and water
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a POISON CENTER or doctor/physician
P331 - Do NOT induce vomiting

P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking
P261 - Avoid breathing dust/fume/gas/mist/vapors/spray
P264 - Wash face, hands and any exposed skin thoroughly after handling
P270 - Do not eat, drink or smoke when using this product
P271 - Use only outdoors or in a well-ventilated area
P272 - Contaminated work clothing should not be allowed out of the workplace
P304 + P340 - IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
P330 - Rinse mouth
P333 + P313 - If skin irritation or rash occurs: Get medical advice/attention
P362 - Take off contaminated clothing and wash before reuse
P403 + P235 - Store in a well-ventilated place. Keep cool
P233 - Keep container tightly closed
P370 + P378 - In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish
P220 - Keep/Store away from combustible materials

Hazards not otherwise classified
None known

Unknown acute toxicity 0% of the mixture consists of ingredient(s) of unknown toxicity.

3. Composition/information on Ingredients

3.1 Substances

Not applicable

3.2 Mixtures

Chemical Name	CAS No	Weight-%
D-Glucopyranose, oligomeric, C8-10 glycosides	68515-73-1	30 - 60
2-butoxyethanol	111-76-2	15 - 40
Citrus Extract	68647-72-3	15 - 40
Distillates, petroleum, hydrotreated light	64742-47-8	15 - 40

Comments
The exact percentage (concentration) of composition has been withheld as a trade secret

4. First Aid Measures

4.1 First aid measures

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion Do not induce vomiting without medical advice. If vomiting occurs spontaneously, minimize the risk of aspiration by properly positioning the affected person. Never give anything by mouth to an unconscious person. Seek medical attention if irritation occurs.

Skin contact Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention immediately if symptoms occur.

Eye Contact Remove contact lenses, if worn. Promptly wash eyes with lots of water while lifting eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

General advice The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Symptoms

Inhalation Please see Section 11. Toxicological Information for further information.

Ingestion Please see Section 11. Toxicological Information for further information.

Skin contact Please see Section 11. Toxicological Information for further information.

Eye contact Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing media appropriate for surrounding material.

Extinguishing media which must not be used for safety reasons
Do not use a solid water stream as it may scatter and spread fire.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
Combustible liquid. Heating of containers may cause pressure rise, with risk of bursting.

Hazardous combustion products
Thermal decomposition can lead to release of irritating gases and vapors.

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. See also section 8. Ensure adequate ventilation. Do not get on skin or clothing. Wash thoroughly after handling. Keep away from heat, sparks, and flame. Do not breathe vapors or spray mist. Solutions extremely slippery when spilled.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Dike far ahead of liquid spill for later disposal.

Methods for cleaning up
Contain and collect spillage with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local/national regulations (see Section 13). Take precautionary measures against static discharges. Use non-sparking tools and equipment.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling

Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Do not breathe vapors or spray mist. Avoid spills and splashing during use. Take precautionary measures against static discharges. Extinguish all ignition sources. Avoid sparks, flames, heat and smoking. All equipment used when handling the product must be grounded.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Ensure adequate ventilation. Keep airborne concentrations below exposure limits. Use spark-proof tools and explosion-proof equipment.

Storage precautions Follow safe warehousing practices regarding palletizing, banding, shrink-wrapping and/or stacking. Keep containers tightly closed in a dry, cool and well-ventilated place. Avoid contact with:. Heat, flames and sparks. Strong oxidizing agents. Strong acids. Strong alkalies. Strong reducing agents.

Packaging materials Use specially constructed containers only.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Exposure limits **OEL for "Normal and branched chain alkanes, > C7: 1200 mg/m³**
No biological limit allocated

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits - TWAs (CMPs)	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits - TWAs (LMPE-PPTs)
D-Glucopyranose, oligomeric, C8-10 glycosides	Not determined	Not determined	Not determined	Not determined	Not determined
2-butoxyethanol	20 ppm	50 ppm TWA 240 mg/m³ TWA	20 ppm TWA	39 ppm TWA LT; 190 mg/m³ TWA LT	26 ppm TWA VLE-PPT; 120 mg/m³ TWA VLE-PPT
Citrus Extract	Not determined	Not determined	Not determined	Not determined	Not determined
Distillates, petroleum, hydrotreated light	Not determined	Not determined	Not determined	Not determined	Not determined

IDLH (Immediately Dangerous to Life or Health)
Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
D-Glucopyranose, oligomeric, C8-10 glycosides 68515-73-1	-
2-butoxyethanol 111-76-2	700 ppm IDLH
Citrus Extract 68647-72-3	-
Distillates, petroleum, hydrotreated light 64742-47-8	-

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard

present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation. Mechanical ventilation or local exhaust ventilation is required.

Personal protective equipment

Eye protection	Tightly fitting safety goggles.
Hand protection	Use protective gloves made of: Nitrile Neoprene Be aware that liquid may penetrate the gloves. Frequent change is advisable.
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne mist/aerosol of this product, use an organic vapor cartridge with a P-95 pre-filter attached. In work environments containing oil mist/aerosol, use an organic vapor cartridge with a P-95 pre-filter attached.If exposed to vapors from this product, use a NIOSH/MSHA-approved respirator with an organic vapor cartridge.
Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Liquid
Appearance	Transparent
Color	Colorless - Light amber
Odor	Slight Citrus
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH	Not applicable	
pH @ dilution		
Melting / freezing point	-49.5 °C / -57.2 °F	
Boiling point/range	150 °C / 302 °F	
Flash point	61 °C / 143 °F	PMCC
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	0.915 - 0.935	
Bulk density	No information available	
Water solubility	Insoluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	
log Pow	No information available	
Explosive properties	No information available	
Oxidizing properties	No information available	

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	No information available
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

Combustible liquid.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Heat, flames and sparks.

10.5 Incompatible materials

Strong oxidizing agents. Strong acids. Strong reducing agents. Strong alkalies.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation	Vapors inhaled in high concentration have a narcotic effect on the central nervous system. May cause irritation of respiratory tract. Harmful: danger of serious damage to health by prolonged exposure through inhalation.
Eye contact	Causes serious eye damage.
Skin contact	Causes skin irritation. May cause an allergic skin reaction. May be absorbed through the skin in harmful amounts.
Ingestion	Harmful if swallowed. May be fatal if swallowed and enters airways.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
D-Glucopyranose, oligomeric, C8-10 glycosides	No data available	No data available	No data available
2-butoxyethanol	= 470 mg/kg (Rat)	= 99 mg/kg (Rabbit)	= 450 ppm (Rat) 4 h
Citrus Extract	No data available	No data available	No data available
Distillates, petroleum, hydrotreated light	> 5000 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	> 5.2 mg/L (Rat) 4 h

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
D-Glucopyranose, oligomeric, C8-10 glycosides	No data available	No data available	No data available	No data available
2-butoxyethanol	No data available	A3 Confirmed Animal Carcinogen with Unknown Relevance to Humans	No data available	No data available
Citrus Extract	No data available	No data available	No data available	No data available
Distillates, petroleum, hydrotreated light	No data available	No data available	No data available	No data available

Sensitization May cause sensitization by skin contact.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity This product does not contain any known or suspected carcinogens.

Reproductive toxicity This product does not contain any known or suspected reproductive hazards.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of exposure Skin contact. Inhalation. Ingestion. Eye contact.

Routes of entry Skin absorption. Inhalation. Ingestion.

Specific target organ toxicity - Single exposure Not classified

Specific target organ toxicity - Repeated exposure Not classified.

Aspiration hazard May be fatal if swallowed and enters airways.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
This product is not considered toxic to algae.

Toxicity to fish
This product is not considered toxic to fish.

Toxicity to daphnia and other aquatic invertebrates
This product is not considered toxic to invertebrates.

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
D-Glucopyranose, oligomeric, C8-10 glycosides	No information available	No information available	No information available
2-butoxyethanol	= 2950 mg/L LC50 Lepomis macrochirus 96 h = 1490 mg/L LC50 Lepomis macrochirus 96 h	No information available	1698 - 1940 mg/L EC50 Daphnia magna 24 h > 1000 mg/L EC50 Daphnia magna 48 h
Citrus Extract	No information available	No information available	No information available
Distillates, petroleum, hydrotreated light	= 45 mg/L LC50 Pimephales promelas 96 h = 2.2 mg/L LC50 Lepomis macrochirus 96 h = 2.4 mg/L LC50 Oncorhynchus mykiss 96 h	No information available	= 4720 mg/L LC50 Den-dronereides heteropoda 96 h

12.2 Persistence and degradability

Product is biodegradable.

12.3 Bioaccumulative potential

The product contains potentially bioaccumulating substances.

12.4 Mobility

Dispersible in water.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method	Disposal should be made in accordance with federal, state and local regulations.
Contaminated packaging	Do not re-use empty containers. Empty containers should be taken for local recycling, recovery or waste disposal. Dispose of in accordance with local regulations. Do not burn, or use a cutting torch on, the empty drum. Empty containers may contain flammable or explosive vapors.

14. Transport information

14.1. UN number

UN No. (DOT)	NA1993
UN No. (MT/ANTT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not Regulated
UN No. (IMDG/ANTAQ)	Not Regulated
UN No. (ICAO/ANAC)	Not Regulated
UN No. (DPC)	Not regulated

14.2. UN proper shipping name

Combustible liquid, n.o.s., Combustible liquid, n.o.s., (contains citric distillate, 2-butoxyethanol),

14.3 Hazard class(es)

DOT Hazard class	Combustible liquid
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not Regulated
ICAO/ANAC Hazard class/division	Not Regulated
DPC Hazard class	Not regulated

14.4 Packing group

DOT Packing group	PG III
ANTT Packing group	Not regulated

TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	II
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not Regulated
DPC Packing group	Not regulated

14.5 Environmental hazard

Marine pollutant No

14.6 Special precautions

Not applicable

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Does not comply
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH

All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

IMPORTS, Canada

No import volume restrictions.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories

Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
D-Glucopyranose, oligomeric, C8-10 glycosides	N/A	N/A	N/A
2-butoxyethanol	N/A	N/A	N/A
Citrus Extract	N/A	N/A	N/A
Distillates, petroleum, hydrotreated light	N/A	N/A	N/A

California Proposition 65

This product does not contain chemical[s] which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Canadian Classification

This Safety Data Sheet has been prepared in compliance with the Hazardous Products Regulations.

16. Other Information

Supersedes date	01/Sep/2015
Revision date	05/Nov/2018
Version	7
This SDS has been revised in the following section(s)	3, 15, 16
HMIS classification	
Health	2
Flammability	2
Physical hazard	0
PPE	B

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The information contained herein is considered in good faith as reliable of the date issued and is based upon on measurements, tests or data derived from supplier's own study or furnished by others. In providing this SDS information, Supplier makes no express or implied warranties as to the information or product; merchantability or fitness of purpose; any express or implied warranty; or non-infringement of intellectual property rights; and supplier assumes no responsibility for any direct, special or consequential damages, results obtained, or the activities of others. To the maximum extent permitted by law, supplier's warranty obligations and buyer's sole remedies are as stated in separate agreement between the parties.
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SDS no. PID452
Version 12
Revision date 26/Jun/2020
Supersedes date 03/Apr/2017

Safety Data Sheet
DEFOAM-X*

1. Identification

1.1 Product identifier

Product name DEFOAM-X*

Product code PID452

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Defoamer.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
200 - 125, 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-780-962-8221

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : +55 11 3197 5891

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards Not classified

Environmental hazards Not classified

Physical Hazards Not classified

2.2 Label elements

Signal word
None

Hazard Statements
This product is not classified as hazardous therefore no (H) hazard statements assigned.

Precautionary Statements
This product is not classified as hazardous therefore has no (P) precautionary statements assigned.

Hazards not otherwise classified
None known

Unknown acute toxicity Not applicable.

3. Composition/information on Ingredients

3.1 Substances

Not applicable

3.2 Mixtures

This product does not contain any hazardous ingredients, or ingredients with national workplace exposure limits.

Comments
No Comments.

4. First Aid Measures

4.1 First aid measures

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Get medical attention if symptoms occur.

Skin contact Wash skin thoroughly with soap and water. Get medical attention if irritation persists.

Eye Contact Promptly wash eyes with lots of water while lifting eye lids. Remove contact lenses, if worn. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

General advice The severity of the symptoms described will vary dependant of the concentration and the

length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Symptoms

Inhalation Inhalation of vapors in high concentration may cause irritation of respiratory system.

Ingestion Ingestion may cause stomach discomfort.

Skin contact Prolonged contact may cause redness and irritation.

Eye contact May cause slight irritation. May cause redness, itching, and pain.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Water Fog, Alcohol Foam, CO_2, Dry Chemical.

Extinguishing media which must not be used for safety reasons
None known.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
None known.

Hazardous combustion products
Silicon oxide, Production of explosive gases, strong alkalis and heat.

5.3 Advice for firefighters

Special protective equipment and precautions for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. See also section 8.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Dike far ahead of liquid spill for later disposal.

Methods for cleaning up
Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Do not breathe vapors or spray mist. Avoid spills and splashing during use.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions	Ensure adequate ventilation.
Storage precautions	Keep containers tightly closed in a dry, cool and well-ventilated place.
Packaging materials	Use specially constructed containers only.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Exposure limits **Contains no substances with occupational exposure limit values**

IDLH (Immediately Dangerous to Life or Health)
Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation. Mechanical ventilation or local exhaust ventilation is required.

Personal protective equipment

Eye protection	Safety glasses with side-shields.
Hand protection	Impervious gloves made of: Nitrile Neoprene
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne mist/aerosol of this product, use an organic vapor cartridge with a P-95 pre-filter attached. In work environments containing oil mist/aerosol, use an organic vapor cartridge with a P-95 pre-filter attached.If exposed to vapors from this product, use a NIOSH/MSHA-approved respirator with an organic vapor cartridge.
Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Liquid
Appearance	Viscous
Color	White
Odor	Mild
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH	Not applicable	
pH @ dilution	5 - 8	@ 1%
Melting point	-28.9 °C / -20 °F	
Boiling point	No information available	
Flash point	> 202.8 °C / > 400 °F	PMCC
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	0.91 - 1.0	
Bulk density	No information available	
Water solubility	Dispersible	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	
Partition Coefficient (n-octanol/water)	No information available	
Explosive properties	Not applicable	
Oxidizing properties	None known.	

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	None
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

No specific reactivity hazards associated with this product.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

None known.

10.5 Incompatible materials

Alkali metals. Strong reducing agents.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation	Inhalation of vapors in high concentration may cause irritation of respiratory system.
Eye contact	May cause slight irritation. May cause pain, redness, discomfort.
Skin contact	Prolonged contact may cause redness and irritation.
Ingestion	Ingestion may cause stomach discomfort.

LD50 Oral	> 2000 mg/kg (rat) Calculated (MIXTURE)

Delayed and immediate effects and

chronic effects from short and long term exposure	
Sensitization	This product does not contain any components suspected to be sensitizing.
Mutagenic effects	This product does not contain any known or suspected mutagens.
Carcinogenicity	This product does not contain any known or suspected carcinogens.
Reproductive toxicity	This product does not contain any known or suspected reproductive hazards.
Developmental toxicity	Not known to cause birth defects or have a deleterious effect on a developing fetus.
Routes of Exposure	Eye contact. Skin contact.
Routes of entry	Skin contact. Eye contact.
Specific target organ toxicity - Single exposure	Not classified
Specific target organ toxicity - Repeated exposure	Not classified.
Aspiration hazard	Not applicable.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
This product is not considered toxic to algae.

Toxicity to fish
This product is not considered toxic to fish.

Toxicity to daphnia and other aquatic invertebrates
This product is not considered toxic to invertebrates.

12.2 Persistence and degradability

No product level data available.

12.3 Bioaccumulative potential

No product level data available.

12.4 Mobility

Dispersible in water.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method	Disposal should be made in accordance with federal, state and local regulations.
Contaminated packaging	Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT)	Not regulated
UN No. (MT/ANTT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG/ANTAQ)	Not regulated
UN No. (ICAO/ANAC)	Not regulated
UN No. (DPC)	Not regulated

14.2. UN proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class	Not regulated
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated
DPC Hazard class	Not regulated

14.4 Packing group

DOT Packing group	Not regulated
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated
DPC Packing group	Not regulated

14.5 Environmental hazard

Marine pollutant	No

14.6 Special precautions

Not applicable

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Does not comply
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH
All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

IMPORTS, Canada
No import volume restrictions.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

California Proposition 65

This product does not contain chemical[s] which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Canadian Classification

This Safety Data Sheet has been prepared in compliance with the Hazardous Products Regulations.

Brazilian Regulations

Brazil Regulation	This SDS was prepared in accordance with Brazil law NBR 14725.
Federal Police	Not determined
Army	Not determined
ANVISA	Not determined

16. Other Information

Supersedes date	03/Apr/2017
Revision date	26/Jun/2020

Version	12
This SDS has been revised in the following section(s)	1, 4, 7, 8, 9, 11, 14, 15, 16 No changes with regard to classification have been made.

HMIS classification

Health	1
Flammability	1
Physical hazard	0
PPE	B

N/A - Not Applicable, N/D - Not Determined.

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SDS no. PID510
Version 15
Revision date 12/Oct/2020
Supersedes date 16/Nov/2018

Safety Data Sheet
DUO-VIS*

1. Identification

1.1 Product identifier

Product name DUO-VIS*

Product code PID510

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Viscosifier.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
200 - 125, 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-780-962-8221

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : +55 11 3197 5891

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Skin sensitization	Category 1

Environmental hazards Not classified

Physical Hazards

Combustible dust

2.2 Label elements

Signal word
WARNING

Hazard Statements
H317 - May cause an allergic skin reaction
May form combustible dust concentrations in air

Precautionary Statements
P261 - Avoid breathing dust/fume/gas/mist/vapors/spray
P272 - Contaminated work clothing should not be allowed out of the workplace
P280 - Wear protective gloves, protective clothing, eye protection
P302 + P352 - IF ON SKIN: Wash with plenty of soap and water
P333 + P313 - If skin irritation or rash occurs: Get medical advice/attention
P362 + P364 - Take off contaminated clothing and wash it before reuse
P501 - Dispose of contents/container in accordance with local, regional, national, and international regulations as applicable

P240 - Ground/bond container and receiving equipment
P241 - Use explosion-proof electrical, ventilating, lighting, equipment
P243 - Take precautionary measures against static discharge

Hazards not otherwise classified
None known

Unknown acute toxicity Not applicable.

3. Composition/information on Ingredients

3.1 Substances

Not applicable

3.2 Mixtures

Chemical Name	CAS No	Weight-%
Xanthan Gum	11138-66-2	60-100
Glyoxal	107-22-2	0.1-<1

Comments
The exact percentage (concentration) of composition has been withheld as a trade secret.

4. First Aid Measures

4.1 First aid measures

Inhalation — If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion — Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Get medical attention if symptoms occur.

Skin contact — Wash skin thoroughly with soap and water. Get medical attention if symptoms occur.

Eye Contact — Promptly wash eyes with lots of water while lifting eye lids. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

General advice — The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Symptoms

Inhalation — Please see Section 11. Toxicological Information for further information.

Ingestion — Please see Section 11. Toxicological Information for further information.

Skin contact — Please see Section 11. Toxicological Information for further information.

Eye contact — Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician — Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Water Fog, Alcohol Foam, CO_2, Dry Chemical.

Extinguishing media which must not be used for safety reasons
Do not use a solid water stream as it may scatter and spread fire.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
Combustible material. Dust may form explosive mixture in air. Heating of containers may cause pressure rise, with risk of bursting.

Hazardous combustion products
Carbon oxides (COx).

5.3 Advice for firefighters

Special protective equipment and precautions for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. See also section 8. Extinguish all ignition sources. Avoid sparks, flames, heat and smoking. Material becomes slippery when wet. Use caution if wet.

6.2 Environmental precautions

Disposal should be in accordance with applicable regional, national and local laws and regulations. Refer to applicable federal, state and local regulations.

Environmental exposure controls
Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Cover powder spill with plastic sheet or tarp to minimize spreading. Prevent further leakage or spillage if safe to do so.

Methods for cleaning up
Take precautionary measures against static discharges. Sweep up and shovel into suitable containers for disposal. Avoid dust formation. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Avoid dust formation. Persons susceptible to allergic reactions should not handle this product.

Hygiene measures
Use good work and personal hygiene practices to avoid exposure. When using do not smoke, eat or drink. Wash hands and face before breaks and immediately after handling the product. Remove contaminated clothing.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions	Ensure adequate ventilation. Take precautionary measures against static discharges. Keep airborne concentrations below exposure limits.
Storage precautions	Keep containers tightly closed in a dry, cool and well-ventilated place. Avoid heat, flames and other sources of ignition. Protect from moisture. Avoid contact with:. Strong oxidizing agents.
Packaging materials	Use specially constructed containers only.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Exposure limits

Control as an ACGIH particulate not otherwise specified (PNOS): 10 mg/m³ (Inhalable); 3 mg/m³ (Respirable) and an OSHA particulate not otherwise regulated (PNOR): 15 mg/m³ (Total); 5 mg/m³ (Respirable).

Component Information

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits - TWAs (CMPs)	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits - TWAs (LMPE-PPTs)
Xanthan Gum	Not determined	Not determined	Not determined	Not determined	Not determined
Glyoxal	0.1 mg/m³	Not determined	0.1 mg/m³ TWA	Not determined	0.1 mg/m³ TWA VLE-PPT (inhalable fraction and vapor)

IDLH (Immediately Dangerous to Life or Health)

Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Xanthan Gum 11138-66-2	-
Glyoxal 107-22-2	-

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls

Ensure adequate ventilation.

Personal protective equipment

Eye protection Tightly fitting safety goggles.

Hand protection Use protective gloves made of: Butyl Neoprene Nitrile Frequent change is advisable

Respiratory Protection All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne particles of this product use at least a NIOSH-approved N95 half-mask disposable or re-useable particulate respirator. In work environments containing oil mist/aerosol use at least a NIOSH-approved P95 half-mask disposable or re-useable particulate respirator.

Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Solid
Appearance	Powder Dust
Color	Cream - Tan
Odor	Mild
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH	Not applicable	
pH @ dilution	7	@ 1% sol.
Melting point	No information available	
Boiling point	No information available	
Flash point	No information available	
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	1.5	20 °C
Bulk density	50 lb/ft³ (800 kg/m³)	
Water solubility	Soluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	> 200 °C / > 392 °F	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	
Partition Coefficient (n-octanol/water)	No information available	

Explosive properties	Suspended dust may present a dust explosion hazard
Oxidizing properties	None known.

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	None
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

Combustible material. Dust may form explosive mixture in air.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Take precautionary measures against static charges. Avoid dust formation. Heat, flames and sparks. Protect from moisture.

10.5 Incompatible materials

Strong oxidizing agents.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation Inhalation of dust in high concentration may cause irritation of respiratory system.

Eye contact Dust may cause mechanical irritation.

Skin contact May cause an allergic skin reaction.

Ingestion Ingestion may cause stomach discomfort.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Xanthan Gum	No data available	No data available	No data available
Glyoxal	200 mg/kg (rat)	12700 mg/kg (Rabbit)	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Xanthan Gum	No data available	No data available	No data available	No data available
Glyoxal	No data available	A4 Not Classifiable as a Human Carcinogen	No data available	No data available

Delayed and immediate effects and chronic effects from short and long term exposure

Sensitization May cause sensitization by skin contact.

Mutagenic effects Conclusive but not sufficient for classification. Contains an known or suspected mutagen.

Carcinogenicity	This product does not contain any known or suspected carcinogens.
Reproductive toxicity	This product does not contain any known or suspected reproductive hazards.
Developmental toxicity	Not known to cause birth defects or have a deleterious effect on a developing fetus.
Routes of Exposure	Inhalation. Skin contact.
Routes of entry	Inhalation. Skin contact.
Specific target organ toxicity - Single exposure	Not classified
Specific target organ toxicity - Repeated exposure	Not classified.
Aspiration hazard	Not applicable.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
See component information below.

Toxicity to fish
See component information below.

Toxicity to daphnia and other aquatic invertebrates
See component information below.

Toxicology data for the components

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Xanthan Gum	No information available	No information available	No information available
Glyoxal	460 - 680 mg/L LC50 Leuciscus idus 96 h = 215 mg/L LC50 Pimephales promelas 96 h	<= 348.59 mg/L EC50 Pseudokirchneriella subcapitata 96 h > 500 mg/L EC50 Desmodesmus subspicatus 96 h > 500 mg/L EC50 Desmodesmus subspicatus 72 h	= 404 mg/L EC50 Daphnia magna 48 h

12.2 Persistence and degradability

The product contains substances which are not expected to be biodegradable.

12.3 Bioaccumulative potential

Does not bioaccumulate.

12.4 Mobility

Soluble in water.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

The product component(s) are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method	Disposal should be made in accordance with federal, state and local regulations.
Contaminated packaging	Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT)	Not regulated
UN No. (MT/ANTT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG/ANTAQ)	Not regulated
UN No. (ICAO/ANAC)	Not regulated
UN No. (DPC)	Not regulated

14.2. UN proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class	Not regulated
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated
DPC Hazard class	Not regulated

14.4 Packing group

DOT Packing group	Not regulated
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated
DPC Packing group	Not regulated

14.5 Environmental hazard

Marine pollutant	No

14.6 Special precautions

Not applicable

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Complies
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH
All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Xanthan Gum	N/A	N/A	N/A
Glyoxal	N/A	N/A	N/A

California Proposition 65

This product does not contain chemical[s] which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

This Safety Data Sheet has been prepared in compliance with the Hazardous Products Regulations.

Brazil Regulation	This SDS was prepared in accordance with Brazil law NBR 14725.
Federal Police	Not determined
Army	Not determined
ANVISA	Not determined

16. Other Information

Supersedes date	16/Nov/2018

Revision date	12/Oct/2020
Version	15
This SDS has been revised in the following section(s)	All sections. No changes with regard to classification have been made.

HMIS classification

Health	2
Flammability	1
Physical hazard	0
PPE	E

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SDS no. PID19433
Version 2
Revision date 12/Mar/2019
Supersedes date 14/Sep/2014

Safety Data Sheet
DURAMOD*

1. Identification of the Substance/Preparation and of the Company/Undertaking

1.1 Product identifier

Product name DURAMOD*

Product code PID19433

Country Limitations This product may not be distributed or used in Canada.

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Viscosifier.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : 0800-720-8000/0800-777-2323 (WGRA)

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Carcinogenicity	Category 1A
Specific target organ toxicity - Repeated exposure	Category 2

Environmental hazards Not classified

Physical Hazards Not classified

2.2 Label elements

Signal word
WARNING

Hazard Statements
H350 - May cause cancer
H373 - May cause damage to organs through prolonged or repeated exposure

Precautionary Statements
P201 - Obtain special instructions before use
P260 - Do not breathe dust/fume/gas/mist/vapors/spray
P281 - Use personal protective equipment as required
P308 + P313 - IF exposed or concerned: Get medical advice/attention
P314 - Get medical advice/attention if you feel unwell
P501 - Dispose of contents/container to industrial incineration plant

P202 - Do not handle until all safety precautions have been read and understood
P314 - Get medical advice/attention if you feel unwell
P501 - Dispose of contents/ container to an approved waste disposal plant

Unknown acute toxicity Not applicable.

3. Composition/information on Ingredients

3.1 Substances

Chemical Name	CAS No	Weight-%
Crystalline silica (impurity)	14808-60-7	<3

3.2 Mixtures

Not applicable

Comments
The exact percentage (concentration) of composition has been withheld as a trade secret.

4. First Aid Measures

4.1 First aid measures

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth

to an unconscious person. Get medical attention if symptoms occur.

Skin contact Wash skin thoroughly with soap and water. Get medical attention if irritation persists.

Eye Contact Promptly wash eyes with lots of water while lifting eye lids. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

General advice The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Symptoms

Inhalation Please see Section 11. Toxicological Information for further information.

Ingestion Please see Section 11. Toxicological Information for further information.

Skin contact Please see Section 11. Toxicological Information for further information.

Eye contact Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Water Fog, Alcohol Foam, CO_2, Dry Chemical.

Extinguishing media which must not be used for safety reasons
None known.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
None known.

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. See also section 8. Material becomes slippery when wet. Use caution if wet.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Cover powder spill with plastic sheet or tarp to minimize spreading. Prevent further leakage or spillage if safe to do so.

Methods for cleaning up
Sweep up and shovel into suitable containers for disposal. Avoid dust formation. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Avoid dust formation. Material becomes slippery when wet. Use caution if wet.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Ensure adequate ventilation. Keep airborne concentrations below exposure limits.

Storage precautions Keep containers tightly closed in a dry, cool and well-ventilated place. Protect from moisture.

Packaging materials Use specially constructed containers only.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Component Information

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits - TWAs (CMPs)	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits - TWAs (LMPE-PPTs)
Crystalline silica (impurity)	0.025 mg/m³	50 µg/m³ TWA respirable fraction	0.05 mg/m³ TWA	Not determined	0.1 mg/m³ TWA VLE-PPT (respirable fraction)

Crystalline silica (impurity)
OSHA - Final PELs - Table Z-3 Mineral Dusts
(250)/(%SiO2 + 5) mppcf TWA, respirable fraction; (10)/(%SiO2 + 2) mg/m³ TWA, respirable fraction

IDLH (Immediately Dangerous to Life or Health)
This product contains substance(s) classified as Immediately Dangerous to Life or Health (IDLH) by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Crystalline silica (impurity) 14808-60-7	50 mg/m³ IDLH (respirable dust)

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation.

Personal protective equipment

Eye protection	It is good practice to wear goggles when handling any chemical. Tightly fitting safety goggles.
Hand protection	Repeated or prolonged contact Use protective gloves made of: Nitrile Neoprene gloves
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne mist/aerosol of this product, use an organic vapor cartridge with a P-95 pre-filter attached. In work environments containing oil mist/aerosol, use an organic vapor cartridge with a P-95 pre-filter attached.If exposed to vapors from this product, use a NIOSH/MSHA-approved respirator with an organic vapor cartridge.
Skin and body protection	Wear suitable protective clothing and gloves, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Solid
Appearance	Granules
Color	Light gray - Tan
Odor	Earthy
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH	Not applicable	
pH @ dilution		
Melting / freezing point	No information available	
Boiling point/range	No information available	
Flash point	No information available	PMCC
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	2.2 - 2.4	
Bulk density	No information available	
Water solubility	Insoluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	

Decomposition temperature	No information available
Kinematic viscosity	No information available
Dynamic viscosity	No information available
log Pow	No information available
Explosive properties	No information available
Oxidizing properties	No information available

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	No information available
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

No specific reactivity hazards associated with this product.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Avoid dust formation. Protect from moisture.

10.5 Incompatible materials

Strong oxidizing agents.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation	Inhalation of dust may cause shortness of breath, tightness of the chest, a sore throat and cough.
Eye contact	Dust may cause mechanical irritation.
Skin contact	Repeated exposure may cause skin dryness or cracking.
Ingestion	Irritant; may cause pain or discomfort to mouth, throat and stomach.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation

Crystalline silica (impurity)	= 500 mg/kg (Rat)	No data available	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Crystalline silica (impurity)	Group 1; Monograph 100C [2012] Monograph 100C [2012] (listed under Crystalline silica inhaled in the form of quartz or cristobalite from occupational sources); Monograph 68 [1997] Group 1; Monograph 68 [1997]	A2 Suspected Human Carcinogen	Present	Known Human Carcinogen

Sensitization This product does not contain any components suspected to be sensitizing.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity Contains a known or suspected carcinogen.

Reproductive toxicity This product does not contain any known or suspected reproductive hazards.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of Exposure Inhalation. Skin contact. Eye contact.

Routes of entry Inhalation.

Specific target organ toxicity - Single exposure Not classified

Specific target organ toxicity - Repeated exposure Category 2.

Target organ effects Lungs.

Aspiration hazard Not applicable.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
This product is not considered toxic to algae.

Toxicity to fish
This product is not considered toxic to fish.

Toxicity to daphnia and other aquatic invertebrates
This product is not considered toxic to invertebrates.

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Crystalline silica (impurity)	LC50 Danio rerio (zebra fish) : > 10000 mg/l 96h	EC50: > 1000 mg/l 72h	LC50 Daphnia manga (Water flea): > 10000 mg/l 24h

12.2 Persistence and degradability

Not Applicable - Inorganic chemical.

12.3 Bioaccumulative potential

Not Applicable - Inorganic chemical.

12.4 Mobility

Insoluble in water.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method	Disposal should be made in accordance with federal, state and local regulations.
Contaminated packaging	Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT)	Not regulated
UN No. (MT/ANTT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG/ANTAQ)	Not regulated
UN No. (ICAO/ANAC)	Not regulated
UN No. (DPC)	Not regulated

14.2. UN proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class	Not regulated
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated
DPC Hazard class	Not regulated

14.4 Packing group

DOT Packing group	Not regulated
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated
DPC Packing group	Not regulated

14.5 Environmental hazard
No

14.6 Special precautions
Not applicable

14.7 Transport in bulk according to Annex I/II of MARPOL 73/78 and the IBC Code
Please contact SDS@slb.com for info regarding transport in Bulk.

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	This product contains chemical(s) which is/are not listed on DSL but is/are listed on the NDSL.
Philippines (PICCS)	Complies
Japan (ENCS)	Does not comply
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH
All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Crystalline silica (impurity)	N/A	N/A	N/A

California Proposition 65

WARNING

This product can expose you to chemicals including those listed below, which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Chemical Name	California Proposition 65
Crystalline silica (impurity) 14808-60-7	Carcinogen

Canadian Classification

This product may not be distributed or used in Canada.

16. Other Information

Supersedes date	14/Sep/2014
Revision date	12/Mar/2019
Version	2
This SDS has been revised in the following section(s)	All sections. Product Code change No changes with regard to classification have been made.
HMIS classification	
Health	1*
Flammability	0
Physical hazard	0
PPE	X

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Safety Data Sheet
ECOTROL* RD

1. Identification

1.1 Product identifier

Product name ECOTROL* RD

Product code PID10792

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Filtration-control.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
200 - 125, 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-780-962-8221

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : +55 11 3197 5891

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards Not classified

Environmental hazards Not classified

Physical Hazards

Combustible dust

2.2 Label elements

Signal word
WARNING

Hazard Statements
May form combustible dust concentrations in air

Precautionary Statements
P240 - Ground or bond container and receiving equipment
P241 - Use explosion-proof electrical, ventilating, lighting, equipment
P243 - Take precautionary measures against static discharge

Unknown acute toxicity Not applicable.

3. Composition/information on Ingredients

3.1 Substances

Not applicable

3.2 Mixtures

Chemical Name	CAS No	Weight-%
Polymer	Proprietary	60-100
Silica gel, pptd., cryst.-free	112926-00-8	1 - 5

Comments
Proprietary component(s) in section 3 of this SDS does not/do not trigger application of trade secret exemption under Hazardous Materials Information Review Act (HMIRA). The proprietary component in this product contributes to combustible dust classification.

4. First Aid Measures

4.1 First aid measures

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Get medical attention if symptoms occur.

Skin contact Wash skin thoroughly with soap and water. Get medical attention if irritation persists.

Eye Contact Promptly wash eyes with lots of water while lifting eye lids. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

General advice	The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.
Symptoms	
Inhalation	Please see Section 11. Toxicological Information for further information.
Ingestion	Please see Section 11. Toxicological Information for further information.
Skin contact	Please see Section 11. Toxicological Information for further information.
Eye contact	Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing agent suitable for type of surrounding fire.

Extinguishing media which must not be used for safety reasons
None known.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
Dust may form explosive mixture in air.

Hazardous combustion products
Fire or high temperatures create:, Carbon oxides (COx), Hydrocarbon.

5.3 Advice for firefighters

Special protective equipment and precautions for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Extinguish all ignition sources. Avoid sparks, flames, heat and smoking. Use personal protective equipment. See also section 8. Material becomes slippery when wet. Use caution if wet.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Cover powder spill with plastic sheet or tarp to minimize spreading.

Methods for cleaning up
Take precautionary measures against static discharges. Sweep up and shovel into suitable containers for disposal. Avoid dust formation. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Avoid dust formation. Material becomes slippery when wet. Use caution if wet.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Ensure adequate ventilation. Take precautionary measures against static discharges. Keep airborne concentrations below exposure limits.

Storage precautions Keep containers tightly closed in a dry, cool and well-ventilated place. Follow safe warehousing practices regarding palletizing, banding, shrink-wrapping and/or stacking. Avoid heat, flames and other sources of ignition. Protect from moisture. Avoid contact with:. Strong oxidizing agents.

Packaging materials Use specially constructed containers only.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Exposure limits **Control as an ACGIH particulate not otherwise specified (PNOS): 10 mg/m³ (Inhalable); 3 mg/m³ (Respirable) and an OSHA particulate not otherwise regulated (PNOR): 15 mg/m³ (Total); 5 mg/m³ (Respirable).**

Component Information

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits - TWAs (CMPs)	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits - TWAs (LMPE-PPTs)
Polymer	Not determined	Not determined	Not determined	Not determined	Not determined
Silica gel, pptd., cryst.-free	Not determined	20 mppcf	10 mg/m³ TWA	Not determined	Not determined

Silica gel, pptd., cryst.-free
OSHA - Final PELs - Table Z-3 Mineral Dusts
20 mppcf TWA; (80)/(% SiO2) mg/m³ TWA

IDLH (Immediately Dangerous to Life or Health)

Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Polymer	-
Silica gel, pptd., cryst.-free 112926-00-8	-

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation. Mechanical ventilation or local exhaust ventilation is required.

Personal protective equipment

Eye protection	Tightly fitting safety goggles.
Hand protection	Wear chemical resistant gloves such as nitrile or neoprene. Frequent change is advisable
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne particles of this product use at least a NIOSH-approved N95 half-mask disposable or re-useable particulate respirator. In work environments containing oil mist/aerosol use at least a NIOSH-approved P95 half-mask disposable or re-useable particulate respirator.
Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Solid
Appearance	Powder Dust
Color	White
Odor	Odorless
Odor threshold	Not applicable

Property	Values	Remarks
pH	Not applicable	
pH @ dilution	No information available	
Melting point	No information available	

Boiling point	No information available	
Flash point	No information available	
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	1.03	20 °C
Bulk density	No information available	
Water solubility	Insoluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	400 °C / 752 °F	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	
Partition Coefficient (n-octanol/water)	No information available	

Explosive properties Suspended dust may present a dust explosion hazard
Oxidizing properties No information available

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	No information available
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

Dust may form explosive mixture in air.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Take precautionary measures against static charges. Avoid heat, flames and other sources of ignition. Avoid dust formation. Protect from moisture.

10.5 Incompatible materials

Strong oxidizing agents.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation Inhalation of dust in high concentration may cause irritation of respiratory system.

Eye contact Dust may cause mechanical irritation.

Skin contact Prolonged contact may cause redness and irritation.

Ingestion Ingestion may cause stomach discomfort.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Polymer	No data available	No data available	No data available
Silica gel, pptd., cryst.-free	7900 mg/kg (rat)	2002 mg/kg (Rabbit)	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Polymer	No data available	No data available	No data available	No data available
Silica gel, pptd., cryst.-free	No data available	No data available	No data available	No data available

Delayed and immediate effects and chronic effects from short and long term exposure

Sensitization This product does not contain any components suspected to be sensitizing.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity This product does not contain any known or suspected carcinogens.

Reproductive toxicity This product does not contain any known or suspected reproductive hazards.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of Exposure Inhalation.

Routes of entry Inhalation.

Specific target organ toxicity - Single exposure Not classified

Specific target organ toxicity - Repeated exposure Not classified.

Aspiration hazard Not applicable.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
This product is not considered toxic to algae.

Toxicity to fish
This product is not considered toxic to fish.

Toxicity to daphnia and other aquatic invertebrates
This product is not considered toxic to invertebrates.

Toxicology data for the components

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Polymer	No information available	No information available	No information available
Silica gel, pptd., cryst.-free	= 5000 mg/L LC50 Brachydanio rerio 96 h	= 440 mg/L EC50 Pseudokirchneriella subcapitata 72 h	= 7600 mg/L EC50 Ceriodaphnia dubia 48 h

12.2 Persistence and degradability

Not readily biodegradable.

12.3 Bioaccumulative potential

Does not bioaccumulate.

12.4 Mobility

Insoluble in water.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method Disposal should be made in accordance with federal, state and local regulations.

Contaminated packaging Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT)	Not regulated
UN No. (MT/ANTT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG/ANTAQ)	Not regulated
UN No. (ICAO/ANAC)	Not regulated
UN No. (DPC)	Not regulated

14.2. UN proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class	Not regulated
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated
DPC Hazard class	Not regulated

14.4 Packing group

DOT Packing group	Not regulated
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated
DPC Packing group	Not regulated

14.5 Environmental hazard

Marine pollutant	No

14.6 Special precautions

Not applicable

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Does not comply
Japan (ENCS)	Does not comply
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH

All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that

it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Polymer	N/A	N/A	N/A
Silica gel, pptd., cryst.-free	N/A	N/A	N/A

California Proposition 65

This product does not contain chemical[s] which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Canadian Classification

This Safety Data Sheet has been prepared in compliance with the Hazardous Products Regulations.

Brazil Regulation This SDS was prepared in accordance with Brazil law NBR 14725.

Federal Police Not determined

Army Not determined

ANVISA Not determined

16. Other Information

Supersedes date 10/Jul/2020

Revision date 12/Oct/2020

Version 10

This SDS has been revised in the following section(s) 15. Regulatory Information Section 16: Other information No changes with regard to classification have been made.

HMIS classification

Health	1
Flammability	1
Physical hazard	0
PPE	E

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measurements, tests or data derived from supplier's own study or furnished by others. In providing this SDS information, Supplier makes no express or implied warranties as to the information or product; merchantability or fitness of purpose; any express or implied warranty; or non-infringement of intellectual property rights; and supplier assumes no responsibility for any direct, special or consequential damages, results obtained, or the activities of others. To the maximum extent permitted by law, supplier's warranty obligations and buyer's sole remedies are as stated in separate agreement between the parties.
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SAFETY DATA SHEET
ESCAID 110

1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

PRODUCT NAME	ESCAID 110
APPLICATION	Base Fluid
SUPPLIER	M-I SWACO. Holburn House, 475-485, Union Street, Aberdeen. AB11 6DB Scotland T -44 (0)1224-336336 F -44 (0)1224-336351
EMERGENCY TELEPHONE	(24 Hour) Europe +44 (0) 208 762 8322, Asia Pacific +65 633 44 177, China +86 10 5100 3039, Middle East and Africa +961 3 487 287.

2 HAZARDS IDENTIFICATION

Harmful: may cause lung damage if swallowed.

Repeated exposure may cause skin dryness or cracking.

CLASSIFICATION Xn;R65. R66.

3 COMPOSITION/INFORMATION ON INGREDIENTS

Name	EC No.	CAS-No.	Content	Classification
DISTILLATES (PETROLEUM), HYDROTREATED LIGHT; KEROSINE - UNSPECIFIED	265-149-8	64742-47-8	60-100%	Xn;R65.

The Full Text for all R-Phrases are Displayed in Section 16

COMPOSITION COMMENTS

The data shown is in accordance with the latest EC Directives.

4 FIRST-AID MEASURES

INHALATION

Move the exposed person to fresh air at once. If respiratory problems, artificial respiration/oxygen. Get medical attention if any discomfort continues.

INGESTION

Do not induce vomiting. If vomiting occurs, the head should be kept low so that stomach vomit doesn't enter the lungs. Rinse mouth thoroughly with water and give large amounts of milk or water to people not unconscious. Get medical attention.

SKIN CONTACT

Remove contaminated clothing immediately and wash skin with soap and water. Get medical attention promptly if symptoms occur after washing.

EYE CONTACT

Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

5 FIRE-FIGHTING MEASURES

EXTINGUISHING MEDIA

Water spray, foam, dry powder or carbon dioxide.

SPECIAL FIRE FIGHTING PROCEDURES

Do not use water jet as an extinguisher, as this will spread the fire. Containers close to fire should be removed immediately or cooled with water.

SPECIFIC HAZARDS

Fire or high temperatures create: Oxides of: Carbon.

PROTECTIVE MEASURES IN FIRE

Self contained breathing apparatus and full protective clothing must be worn in case of fire.

6 ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS

Wear protective clothing as described in Section 8 of this safety data sheet.

ENVIRONMENTAL PRECAUTIONS

Do not allow to enter drains, sewers or watercourses.

SPILL CLEAN UP METHODS

Stop leak if possible without risk. Dike far ahead of larger spills for later disposal. Absorb spillage with suitable absorbent material. Shovel into dry containers. Cover and move the containers. Flush the area with water. In case of spills, beware of slippery floors and surfaces.

7 HANDLING AND STORAGE

USAGE PRECAUTIONS

Do not use contact lenses. Avoid inhalation of vapours/spray and contact with skin and eyes.

STORAGE PRECAUTIONS

Store in tightly closed original container in a dry, cool and well-ventilated place.

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

INGREDIENT COMMENTS

Oil mist (mineral) workplace exposure limits are currently under review by legislative authorities. This workplace exposure limit (WEL) standard is applicable to highly refined mineral oils and is provided as a guidance limit only LT. EXP = 5mg/m3 and ST. EXP = 10mg/m3.

PROTECTIVE EQUIPMENT

ENGINEERING MEASURES

Provide adequate general and local exhaust ventilation.

RESPIRATORY EQUIPMENT

Respiratory protection must be used if air contamination exceeds acceptable level. Wear mask supplied with: Gas cartridge suitable for organic substances.

HAND PROTECTION

Chemical resistant gloves required for prolonged or repeated contact. Use protective gloves made of: Nitrile.

EYE PROTECTION

Wear splash-proof eye goggles to prevent any possibility of eye contact.

OTHER PROTECTION

Wear appropriate clothing to prevent repeated or prolonged skin contact. Provide eyewash station.

9 PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE	Clear liquid
COLOUR	Colourless
ODOUR	Mild Petroleum. / Solvent.
SOLUBILITY	Insoluble in water

MOL. WEIGHT	172	BOILING POINT (°C)	192°C (378°F) - 245°C (473°F)
RELATIVE DENSITY	0.804 s.g	BULK DENSITY	803 kg/m3
VAPOUR DENSITY (air=1)	>1 at 101 kPa	VAPOUR PRESSURE	0.3 kPa @ 20°C
EVAPORATION RATE	<0.01 BuAc=1	VISCOSITY	1.64 cSt @ 40°C
FLASH POINT (°C)	>70°C (158°F) CC (Closed cup).	AUTO IGNITION TEMPERATURE (°C)	>200°C (392°F)
FLAMMABILITY LIMIT - LOWER(%)	0.6	FLAMMABILITY LIMIT - UPPER(%)	7.0
POUR POINT (°C)	<-20°C (-4°F)		

10 STABILITY AND REACTIVITY

STABILITY

Stable under normal temperature conditions.

CONDITIONS TO AVOID

Avoid heat, flames and other sources of ignition.

MATERIALS TO AVOID

Avoid: Strong oxidising substances.

HAZARDOUS DECOMPOSITION PRODUCTS

Fire or high temperatures create: Oxides of: Carbon.

11 TOXICOLOGICAL INFORMATION

INHALATION

May cause irritation to the respiratory system.

INGESTION

Harmful: may cause lung damage if swallowed. Low viscosity product. If after ingestion occurs, harmful or fatal if aspirated into the lungs.

SKIN CONTACT

Product has a defatting effect on skin. Prolonged or repeated contact may lead to irritation and dermatitis.

EYE CONTACT

Spray and vapour in the eyes may cause irritation and smarting.

12 ECOLOGICAL INFORMATION

ECOTOXICITY

Contact M-I Swaco's QHSE Department for ecological information.

13 DISPOSAL CONSIDERATIONS

DISPOSAL METHODS

Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local authority requirements.

14 TRANSPORT INFORMATION

GENERAL	The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA, ADR/RID).

15 REGULATORY INFORMATION

LABELLING

Harmful

RISK PHRASES

R65	Harmful: may cause lung damage if swallowed.
R66	Repeated exposure may cause skin dryness or cracking.

SAFETY PHRASES

S23	Do not breathe vapour/spray.
S24	Avoid contact with skin.
S62	If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

UK REGULATORY REFERENCES

Chemicals (Hazard Information & Packaging) Regulations.

ENVIRONMENTAL LISTING

OGP Group III non-aqueous fluid

EU DIRECTIVES

Dangerous Substance Directive 67/548/EEC. Dangerous Preparations Directive 1999/45/EC.

GUIDANCE NOTES

Workplace Exposure Limits EH40.

16 OTHER INFORMATION

INFORMATION SOURCES

Material Safety Data Sheet, Misc. manufacturers. Product information provided by the commercial vendor(s). European Chemicals Bureau - ESIS (European Chemical Substances Information System).

REVISION COMMENTS

General revision. Compiled or revised by Bill Cameron

ISSUED BY

Dr. Kirsty Walker

REVISION DATE	07-06-07
REV. NO./REPL. SDS GENERATED	2
SDS NO.	11230

RISK PHRASES IN FULL

R65	Harmful: may cause lung damage if swallowed.

DISCLAIMER

MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We cannot make any assertions as to its reliability or completeness; therefore, user may rely only at user's risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations. It is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to this product or to the data herein is made or incurred hereunder.

SDS no. PID2272
Version 15
Revision date 19/Dec/2018
Supersedes date 31/Jan/2017

Safety Data Sheet
HRP*

1. Identification of the Substance/Preparation and of the Company/Undertaking

1.1 Product identifier

Product name HRP*

Product code PID2272

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Viscosifier.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

Schlumberger Canada, Ltd.
200, 125 - 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-613-992-4624

E-mail address sdsmi@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : 0800-720-8000/0800-777-2323 (WGRA)

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Skin corrosion/irritation	Category 2
Serious eye damage/eye irritation	Category 1

Environmental hazards Not classified

Physical Hazards Not classified

2.2 Label elements

Signal word
DANGER

Hazard Statements
H315 - Causes skin irritation
H318 - Causes serious eye damage

Precautionary Statements
P280 - Wear protective gloves/protective clothing/eye protection/face protection
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a POISON CENTER or doctor/physician
P302 + P352 - IF ON SKIN: Wash with plenty of soap and water
P332 + P313 - If skin irritation occurs: Get medical advice/attention
P501 - Dispose of contents/container in accordance with local, regional, national, and international regulations as applicable

Supplementary precautionary statements
P264 - Wash face, hands and any exposed skin thoroughly after handling
P362 - Take off contaminated clothing and wash before reuse

Hazards not otherwise classified
None known

Unknown acute toxicity Not applicable.

3. Composition/information on Ingredients

3.1 Substances

Not applicable

3.2 Mixtures

Chemical Name	CAS No	Weight-%
Fatty acid, C18 unsatd. dimers, polymer with diethanolamine and diethylenetriamine	515861-19-5	45 - 70
2-[2-(2-butoxyethoxy)ethoxy]ethanol	143-22-6	45 - 70
4-methyl-1,3-dioxolan-2-one	108-32-7	5 - 10

Comments
Fatty acid, C18 unsatd. dimers, polymer with diethanolamine and diethylenetriamine can also use the CAS # 68410-22-0. The exact percentage (concentration) of composition has been withheld as a trade secret

4. First Aid Measures

4.1 First aid measures

Inhalation — If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion — Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Seek medical attention if irritation occurs.

Skin contact — Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention if irritation persists.

Eye Contact — Promptly wash eyes with lots of water while lifting eye lids. Remove contact lenses, if worn. Continue to rinse for at least 15 minutes. Seek medical attention.

4.2. Most important symptoms and effects, both acute and delayed

General advice — The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Symptoms

Inhalation — Please see Section 11. Toxicological Information for further information.

Ingestion — Please see Section 11. Toxicological Information for further information.

Skin contact — Please see Section 11. Toxicological Information for further information.

Eye contact — Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician — Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Water Fog, Alcohol Foam, CO_2, Dry Chemical.

Extinguishing media which must not be used for safety reasons
None known.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
None known.

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures

Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. See also section 8.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Dike far ahead of liquid spill for later disposal.

Methods for cleaning up
Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Do not breathe vapors or spray mist. Avoid spills and splashing during use.

Hygiene measures
Use good work and personal hygiene practices to avoid exposure. When using do not smoke, eat or drink. Wash hands before eating, drinking or smoking. Remove contaminated clothing.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Ensure adequate ventilation. Keep airborne concentrations below exposure limits.

Storage precautions Keep containers tightly closed in a dry, cool and well-ventilated place. Avoid contact with:. Strong oxidizing agents.

Packaging materials Use specially constructed containers only.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Exposure limits

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits - TWAs (CMPs)	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits - TWAs (LMPE-PPTs)
Fatty acid, C18 unsatd. dimers, polymer with	Not determined	Not determined	Not determined	Not determined	Not determined

diethanolamine and diethylenetriamine					
2-[2-(2-butoxyethoxy)ethoxy]ethanol	Not determined	Not determined	Not determined	Not determined	Not determined
4-methyl-1,3-dioxolan-2-one	Not determined	Not determined	Not determined	Not determined	Not determined

IDLH (Immediately Dangerous to Life or Health)
Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Fatty acid, C18 unsatd. dimers, polymer with diethanolamine and diethylenetriamine 515861-19-5	-
2-[2-(2-butoxyethoxy)ethoxy]ethanol 143-22-6	-
4-methyl-1,3-dioxolan-2-one 108-32-7	-

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation. Mechanical ventilation or local exhaust ventilation is required. Apply technical measures to comply with the occupational exposure limits. Keep airborne concentrations below exposure limits.

Personal protective equipment

Eye protection	Tightly fitting safety goggles.
Hand protection	Impervious gloves made of: Neoprene Nitrile PVC Break through time >480 minutes Glove thickness >=0.4 mm Be aware that liquid may penetrate the gloves. Frequent change is advisable.
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne mist/aerosol of this product, use an organic vapor cartridge with a P-95 pre-filter attached. In work environments containing oil mist/aerosol, use an organic vapor cartridge with a P-95 pre-filter attached.If exposed to vapors from this product, use a NIOSH/MSHA-approved respirator with an organic vapor cartridge.
Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Liquid
Appearance	Transparent
Color	Straw
Odor	Slight
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH	No information available	
pH @ dilution	8-9	(20 g/l IPA)
Melting / freezing point	No information available	
Boiling point/range	No information available	
Flash point	> 93 °C / 200 °F	PMCC
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	1.01 sg	
Bulk density	No information available	
Water solubility	Insoluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	
Dynamic viscosity	2000 mPa s	@ 20 °C
log Pow	No information available	
Explosive properties	Not applicable	
Oxidizing properties	None known.	

9.2 Other information

Pour point	4°C / 40°F
Molecular weight	No information available
VOC content(%)	None
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

No specific reactivity hazards associated with this product.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Avoid contact with heat, sparks, open flame, and static discharge. Do not freeze. Keep away from direct sunlight.

10.5 Incompatible materials

Strong oxidizing agents.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation Inhalation of vapors in high concentration may cause irritation of respiratory system.

Eye contact Causes serious eye damage.

Skin contact Causes skin irritation.

Ingestion Ingestion may cause stomach discomfort.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Fatty acid, C18 unsatd. dimers, polymer with diethanolamine and diethylenetriamine	No data available	No data available	No data available
2-[2-(2-butoxyethoxy)ethoxy]ethanol	= 5300 mg/kg (Rat) Literature data	> 2000 mg/kg (Rabbit)	No data available
4-methyl-1,3-dioxolan-2-one	= 29000 mg/kg (Rat)	> 3000 mg/kg (Rabbit)	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Fatty acid, C18 unsatd. dimers, polymer with diethanolamine and diethylenetriamine	No data available	No data available	No data available	No data available
2-[2-(2-butoxyethoxy)ethoxy]ethanol	No data available	No data available	No data available	No data available
4-methyl-1,3-dioxolan-2-one	No data available	No data available	No data available	No data available

Sensitization Not classified.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity This product does not contain any known or suspected carcinogens.

Reproductive toxicity This product does not contain any known or suspected reproductive hazards.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of exposure Eyes. Skin contact.

Routes of entry No route of entry noted.

Specific target organ toxicity - Single exposure Not classified

Specific target organ toxicity - Repeated exposure Not classified.

Aspiration hazard Not classified.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
See component information below.

Toxicity to fish
See component information below.

Toxicity to daphnia and other aquatic invertebrates
See component information below.

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Fatty acid, C18 unsatd. dimers, polymer with diethanolamine and diethylenetriamine	No information available	No information available	No information available
2-[2-(2-butoxyethoxy)ethoxy]ethanol	2200 - 4600 mg/L LC50 Leuciscus idus 96h = 2400 mg/L LC50 Pimephales promelas 96h	> 500 mg/L EC50 Desmodesmus subspicatus 72h	> 500 mg/L EC50 Daphnia magna 48h
4-methyl-1,3-dioxolan-2-one	= 5300 mg/L LC50 Leuciscus idus 96 h > 1000 mg/L LC50 Cyprinus carpio 96 h	> 500 mg/L EC50 Desmodesmus subspicatus 72 h	> 500 mg/L EC50 Daphnia magna 48 h

12.2 Persistence and degradability

Not readily biodegradable.

12.3 Bioaccumulative potential

Does not bioaccumulate.

12.4 Mobility

Insoluble in water.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method Disposal should be made in accordance with federal, state and local regulations.

Contaminated packaging Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT)	Not regulated
UN No. (MT/ANTT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG/ANTAQ)	Not regulated
UN No. (ICAO/ANAC)	Not regulated
UN No. (DPC)	Not regulated

14.2. UN proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class	Not regulated
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated
DPC Hazard class	Not regulated

14.4 Packing group

DOT Packing group	Not regulated
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated
DPC Packing group	Not regulated

14.5 Environmental hazard

No

14.6 Special precautions

Not applicable

14.7 Transport in bulk according to Annex I/II of MARPOL 73/78 and the IBC Code

Please contact SDS@slb.com for info regarding transport in Bulk.

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Does not comply
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH

All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that

it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

IMPORTS, Canada
No import volume restrictions.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Fatty acid, C18 unsatd. dimers, polymer with diethanolamine and diethylenetriamine	N/A	N/A	N/A
2-[2-(2-butoxyethoxy)ethoxy]ethanol	N/A	N/A	N/A
4-methyl-1,3-dioxolan-2-one	N/A	N/A	N/A

California Proposition 65

This product does not contain chemical[s] which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Canadian Classification

This Safety Data Sheet has been prepared in compliance with the Hazardous Products Regulations.

Brazilian Regulations

Brazil Regulation This SDS was prepared in accordance with Brazil law NBR 14725.

Federal Police Not determined

Army Not determined

ANVISA Not determined

16. Other Information

Supersedes date 31/Jan/2017

Revision date 19/Dec/2018

Version 15

This SDS has been revised in the following section(s) 9, 16

HMIS classification

Health	3
Flammability	1
Physical hazard	0
PPE	X

N/A - Not Applicable, N/D - Not Determined.

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SDS no. PID15613
Version 5
Revision date 15/Jan/2020
Supersedes date 03/Jan/2017

Safety Data Sheet
KI-3924

1. Identification

1.1 Product identifier

Product name KI-3924

Product code PID15613

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Corrosion inhibitor.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
Schlumberger Production Technologies
P.O. Box 42842
Houston, TX 77242
Telephone: 1 281-561-1511
www.slb.com

Schlumberger Canada, Ltd.
200, 125 - 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-613-992-4624

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : +55 11 3197 5891

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Skin corrosion/irritation	Category 2
Serious eye damage/eye irritation	Category 1
Skin sensitization	Category 1

Environmental hazards

Acute aquatic toxicity	Category 1
Chronic aquatic toxicity	Category 1

Physical Hazards Not classified

2.2 Label elements

Signal word
DANGER

Hazard Statements
H315 - Causes skin irritation
H317 - May cause an allergic skin reaction
H318 - Causes serious eye damage
H410 - Very toxic to aquatic life with long lasting effects

Precautionary Statements
P280 - Wear protective gloves and eye/face protection
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a POISON CENTER or physician
P302 + P352 - IF ON SKIN: Wash with plenty of soap and water
P333 + P313 - If skin irritation or rash occurs: Get medical advice/attention
P501 - Dispose of contents/container in accordance with local, regional, national, and international regulations as applicable

Supplementary precautionary statements
P261 - Avoid breathing dust/fume/gas/mist/vapors/spray
P264 - Wash face, hands and any exposed skin thoroughly after handling
P272 - Contaminated work clothing should not be allowed out of the workplace
P273 - Avoid release to the environment
P362 + P364 - Take off contaminated clothing and wash it before reuse
P391 - Collect spillage

Hazards not otherwise classified
None known

Unknown acute toxicity Not applicable.

3. Composition/information on Ingredients

3.1 Substances

Chemical Name	CAS No	Weight-%
Amines, N-coco alkyltrimethylenedi-, acetates	61791-64-8	60-100

3.2 Mixtures

Not applicable

Comments
The exact percentage (concentration) of composition has been withheld as a trade secret.

4. First Aid Measures

4.1 First aid measures

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Seek medical attention if irritation occurs.

Skin contact Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention if irritation persists.

Eye Contact Immediately flush eyes with water for 15 minutes while holding eyelids open. Seek medical attention.

4.2. Most important symptoms and effects, both acute and delayed

General advice The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Symptoms

Inhalation Inhalation of dust in high concentration may cause irritation of respiratory system.

Ingestion Ingestion may cause stomach discomfort.

Skin contact Causes skin irritation. Repeated or prolonged skin contact may cause allergic reactions with susceptible persons.

Eye contact Causes severe irritation and or burns. May cause irreversible damage to eyes.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, fog, Carbon dioxide (CO_2), foam or dry chemical.

Extinguishing media which must not be used for safety reasons
None known.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
Contact with metals may evolve flammable hydrogen gas.

5.3 Advice for firefighters

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. See also section 8.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Cover powder spill with plastic sheet or tarp to minimize spreading and keep powder dry.

Methods for cleaning up
Sweep up and shovel into suitable containers for disposal. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes and clothing. Do not breathe dust. Avoid dust formation. Persons susceptible to allergic reactions should not handle this product.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Ensure adequate ventilation.

Storage precautions Keep containers tightly closed in a dry, cool and well-ventilated place. Store in original container. Avoid contact with:. Heat. Strong oxidizing agents. Strong acids.

Packaging materials Use specially constructed containers only.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Exposure limits **Contains no substances with occupational exposure limit values**

Component Information

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits - TWAs (CMPs)	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits - TWAs (LMPE-PPTs)
Amines, N-coco alkyltrimethylenedi-, acetates	Not determined	Not determined	Not determined	Not determined	Not determined

IDLH (Immediately Dangerous to Life or Health)

Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Amines, N-coco alkyltrimethylenedi-, acetates 61791-64-8	Not detemined

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation, especially in confined areas.

Personal protective equipment

Eye protection	Tightly fitting safety goggles. Safety glasses with side-shields.
Hand protection	Impervious gloves made of: Nitrile Break through time >480 minutes Glove thickness 0.26 mm Frequent change is advisable
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne mist/aerosol of this product, use an organic vapor cartridge with a P-95 pre-filter attached. In work environments containing oil mist/aerosol, use an organic vapor cartridge with a P-95 pre-filter attached.If exposed to vapors from this product, use a NIOSH/MSHA-approved respirator with an organic vapor cartridge.
Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Solid
Appearance	Wax like
Color	Yellow
Odor	No information available
Odor threshold	Not applicable

Property	Values	Remarks
pH	5 - 8	
pH @ dilution		
Melting point	No information available	
Boiling point	No information available	

Flash point	186 °C / 366.8 °F	PMCC
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	No information available	
Bulk density	No information available	
Water solubility	Slightly soluble in water.	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	
Partition Coefficient (n-octanol/water)	No information available	

Explosive properties	Not applicable
Oxidizing properties	None known.

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	None
Density	0.91 - 0.93 g/ml @ 20°C

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

No specific reactivity hazards associated with this product.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Not known.

10.4 Conditions to avoid

Heat.

10.5 Incompatible materials

Strong oxidizing agents. Strong acids.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation Inhalation of dust in high concentration may cause irritation of respiratory system.

Eye contact Causes serious eye damage. May cause irreversible damage to eyes.

Skin contact Causes skin irritation. May cause an allergic skin reaction.

Ingestion Ingestion may cause stomach discomfort.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Amines, N-coco alkyltrimethylenedi-, acetates	No data available	No data available	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Amines, N-coco alkyltrimethylenedi-, acetates	No data available	No data available	No data available	No data available

Delayed and immediate effects and chronic effects from short and long term exposure

Sensitization May cause allergic skin reaction.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity This product does not contain any known or suspected carcinogens.

Reproductive toxicity This product does not contain any known or suspected reproductive hazards.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of Exposure Eye contact. Skin contact.

Routes of entry Eye contact. Skin contact.

Specific target organ toxicity - Single exposure Not classified

Specific target organ toxicity - Repeated exposure Not classified.

Aspiration hazard Not applicable.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
See component information below.

Toxicity to fish
See component information below.

Toxicity to daphnia and other aquatic invertebrates

See component information below.

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Amines, N-coco alkyltrimethylenedi-, acetates	0.84 mg/l LC 50 (Juv. Turbot, Scopthalmus max) 96 hrs Vendor data	0.023 mg/l EC50 (Skeletonema costatum) 72 hrs Vendor data	0.032 mg/l LC50 (Arcartia tonsa) 48 hrs Vendor data

12.2 Persistence and degradability

See component information below.

12.3 Bioaccumulative potential

See component information below.

12.4 Mobility

See component information below.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method Disposal should be made in accordance with federal, state and local regulations.

Contaminated packaging Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT)	UN3077
UN No. (MT/ANTT)	UN3077
UN No. (TDG)	UN3077
UN/ID No. (ADR/RID/ADN/ADG)	UN3077
UN No. (IMDG/ANTAQ)	UN3077
UN No. (ICAO/ANAC)	UN3077
UN No. (DPC)	UN3077

14.2. UN proper shipping name

ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Amines, N-coco alkyltrimethylenedi-, acetates)

14.3 Hazard class(es)

DOT Hazard class	9
ANTT Hazard class	9
TDG Hazard class	9
ADR/RID/ADN/ADG Hazard class	9
IMDG/ANTAQ Hazard class	9

ICAO/ANAC Hazard class/division	9
DPC Hazard class	9

14.4 Packing group

DOT Packing group	III
ANTT Packing group	III
TDG Packing group	III
ADR/RID/ADN/ADG Packing group	III
IMDG/ANTAQ Packing group	III
ICAO/ANAC Packing group	III
DPC Packing group	III

14.5 Environmental hazard

Yes

Marine pollutant — Yes, (Amines, N-coco alkyltrimethylenedi-, acetates)

14.6 Special precautions

Not applicable

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Does not comply
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH

All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories

Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Amines, N-coco alkyltrimethylenedi-, acetates	N/A	N/A	N/A

California Proposition 65

This product does not contain chemical[s] which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Canadian Classification

This Safety Data Sheet has been prepared in compliance with the Hazardous Products Regulations.

16. Other Information

Supersedes date 03/Jan/2017

Revision date 15/Jan/2020

Version 5

This SDS has been revised in the following section(s) All sections. There have been changes with regard to classification.

HMIS classification

Health	3
Flammability	1
Physical hazard	0
PPE	X

Disclaimer
The information contained herein is considered in good faith as reliable of the date issued and is based upon on measurements, tests or data derived from supplier's own study or furnished by others. In providing this SDS information, Supplier makes no express or implied warranties as to the information or product; merchantability or fitness of purpose; any express or implied warranty; or non-infringement of intellectual property rights; and supplier assumes no responsibility for any direct, special or consequential damages, results obtained, or the activities of others. To the maximum extent permitted by law, supplier's warranty obligations and buyer's sole remedies are as stated in separate agreement between the parties.
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SDS no. PID904
Version 12
Revision date 13/Oct/2020
Supersedes date 07/Oct/2020

Safety Data Sheet
LIME

1. Identification

1.1 Product identifier

Product name LIME

Product code PID904

Synonyms CALCIUM HYDROXIDE, HYDRATKALK

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Drilling fluid additive. pH modifier.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
200 - 125, 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-780-962-8221

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : +55 11 3197 5891

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Skin corrosion/irritation	Category 2
Serious eye damage/eye irritation	Category 1
Specific target organ toxicity - Single exposure	Category 3

Environmental hazards Not classified

Physical Hazards Not classified

2.2 Label elements

Signal word
DANGER

Hazard Statements
H315 - Causes skin irritation
H318 - Causes serious eye damage
H335 - May cause respiratory irritation

Precautionary Statements
P280 - Wear protective gloves, protective clothing, eye protection
P302 + P352 - IF ON SKIN: Wash with plenty of soap and water
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P301 + P310 - IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
P332 + P313 - If skin irritation occurs: Get medical advice/attention
P501 - Dispose of contents/container in accordance with local, regional, national, and international regulations as applicable

Supplementary precautionary statements
P261 - Avoid breathing dust/fume/gas/mist/vapors/spray
P264 - Wash face, hands and any exposed skin thoroughly after handling
P271 - Use only outdoors or in a well-ventilated area
P304 + P340 - IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
P312 - Call a POISON CENTER or doctor/physician if you feel unwell
P362 + P364 - Take off contaminated clothing and wash it before reuse
P403 + P233 - Store in a well-ventilated place. Keep container tightly closed

Unknown acute toxicity Not applicable.

3. Composition/information on Ingredients

3.1 Substances

Chemical Name	CAS No	Weight-%
Calcium hydroxide	1305-62-0	60-100

3.2 Mixtures

Not applicable

Comments

The exact percentage (concentration) of composition has been withheld as a trade secret.

4. First Aid Measures

4.1 First aid measures

Inhalation — If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion — Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Seek medical attention if irritation occurs.

Skin contact — Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention if irritation persists.

Eye Contact — Promptly wash eyes with lots of water while lifting eye lids. Remove contact lenses, if worn. Continue to rinse for at least 15 minutes. Seek medical attention.

4.2. Most important symptoms and effects, both acute and delayed

General advice — The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Symptoms

Inhalation — Please see Section 11. Toxicological Information for further information.

Ingestion — Please see Section 11. Toxicological Information for further information.

Skin contact — Please see Section 11. Toxicological Information for further information.

Eye contact — Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician — Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Alcohol Foam, CO_2, Dry Chemical.

Extinguishing media which must not be used for safety reasons
Water.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
None known.

Hazardous combustion products
Calcium oxide.

5.3 Advice for firefighters

Special protective equipment and precautions for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. See also section 8.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Cover powder spill with plastic sheet or tarp to minimize spreading and keep powder dry.

Methods for cleaning up
Avoid dust formation. Sweep up and shovel into suitable containers for disposal.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Avoid dust formation.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions	Ensure adequate ventilation. Keep airborne concentrations below exposure limits.
Storage precautions	Keep containers tightly closed in a dry, cool and well-ventilated place. Protect from moisture. Avoid contact with:. Acids.
Packaging materials	Use specially constructed containers only.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Component Information

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits - TWAs (CMPs)	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits - TWAs (LMPE-PPTs)
Calcium hydroxide	5 mg/m³	15 mg/m³ TWA 5 mg/m³ TWA	5 mg/m³ TWA	Not determined	5 mg/m³ TWA VLE-PPT

IDLH (Immediately Dangerous to Life or Health)
Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Calcium hydroxide 1305-62-0	Not detemined

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation, especially in confined areas. Provide appropriate exhaust ventilation at places where dust is formed.

Personal protective equipment

Eye protection	Wear chemical splash goggles and face shield.
Hand protection	Wear protective nitrile rubber gloves Frequent change is advisable
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne particles of this product use at least a NIOSH-approved N95 half-mask disposable or re-useable particulate respirator. In work environments containing oil mist/aerosol use at least a NIOSH-approved P95 half-mask disposable or re-useable particulate respirator.
Skin and body protection	Wear suitable protective clothing and gloves, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Solid
Appearance	Powder
Color	White - Off-white
Odor	Odorless
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH	12.4	
pH @ dilution	No information available	
Melting point	> 450 °C / > 842 °F	
Boiling point	No information available	
Flash point	No information available	
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	2.24	20 °C
Bulk density	400 Kg/m³	
Water solubility	Soluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	
Partition Coefficient (n-octanol/water)	No information available	
Explosive properties	No information available	
Oxidizing properties	No information available	

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	No information available
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

No specific reactivity hazards associated with this product.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Avoid dust formation. Protect from moisture.

10.5 Incompatible materials

Acids. Water.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation May cause respiratory irritation. Inhalation of dust may cause shortness of breath, tightness of the chest, a sore throat and cough.

Eye contact Causes serious eye damage.

Skin contact Causes skin irritation.

Ingestion Ingestion may cause stomach discomfort. May cause additional affects as listed under "Inhalation".

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Calcium hydroxide	7340 mg/kg (rat)	No data available	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Calcium hydroxide	No data available	No data available	No data available	No data available

Delayed and immediate effects and chronic effects from short and long term exposure

Sensitization This product does not contain any components suspected to be sensitizing.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity This product does not contain any known or suspected carcinogens.

Reproductive toxicity This product does not contain any known or suspected reproductive hazards.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of Exposure Eye contact. Skin contact. Inhalation.

Routes of entry Inhalation.

Specific target organ toxicity - Single exposure	Category 3
Specific target organ toxicity - Repeated exposure	Not classified.
Target organ effects	Respiratory system.
Aspiration hazard	Not applicable.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
This product is not considered toxic to algae.

Toxicity to fish
This product is not considered toxic to fish.

Toxicity to daphnia and other aquatic invertebrates
This product is not considered toxic to invertebrates.

Toxicology data for the components

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Calcium hydroxide	= 160 mg/L LC50 Gambusia affinis 96 h	No information available	No information available

12.2 Persistence and degradability

Not Applicable - Inorganic chemical.

12.3 Bioaccumulative potential

Not Applicable - Inorganic chemical.

12.4 Mobility

Soluble in water.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method	Disposal should be made in accordance with federal, state and local regulations.
Contaminated packaging	Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT)	Not regulated
UN No. (MT/ANTT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG/ANTAQ)	Not regulated
UN No. (ICAO/ANAC)	Not regulated
UN No. (DPC)	Not regulated

14.2. UN proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class	Not regulated
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated
DPC Hazard class	Not regulated

14.4 Packing group

DOT Packing group	Not regulated
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated
DPC Packing group	Not regulated

14.5 Environmental hazard

Marine pollutant	No

14.6 Special precautions

Not applicable

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies

Japan (ENCS)	Complies
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH

All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories

Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Calcium hydroxide	N/A	N/A	N/A

California Proposition 65

This product does not contain chemical[s] which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Brazilian Regulations

Brazil Regulation	This SDS was prepared in accordance with Brazil law NBR 14725.
Federal Police	Not determined
Army	Not determined
ANVISA	Not determined
MTE (NR 15)	No information available

16. Other Information

Supersedes date	07/Oct/2020
Revision date	13/Oct/2020
Version	12
This SDS has been revised in the following section(s)	1, 8, 14, 16 No changes with regard to classification have been made.

HMIS classification

Health	3
Flammability	0
Physical hazard	0
PPE	E

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The information contained herein is considered in good faith as reliable of the date issued and is based upon on measurements, tests or data derived from supplier's own study or furnished by others. In providing this SDS information, Supplier makes no express or implied warranties as to the information or product; merchantability or fitness of purpose; any express or implied warranty; or non-infringement of intellectual property rights; and supplier assumes no responsibility for any direct, special or consequential damages, results obtained, or the activities of others. To the maximum extent permitted by law, supplier's warranty obligations and buyer's sole remedies are as stated in separate agreement between the parties.
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SDS no. PID971
Version 8
Revision date 12/Oct/2020
Supersedes date 30/Mar/2020

Safety Data Sheet
M-I GEL*

1. Identification

1.1 Product identifier

Product name M-I GEL*

Product code PID971

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Viscosifier.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
200 - 125, 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-780-962-8221

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : +55 11 3197 5891

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Carcinogenicity	Category 1A
Specific target organ toxicity - Repeated exposure	Category 2

Environmental hazards Not classified

Physical Hazards Not classified

2.2 Label elements

Signal word
DANGER

Hazard Statements
H350 - May cause cancer
H373 - May cause damage to organs through prolonged or repeated exposure if inhaled

Precautionary Statements
P201 - Obtain special instructions before use
P202 - Do not handle until all safety precautions have been read and understood
P260 - Do not breathe dust, fume, gas, mist, vapors, spray
P280 - Wear protective gloves, protective clothing, eye protection
P308 + P313 - IF exposed or concerned: Get medical advice/attention
P314 - Get medical attention if you feel unwell
P501 - Dispose of contents/container in accordance with local, regional, national, and international regulations as applicable

Hazards not otherwise classified
None known

Unknown acute toxicity Not applicable.

3. Composition/information on Ingredients

3.1 Substances

Chemical Name	CAS No	Weight-%
Crystalline silica (impurity)	14808-60-7	<10

3.2 Mixtures

Not applicable

Comments
The product contains other ingredients which do not contribute to the overall classification.
Percentages (concentrations) represented as a range are due to batch-to-batch variability. The exact percentage (concentration) of composition has been withheld as a trade secret.

4. First Aid Measures

4.1 First aid measures

Inhalation — If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion — Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Get medical attention if symptoms occur.

Skin contact — Wash skin thoroughly with soap and water. Get medical attention immediately if symptoms occur.

Eye Contact — Promptly wash eyes with lots of water while lifting eye lids. Remove contact lenses, if worn. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

General advice — The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Symptoms

Inhalation — Please see Section 11. Toxicological Information for further information.

Ingestion — Please see Section 11. Toxicological Information for further information.

Skin contact — Please see Section 11. Toxicological Information for further information.

Eye contact — Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician — Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing media appropriate for surrounding material.

Extinguishing media which must not be used for safety reasons
Do not use water jet.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
None known.

Hazardous combustion products
Thermal decomposition can lead to release of irritating gases and vapors.

5.3 Advice for firefighters

Special protective equipment and precautions for fire-fighters

As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. See also section 8.

6.2 Environmental precautions

Disposal should be in accordance with applicable regional, national and local laws and regulations. Refer to applicable federal, state and local regulations.

Environmental exposure controls
Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Cover powder spill with plastic sheet or tarp to minimize spreading. Prevent further leakage or spillage if safe to do so.

Methods for cleaning up
Sweep up and shovel into suitable containers for disposal. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Avoid dust formation.

Hygiene measures
Use good work and personal hygiene practices to avoid exposure. When using do not smoke, eat or drink. Wash hands and face before breaks and immediately after handling the product. Remove contaminated clothing.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions	Ensure adequate ventilation. Keep airborne concentrations below exposure limits.
Storage precautions	Keep containers tightly closed in a dry, cool and well-ventilated place.
Packaging materials	Use specially constructed containers only.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Component Information

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits -	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits -

			TWAs (CMPs)		TWAs (LMPE-PPTs)
Crystalline silica (impurity)	0.025 mg/m³	50 µg/m³ TWA respirable fraction	0.05 mg/m³ TWA	Not determined	0.025 mg/m³ TWA VLE-PPT (respirable fraction)

Crystalline silica (impurity)
OSHA - Final PELs - Table Z-3 Mineral Dusts
(250)/(%SiO2 + 5) mppcf TWA, respirable fraction; (10)/(%SiO2 + 2) mg/m³ TWA, respirable fraction

IDLH (Immediately Dangerous to Life or Health)
Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Crystalline silica (impurity) 14808-60-7	50 mg/m³ IDLH (respirable dust)

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation. Local exhaust ventilation.

Personal protective equipment

Eye protection	Tightly fitting safety goggles.
Hand protection	Use protective gloves made of: Neoprene Nitrile Frequent change is advisable
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne particles of this product use at least a NIOSH-approved N95 half-mask disposable or re-useable particulate respirator. In work environments containing oil mist/aerosol use at least a NIOSH-approved P95 half-mask disposable or re-useable particulate respirator.
Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Solid

Appearance	Powder
Color	Cream - Gray
Odor	Odorless
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH	9-10	
pH @ dilution	No information available	
Melting point	No information available	
Boiling point	No information available	
Flash point	Not applicable	
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	2.3 - 2.6	@ 20 °C
Bulk density	48 – 52 lb/ft³ (769 – 833 kg/m³)	
Water solubility	Insoluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	
Partition Coefficient (n-octanol/water)	No information available	

Explosive properties	Not applicable
Oxidizing properties	None known.

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	None
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

No specific reactivity hazards associated with this product.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

None known.

10.5 Incompatible materials

No materials to be especially mentioned.

10.6 Hazardous decomposition products

See Section 5.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation Inhalation of dust in high concentration may cause irritation of respiratory system. Repeated or prolonged inhalation of crystalline silica dust can cause delayed lung injury, and other diseases, including silicosis and lung cancer.

Eye contact Dust may cause mechanical irritation.

Skin contact Prolonged contact may cause redness and irritation.

Ingestion Ingestion may cause stomach discomfort.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Crystalline silica (impurity)	No data available	No data available	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Crystalline silica (impurity)	Group 1; Monograph 100C [2012] Monograph 100C [2012] (listed under Crystalline silica inhaled in the form of quartz or cristobalite from occupational sources); Monograph 68 [1997] Group 1; Monograph 68 [1997]	A2 Suspected Human Carcinogen	Present	Known Human Carcinogen

Delayed and immediate effects and chronic effects from short and long term exposure

Sensitization This product does not contain any components suspected to be sensitizing.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity May cause cancer. Crystalline silica dust is listed by IARC in Group 1 as known to cause lung cancer in humans, if inhaled.

Reproductive toxicity	This product does not contain any known or suspected reproductive hazards.
Developmental toxicity	Not known to cause birth defects or have a deleterious effect on a developing fetus.
Routes of Exposure	Inhalation.
Routes of entry	Inhalation.
Specific target organ toxicity - Single exposure	Not classified
Specific target organ toxicity - Repeated exposure	Category 2.
Target organ effects	Respiratory system. Lungs.
Aspiration hazard	Not applicable.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
See component information below.

Toxicity to fish
See component information below.

Toxicity to daphnia and other aquatic invertebrates
See component information below.

Toxicology data for the components

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Crystalline silica (impurity)	LC50 Danio rerio (zebra fish) : > 10000 mg/l 96h	EC50: > 1000 mg/l 72h	LC50 Daphnia manga (Water flea): > 10000 mg/l 24h

12.2 Persistence and degradability

Not Applicable - Inorganic chemical.

12.3 Bioaccumulative potential

Not Applicable - Inorganic chemical.

12.4 Mobility

Insoluble in water.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

The product component(s) are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method	Disposal should be made in accordance with federal, state and local regulations.
Contaminated packaging	Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT)	Not regulated
UN No. (MT/ANTT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG/ANTAQ)	Not regulated
UN No. (ICAO/ANAC)	Not regulated
UN No. (DPC)	Not regulated

14.2. UN proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class	Not regulated
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated
DPC Hazard class	Not regulated

14.4 Packing group

DOT Packing group	Not regulated
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated
DPC Packing group	Not regulated

14.5 Environmental hazard

Marine pollutant	No

14.6 Special precautions

Not applicable

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Complies
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH

All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories

Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Crystalline silica (impurity)	N/A	N/A	N/A

California Proposition 65

WARNING

This product does not contain chemical[s] which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Chemical Name	California Proposition 65
Crystalline silica (impurity) 14808-60-7	Carcinogen

Canadian Classification

This Safety Data Sheet has been prepared in compliance with the Hazardous Products Regulations.

Brazil Regulation This SDS was prepared in accordance with Brazil law NBR 14725.

Federal Police	Not determined
Army	Not determined
ANVISA	Not determined

16. Other Information

Supersedes date	30/Mar/2020
Revision date	12/Oct/2020
Version	8
This SDS has been revised in the following section(s)	All sections. There have been changes with regard to classification.

HMIS classification

Health	1*
Flammability	0
Physical hazard	0
PPE	E

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Safety Data Sheet
MICROBAR*
(GBL011)

1. Identification of the Substance/Preparation and of the Company/Undertaking

1.1 Product identifier

Product name MICROBAR*
(GBL011)

Product code PID20269-GBL011

Synonyms Micronized barite

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Weighting agent.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
200 - 125, 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-780-962-8221

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : 0800-720-8000/0800-777-2323 (WGRA)

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Carcinogenicity	Category 1A
Specific target organ toxicity - Repeated exposure	Category 2

Environmental hazards Not classified

Physical Hazards Not classified

2.2 Label elements

Signal word
DANGER

Hazard Statements
H350i - May cause cancer by inhalation
H373 - May cause damage to organs through prolonged or repeated exposure if inhaled

Precautionary Statements
P201 - Obtain special instructions before use
P202 - Do not handle until all safety precautions have been read and understood
P260 - Do not breathe dust/fume/gas/mist/vapors/spray
P281 - Use personal protective equipment as required
P308 + P313 - IF exposed or concerned: Get medical advice/attention
P314 - Get medical advice/attention if you feel unwell
P501 - Dispose of contents/container to industrial incineration plant

Unknown acute toxicity 0% of the mixture consists of ingredient(s) of unknown toxicity.

3. Composition/information on Ingredients

3.1 Substances

Chemical Name	CAS No	Weight-%
Crystalline silica (impurity)	14808-60-7	1-5

3.2 Mixtures

Not applicable

Comments
The product contains other ingredients which do not contribute to the overall classification.

This product contains a small quantity of quartz, crystalline silica. Prolonged and repeated exposure to concentrations of crystalline silica exceeding the workplace exposure limit (WEL) may lead to chronic lung disease such as silicosis. IARC Monographs, Vol. 68, 1997, concludes that there is sufficient evidence that inhaled crystalline silica in the form of quartz or cristobalite from occupational sources causes cancer in humans. IARC Classification Group I. The exact percentage (concentration) of composition has been withheld as a trade secret.

4. First Aid Measures

4.1 First aid measures

Inhalation — If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion — Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Get medical attention if symptoms occur.

Skin contact — Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention immediately if symptoms occur.

Eye Contact — Remove contact lenses, if worn. Promptly wash eyes with lots of water while lifting eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

General advice — The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Symptoms

Inhalation — Please see Section 11. Toxicological Information for further information.

Ingestion — Please see Section 11. Toxicological Information for further information.

Skin contact — Please see Section 11. Toxicological Information for further information.

Eye contact — Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician — Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing media appropriate for surrounding material.

Extinguishing media which must not be used for safety reasons
None known.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
None known.

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Avoid dust formation. Use personal protective equipment. See also section 8.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Cover powder spill with plastic sheet or tarp to minimize spreading.

Methods for cleaning up
Sweep up and shovel into suitable containers for disposal. After cleaning, flush away traces with water. Avoid generating or breathing dust. Material becomes slippery when wet. Use caution if wet.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Avoid dust formation. Do not breathe dust. Material becomes slippery when wet. Use caution if wet.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Ensure adequate ventilation. Keep airborne concentrations below exposure limits.

Storage precautions Keep containers tightly closed in a dry, cool and well-ventilated place. Avoid wet and humid conditions. Store in original container.

Packaging materials Use specially constructed containers only.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Component Information

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits - TWAs (CMPs)	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits - TWAs (LMPE-PPTs)
Crystalline silica (impurity)	0.025 mg/m³	50 µg/m³ TWA respirable fraction	0.05 mg/m³ TWA	Not determined	0.025 mg/m³ TWA VLE-PPT (respirable fraction)

Crystalline silica (impurity)
OSHA - Final PELs - Table Z-3 Mineral Dusts
(250)/(%SiO2 + 5) mppcf TWA, respirable fraction; (10)/(%SiO2 + 2) mg/m³ TWA, respirable fraction

IDLH (Immediately Dangerous to Life or Health)
This product contains substance(s) classified as Immediately Dangerous to Life or Health (IDLH) by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Crystalline silica (impurity) 14808-60-7	50 mg/m³ IDLH (respirable dust)

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation. Mechanical ventilation or local exhaust ventilation is required.

Personal protective equipment

Eye protection	Tightly fitting safety goggles.
Hand protection	Use protective gloves made of: Neoprene PVC Nitrile Frequent change is advisable
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne particles of this product use at least a NIOSH-approved N95 half-mask disposable or re-useable particulate respirator. In work environments containing oil mist/aerosol use at least a NIOSH-approved P95 half-mask disposable or re-useable particulate respirator.
Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Solid
Appearance	Powder
Color	Tan - Gray
Odor	Odorless
Odor threshold	Not applicable

Property	Values	Remarks
pH	No information available	
pH @ dilution		
Melting / freezing point	1580 °C / 2876 °F	
Boiling point/range	No information available	
Flash point	No information available	PMCC
Evaporation rate (BuAc =1)	No information available	

Flammability (solid, gas)	Not applicable
Flammability Limit in Air	
Upper flammability limit	No information available
Lower flammability limit	No information available
Vapor pressure	No information available
Vapor density	No information available
Specific gravity	No information available
Bulk density	1920 - 2400 kg/m³
Water solubility	Insoluble in water
Solubility in other solvents	No information available
Autoignition temperature	No information available
Decomposition temperature	No information available
Kinematic viscosity	No information available
Dynamic viscosity	No information available
log Pow	No information available
Explosive properties	Not applicable
Oxidizing properties	None known.

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	None
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

No specific reactivity hazards associated with this product.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Avoid dust formation. Avoid wet and humid conditions.

10.5 Incompatible materials

No materials to be especially mentioned.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation Inhalation of dust in high concentration may cause irritation of respiratory system. Repeated or prolonged inhalation of crystalline silica dust can cause delayed lung injury, and other

diseases, including silicosis and lung cancer.

Eye contact Dust may cause mechanical irritation.

Skin contact Prolonged contact may cause redness and irritation.

Ingestion Ingestion may cause stomach discomfort.

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Crystalline silica (impurity)	No data available	No data available	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Crystalline silica (impurity)	Group 1; Monograph 100C [2012] Monograph 100C [2012] (listed under Crystalline silica inhaled in the form of quartz or cristobalite from occupational sources); Monograph 68 [1997] Group 1; Monograph 68 [1997]	A2 Suspected Human Carcinogen	Present	Known Human Carcinogen

Sensitization Not classified.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity Crystalline silica dust is listed by IARC in Group 1 as known to cause lung cancer in humans, if inhaled.

Reproductive toxicity This product does not contain any known or suspected reproductive hazards.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of Exposure Inhalation.

Routes of entry Inhalation.

Specific target organ toxicity - Single exposure Not classified

Specific target organ toxicity - Repeated exposure Category 2.

Target organ effects Lungs. Respiratory system.

Aspiration hazard Not applicable.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
This product is not considered toxic to algae.

Toxicity to fish
This product is not considered toxic to fish.

Toxicity to daphnia and other aquatic invertebrates
This product is not considered toxic to invertebrates.

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Crystalline silica (impurity)	LC50 Danio rerio (zebra fish) : > 10000 mg/l 96h	EC50: > 1000 mg/l 72h	LC50 Daphnia manga (Water flea): > 10000 mg/l 24h

12.2 Persistence and degradability

Product is not biodegradable.

12.3 Bioaccumulative potential

Does not bioaccumulate.

12.4 Mobility

Insoluble in water.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method Disposal should be made in accordance with federal, state and local regulations.

Contaminated packaging Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT) Not regulated
UN No. (MT/ANTT) Not regulated
UN No. (TDG) Not regulated
UN/ID No. (ADR/RID/ADN/ADG) Not regulated
UN No. (IMDG/ANTAQ) Not regulated
UN No. (ICAO/ANAC) Not regulated
UN No. (DPC) Not regulated

14.2. UN proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class Not regulated
ANTT Hazard class Not regulated
TDG Hazard class Not regulated
ADR/RID/ADN/ADG Hazard class Not regulated
IMDG/ANTAQ Hazard class Not regulated

ICAO/ANAC Hazard class/division	Not regulated
DPC Hazard class	Not regulated

14.4 Packing group

DOT Packing group	Not regulated
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated
DPC Packing group	Not regulated

14.5 Environmental hazard
No

14.6 Special precautions
Not applicable

14.7 Transport in bulk according to Annex I/II of MARPOL 73/78 and the IBC Code
Please contact SDS@slb.com for info regarding transport in Bulk.

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Complies
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH
All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Crystalline silica (impurity)	N/A	N/A	N/A

California Proposition 65

WARNING

This product can expose you to chemicals including those listed below, which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Chemical Name	California Proposition 65
Crystalline silica (impurity) 14808-60-7	Carcinogen

Canadian Classification

This Safety Data Sheet has been prepared in compliance with the Hazardous Products Regulations.

16. Other Information

Supersedes date 10/Nov/2016

Revision date 03/Jul/2019

Version 2

This SDS has been revised in the following section(s) 8, 15,

HMIS classification

Health	1*
Flammability	0
Physical hazard	0
PPE	X

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Safety Data Sheet
MONOETHYLENE GLYCOL (MEG)

1. Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Product name MONOETHYLENE GLYCOL (MEG)
Product code PID1081

Synonyms MONOETHYLENE GLYCOL 100%, MEG 100%
Molecular weight 62.06 g/mol

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Commercial chemical

Uses advised against None known

1.3 Details of the supplier of the safety data sheet

Supplier
M-I Drilling Fluids UK Limited
Westhill Business Park
Westhill AB32 6JL Aberdeenshire
Scotland United Kingdom

+47 51577424

SDS@slb.com

1.4 Emergency Telephone Number

Emergency telephone - (24 Hour) Australia +61 2801 44558, Asia Pacific +65 3158 1074, China +86 10 5100 3039, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, New Zealand +64 9929 1483, USA 001 281 561 1600

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS Classification

Health hazards

Acute toxicity - Oral	Category 4
Specific target organ toxicity - Repeated exposure	Category 2

Environmental hazards Not classified

Physical Hazards Not classified

2.2 Label elements

Signal word
WARNING

Hazard Statements
H302 - Harmful if swallowed
H373 - May cause damage to organs through prolonged or repeated exposure

Precautionary statements
P260 - Do not breathe dust/fume/gas/mist/vapours/spray
P264 - Wash face, hands and any exposed skin thoroughly after handling
P270 - Do not eat, drink or smoke when using this product
P301 + P312 - IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
P330 - Rinse mouth
P314 - Get medical advice/attention if you feel unwell
P501 - Dispose of contents/container in accordance with local, regional, national, and international regulations as applicable

-

Contains
Ethylene Glycol

2.3 Other hazards

Not classified as PBT/vPvB by current EU criteria

3. Composition/information on Ingredients

3.1 Substances

Chemical Name	EC No	CAS No	Weight-%
Ethylene Glycol	203-473-3	107-21-1	60-100

3.2 Mixtures

Not applicable

4. First Aid Measures

4.1 First aid measures

Inhalation — If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion — Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Seek medical attention if irritation occurs.

Skin contact — Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention immediately if symptoms occur.

Eye Contact — Remove contact lenses, if worn. Promptly wash eyes with lots of water while lifting eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

General advice — The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Symptoms

Inhalation — Please see Section 11. Toxicological Information for further information.

Ingestion — Please see Section 11. Toxicological Information for further information.

Skin contact — Please see Section 11. Toxicological Information for further information.

Eye contact — Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician — Treat symptomatically.

5. Firefighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Extinguishing media - small fires, Dry powder,
, Extinguishing media - large fires, Water spray, fog or regular foam.

Extinguishing media which must not be used for safety reasons
None known.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
None known.

Hazardous combustion products
Fire or high temperatures create: Carbon oxides (COx).

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. See also section 8.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Dike far ahead of liquid spill for later disposal.

Methods for cleaning up
Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Do not breathe vapors or spray mist. Avoid spills and splashing during use.

Hygiene Measures
Use good work and personal hygiene practices to avoid exposure When using do not smoke, eat or drink. Wash hands and face before breaks and immediately after handling the product Remove contaminated clothing

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Ensure adequate ventilation. Keep airborne concentrations below exposure limits.

Storage precautions Keep containers tightly closed in a dry, cool and well-ventilated place Avoid excessive heat for prolonged periods of time. Avoid contact with: Oxidizing agents

Storage class Chemical storage.

Packaging materials Use specially constructed containers only

8. Exposure Controls/Personal Protection

8.1 Control parameters

Component Information

Chemical Name	Arabic	Australia	Egypt
Ethylene Glycol	Not determined	40ppmSTELvapour 104mg/m³STELvapour 10mg/m³TWAparticulate 20ppmTWAvapour 52mg/m³TWAvapour	39.4 ppm Ceiling 100 mg/m³ Ceiling
Chemical Name	**India**	**Indonesian**	**Japan**
Ethylene Glycol	Not determined	100 mg/m³ STEL	Not determined
Chemical Name	**Kazakhstan**	**Kuwait**	**New Zealand**
Ethylene Glycol	5 mg/m³ MAC	125 mg/m³ TWA 50.0 ppm TWA 100 mg/m³ STEL	50 ppm Ceiling mist and vapour 127 mg/m³ Ceiling mist and vapour
Chemical Name	**Malaysia**	**Philippines**	**Russia**
Ethylene Glycol	39.4 ppm Ceiling aerosol 100 mg/m³ Ceiling aerosol	Not determined	10 mg/m³ STEL 5 mg/m³ TWA
Chemical Name	**Thailand**	**Vietnam**	**Turkey**
Ethylene Glycol	Not determined	10 mg/m³ TWA 60 mg/m³ TWA 20 mg/m³ STEL 125 mg/m³ STEL	40 ppm STEL 104 mg/m³ STEL Skin 20 ppm TWA 52 mg/m³ TWA

8.2 Exposure controls

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation

Personal protective equipment

Eye protection Use eye protection according to EN 166, designed to protect against liquid splashes Tightly fitting safety goggles Safety glasses with side-shields

Hand protection Wear chemically resistant gloves (tested to EN 374) in combination with 'basic' employee

	training Use protective gloves made of: Nitrile Neoprene Butyl rubber Break through time >480 minutes Glove thickness 0.4 mm Be aware that liquid may penetrate the gloves. Frequent change is advisable.
Respiratory protection	No personal respiratory protective equipment normally required In case of insufficient ventilation wear suitable respiratory equipment Use respirator with organic vapor protection (A, brown) At work in confined or poorly ventilated spaces, respiratory protection with air supply must be used.
Skin and body protection	Wear suitable protective clothing Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before eating, drinking or smoking Remove and wash contaminated clothing before re-use

8.2.3 Environmental exposure controls

Environmental exposure	Use appropriate containment to avoid environmental contamination See section 6 for more information

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Liquid
Appearance	Clear
Odour	Mild
Colour	Colourless
Odour threshold	Not applicable

Property	**Values**	**Remarks**
pH	No information available	
pH @ dilution	6 - 7.5	@ 10%
Melting / freezing point	< -12 °C / 10.4 °F	
Boiling point/range	196 - 199 °C / 384.8 - 390.2 °F	
Flash point	111 °C / 231.8 °F	Closed cup
Evaporation rate	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	28 %	
Lower flammability limit	3.2 %	
Vapour pressure	0.007 kPa	@ 20 °C
Vapour density	No information available	
Specific gravity	No information available	

Bulk density	No information available	
Relative density	No information available	
Water solubility	Soluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	410 °C / 770 °F	
Decomposition temperature	No information available	
Kinematic viscosity	21 mPas	@ 20 °C
Dynamic viscosity	No information available	
log Pow	-1.36	

Explosive properties	Not applicable
Oxidising properties	None known

9.2 Other information

Pour point	No information available
Molecular weight	62.06 g/mol
VOC content(%)	None
Density	1.11 ± 0.03 g/ml @ 25°C

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

No specific reactivity hazards associated with this product.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerisation
Hazardous polymerisation does not occur.

10.4 Conditions to avoid

Avoid excessive heat for prolonged periods of time.

10.5 Incompatible materials

Oxidizing agents.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation Vapors may irritate throat and respiratory system. May cause additional affects as listed under "Ingestion".

Eye contact Contact with eyes may cause irritation.

Skin contact May be absorbed through the skin in harmful amounts. Prolonged contact may cause redness and irritation.

Ingestion Harmful if swallowed. May cause damage to organs through prolonged or repeated exposure.

Unknown acute toxicity Not applicable.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Ethylene Glycol	= 7712 mg/kg (Rat) ECHA Data	> 3500 mg/kg (Mouse) ECHA Data	> 2.5 mg/l (Rat) 6 hour ECHA Data

Sensitisation This product does not contain any components suspected to be sensitizing.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity This product does not contain any known or suspected carcinogens.

Reproductive toxicity This product does not contain any known or suspected reproductive hazards.

Routes of Exposure Skin contact. Ingestion. Inhalation.

Routes of entry Skin contact. Skin absorption. Ingestion.

Specific target organ toxicity - Single exposure Not classified

Specific target organ toxicity - Repeated exposure Category 2.

Target organ effects Kidney.

Aspiration hazard Not applicable.

Other information Key literature references and sources for data. See Section 16 for more information.

12. Ecological Information

12.1 Toxicity

Listed on PLONOR list of OSPAR
The product component(s) are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Toxicity to algae
See component information below.

Toxicity to fish
See component information below.

Toxicity to daphnia and other aquatic invertebrates
See component information below.

Toxicology data for the components

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Ethylene Glycol	40000 - 60000 mg/L LC50 (Pimephales promelas) = 96 h 40761 mg/L LC50 (Oncorhynchus mykiss) = 96 h 27540 mg/L LC50 (Lepomis macrochirus) = 96 h 14 - 18 mL/L LC50 (Oncorhynchus mykiss) = 96 h 16000 mg/L LC50 (Poecilia reticulata) = 96 h 41000 mg/L LC50 (Oncorhynchus mykiss) = 96 h	6500 - 13000 mg/L EC50 (Pseudokirchneriella subcapitata) = 96 h	46300 mg/L EC50 (Daphnia magna) = 48 h

12.2 Persistence and degradability

See component information below.

Chemical Name	Persistence and degradability
Ethylene Glycol	Readily biodegradable

12.3 Bioaccumulative potential

See component information below.

Chemical Name	Bioaccumulation
Ethylene Glycol	log Pow -1.36(Calculated) Not likely to bioaccumulate

log Pow
-1.36

12.4 Mobility

Mobility
Soluble in water.

Chemical Name	Mobility
Ethylene Glycol	Completely soluble

Mobility in soil
No information available.

Chemical Name	Mobility in soil
Ethylene Glycol	Not expected to adsorb on soil

12.5 Results of PBT and vPvB assessment

Not classified as PBT/vPvB by current EU criteria.

12.6 Other adverse effects.

None known.

12.7 Other information

Key literature references and sources for data. See Section 16 for more information.

13. Disposal considerations

13.1 Waste treatment methods

Waste from residues/unused products Dispose of in accordance with local regulations.

Contaminated packaging Empty containers should be transported/delivered using a registered waste carrier for local recycling or waste disposal.

14. Transport information

14.1. UN number

Not regulated

14.2. UN proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3. Hazard class(es)

ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG Hazard class	Not regulated
ICAO Hazard class/division	Not regulated

14.4 Packing group

ADR/RID/ADN/ADG Packing Group	Not regulated
IMDG Packing group	Not regulated
ICAO Packing group	Not regulated

14.5 Environmental hazard

No

14.6 Special precautions

Not applicable

14.7 Transport in bulk according to Annex I/II of MARPOL 73/78 and the IBC Code

The product has been assessed and contained in Chapters 17/18 of the IBC Code and the latest MEPC.2/Circular and is permitted to be carried under Annex II of MARPOL and resolution A.673 (16) Offshore Supply Vessel Code.
Proper Shipping Name: Ethylene glycol. Ship Type:- 3. Pollution Category:- Y.

Please contact SDS@slb.com for info regarding transport in Bulk.

15. Regulatory Information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

This safety data sheet complies with the requirements of:
The Globally Harmonised System of Classification and Labelling of Chemicals (GHS)

Australian Standard for the Uniform Scheduling of Drugs and Poisons
Australian Standard for the Uniform Scheduling of Drugs and Poisons
Ethylene Glycol
Schedule 6
Schedule 5

International inventories

USA, Toxic Substances Control Act inventory (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies
Inventory - Japan - Existing and New Chemicals list	Complies
China (IECSC)	Complies

Australia (AICS)	Complies
Korea (KECL)	Complies
Inventory - New Zealand - Inventory of Chemicals (NZIoC)	Complies

16. Other Information

Prepared by	Global Regulatory Compliance - Chemicals (GRC - Chemicals) , Sandra McWilliam
Supercedes Date:	17/Dec/2014
Revision date	19/Mar/2018
Version	10
This SDS has been revised in the following section(s)	All sections No changes with regard to classification have been made.

Key literature references and sources for data
www.ChemADVISOR.com
Supplier
National Chemical Inventories
National regulatory information
National occupational exposure limits

Training Advice
Follow general hygiene considerations recognised as common good workplace practices

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We create chemistry

Safety Data Sheet
Myacide® GA 25

1. Identification

Product identifier used on the label

Myacide® GA 25

Recommended use of the chemical and restriction on use
Recommended use*: Approved only for uses listed on the FIFRA label.

* The “Recommended use” identified for this product is provided solely to comply with a Federal requirement and is not part of the seller's published specification. The terms of this Safety Data Sheet (SDS) do not create or infer any warranty, express or implied, including by incorporation into or reference in the seller's sales agreement.

Details of the supplier of the safety data sheet

Company:
BASF CORPORATION
100 Park Avenue
Florham Park, NJ 07932, USA

Telephone: +1 973 245-6000

Emergency telephone number

CHEMTREC: 1-800-424-9300
BASF HOTLINE: 1-800-832-HELP (4357)

Other means of identification

Substance number:	145849
EPA Registration number:	33753-26
Molecular formula:	CHO(CH2)3CHO
Chemical family:	dialdehydes, aqueous solution
Synonyms:	GLUTARALDEHYDE

2. Hazards Identification

According to Regulation 2012 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

Classification of the product

Acute Tox.	4 (oral)	Acute toxicity
Acute Tox.	4 (Inhalation - mist)	Acute toxicity
Skin Corr./Irrit.	1B	Skin corrosion/irritation
Eye Dam./Irrit.	1	Serious eye damage/eye irritation
Resp. Sens.	1	Respiratory sensitization

Skin Sens.	1A	Skin sensitization
STOT SE	3 (irritating to respiratory system)	Specific target organ toxicity — single exposure
Aquatic Chronic	2	Hazardous to the aquatic environment - chronic
Aquatic Acute	1	Hazardous to the aquatic environment - acute

Label elements

Pictogram:

Signal Word:
Danger

Hazard Statement:

H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H317	May cause an allergic skin reaction.
H335	May cause respiratory irritation.
H314	Causes severe skin burns and eye damage.
H302 + H332	Harmful if swallowed or if inhaled
H411	Toxic to aquatic life with long lasting effects.
H400	Very toxic to aquatic life.

Precautionary Statements (Prevention):

P280	Wear protective gloves/protective clothing/eye protection/face protection.
P271	Use only outdoors or in a well-ventilated area.
P260	Do not breathe dust/mist/vapours.
P273	Avoid release to the environment.
P284	In case of inadequate ventilation wear respiratory protection.
P272	Contaminated work clothing should not be allowed out of the workplace.
P270	Do not eat, drink or smoke when using this product.
P264	Wash with plenty of water and soap thoroughly after handling.

Precautionary Statements (Response):

P310	Immediately call a POISON CENTER or doctor/physician.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P304 + P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P301 + P330 + P331	IF SWALLOWED: rinse mouth. Do NOT induce vomiting.
P362 + P364	Take off contaminated clothing and wash it before reuse.
P391	Collect spillage.

Precautionary Statements (Storage):

P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.

Precautionary Statements (Disposal):

P501	Dispose of contents/container in accordance with local regulations.

Hazards not otherwise classified

No specific dangers known, if the regulations/notes for storage and handling are considered.

Labeling of special preparations (GHS):
Corrosive to the respiratory tract.

3. Composition / Information on Ingredients

According to Regulation 2012 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

CAS Number	Weight %	Chemical name
111-30-8	>= 20.0 - < 50.0%	glutaral
67-56-1	>= 0.0 - < 0.3%	Methanol

4. First-Aid Measures

Description of first aid measures

General advice:
Immediately remove contaminated clothing. If the patient is likely to become unconscious, place and transport in stable sideways position (recovery position). First aid personnel should pay attention to their own safety.

If inhaled:
Keep patient calm, remove to fresh air, seek medical attention.

If on skin:
Remove contaminated clothing. Rinse skin immediately with plenty of water for 15 - 20 minutes. Seek medical attention. Consult a skin specialist.

If in eyes:
Immediately wash affected eyes for at least 15 minutes under running water with eyelids held open, consult an eye specialist.

If swallowed:
Immediately rinse mouth and then drink plenty of water, do not induce vomiting, seek medical attention.

Most important symptoms and effects, both acute and delayed

Symptoms: The most important known symptoms and effects are described in the labelling (see section 2) and/or in section 11., Further symptoms and / or effects are not known so far
Hazards: No applicable information available.

Indication of any immediate medical attention and special treatment needed

Note to physician

Treatment:	Treat according to symptoms (decontamination, vital functions), no known specific antidote, administer corticosteroid dose aerosol to prevent pulmonary odema.

5. Fire-Fighting Measures

Extinguishing media

Suitable extinguishing media:
water spray, dry powder, foam

Special hazards arising from the substance or mixture

Hazards during fire-fighting:
harmful vapours
Evolution of fumes/fog. The substances/groups of substances mentioned can be released in case of fire.

Advice for fire-fighters

Protective equipment for fire-fighting:
Wear a self-contained breathing apparatus in confined areas or when exposed to combustion products.

Further information:
Contaminated extinguishing water must be disposed of in accordance with official regulations.

Impact Sensitivity:

Impact Weight:	10 kg
Height of Fall:	0.4 m
Method:	Explosive properties
Remarks:	Substance/product is not impact sensitve at room temperature.

6. Accidental release measures

Further accidental release measures:
Pack in tightly closed containers for disposal.

Personal precautions, protective equipment and emergency procedures

Use personal protective clothing.

Environmental precautions

Do not discharge into drains/surface waters/groundwater.

Methods and material for containment and cleaning up

For small amounts: Pick up with absorbent material (e.g. sand, sawdust, general-purpose binder).
Dispose of absorbed material in accordance with regulations.
For large amounts: Pump off product.
Spills should be contained, solidified, and placed in suitable containers for disposal.

7. Handling and Storage

Precautions for safe handling

No special measures necessary provided product is used correctly.

Protection against fire and explosion:
No special precautions necessary.

Conditions for safe storage, including any incompatibilities

Segregate from foods and animal feeds.

Further information on storage conditions: Keep container tightly closed and in a cool place. Store protected against freezing.

8. Exposure Controls/Personal Protection

Users of a pesticidal product should refer to the product label for personal protective equipment requirements.

Components with occupational exposure limits

Methanol	OSHA PEL	PEL 200 ppm 260 mg/m3 ; TWA value 200 ppm 260 mg/m3 ; SKIN_FINAL ; The substance can be absorbed through the skin. STEL value 250 ppm 325 mg/m3 ;
	ACGIH TLV	TWA value 200 ppm ; STEL value 250 ppm ; Skin Designation ; The substance can be absorbed through the skin.
glutaral	OSHA PEL	CLV 0.2 ppm 0.8 mg/m3 ;
	ACGIH TLV	CLV 0.05 ppm ;

Advice on system design:
Provide local exhaust ventilation to control vapours/mists.

Personal protective equipment

RECOMMENDATIONS FOR MANUFACTURING, COMMERCIAL BLENDING, AND PACKAGING WORKERS:

Respiratory protection:
Wear respiratory protection if ventilation is inadequate. Respiratory protection in case of vapour/aerosol release. Wear a NIOSH-certified (or equivalent) organic vapour/particulate respirator.

Hand protection:
Wear chemical resistant protective gloves.

Eye protection:
Tightly fitting safety goggles (chemical goggles) and face shield.

Body protection:
Body protection must be chosen based on level of activity and exposure., Protective coverall and/or impermeable apron and boots as necessary.

General safety and hygiene measures:
Handle in accordance with good industrial hygiene and safety practice. Wearing of closed work clothing is required additionally to the stated personal protection equipment. Keep away from food, drink and animal feeding stuffs. Avoid contact with skin and eyes. Remove contaminated clothing. Handle in accordance with good industrial hygiene and safety practice.

9. Physical and Chemical Properties

Form:	liquid
Odour:	characteristic

Odour threshold:	No applicable information available.	
Colour:	yellow	
pH value:	5.9 (0.5 %(m), 23 °C)	
Freezing point:	approx. -5 °C (1 ATM)	
Boiling point:	> 100 °C (1 ATM)	
Sublimation point:	No applicable information available.	
Flash point:	not applicable	
Flammability:	No applicable information available.	
Lower explosion limit:	No applicable information available.	
Upper explosion limit:	No applicable information available.	
Autoignition:	> 275 °C	(DIN 51794)
Vapour pressure:	approx. 17.5 mmHg (20 °C) The product has not been tested. The statement has been derived from the properties of the individual components.	
Density:	1.06 g/cm3 (20 °C)	
Relative density:	1.06 (20 °C)	
Vapour density:	No applicable information available.	
Partitioning coefficient n-octanol/water (log Pow):	No applicable information available.	
Thermal decomposition:	No decomposition if correctly stored and handled.	
Viscosity, dynamic:	No applicable information available.	
Viscosity, kinematic:	No applicable information available.	
Solubility in water:	soluble	
Solubility (quantitative):	No applicable information available.	
Solubility (qualitative):	No applicable information available.	
Molar mass:	100 g/mol	
Evaporation rate:	Value can be approximated from Henry's Law Constant or vapor pressure.	
Other Information:	If necessary, information on other physical and chemical parameters is indicated in this section.	

10. Stability and Reactivity

Reactivity
No hazardous reactions if stored and handled as prescribed/indicated.

Corrosion to metals:
No corrosive effect on metal.

Formation of flammable gases:	Remarks:	Forms no flammable gases in the presence of water.

Chemical stability
The product is stable if stored and handled as prescribed/indicated.

Possibility of hazardous reactions
The product is chemically stable.

Conditions to avoid
No conditions to avoid anticipated.

Incompatible materials
acids, bases, amines

Hazardous decomposition products

Decomposition products:
Hazardous decomposition products:
carbon monoxide, carbon dioxide

Thermal decomposition:
No decomposition if correctly stored and handled.

11. Toxicological information

Primary routes of exposure

Routes of entry for solids and liquids are ingestion and inhalation, but may include eye or skin contact. Routes of entry for gases include inhalation and eye contact. Skin contact may be a route of entry for liquefied gases.

Acute Toxicity/Effects

Acute toxicity
Assessment of acute toxicity: Of moderate toxicity after single ingestion. Of moderate toxicity after short-term inhalation. Of low toxicity after short-term skin contact.

Oral
Type of value: ATE
Value: 301 mg/kg

Tested as a preparation.

Information on: glutaral
Type of value: LD50
Species: rat (female)
Value: approx. 77 mg/kg (similar to OECD guideline 401)

Information on: Methanol
Type of value: LD50
Species: rat
Value: > 1187 - 2769 mg/kg (BASF-Test)

Inhalation
Type of value: ATE
Value: 1.09 mg/l
Determined for mist

Dermal
Type of value: ATE
Value: 3,790 mg/kg

Assessment other acute effects
Assessment of STOT single:

Causes temporary irritation of the respiratory tract.

Irritation / corrosion
Assessment of irritating effects: Corrosive! Damages skin and eyes.

Skin

Information on: glutaral
Species: rabbit
Result: Corrosive.
Method: similar to OECD guideline 404

Eye

Information on: glutaral
Species: rabbit
Result: Risk of serious damage to eyes.
Method: Draize test

Sensitization
Assessment of sensitization: The substance may cause sensitization of the respiratory tract.
Sensitization after skin contact possible.

Information on: glutaral
Open epicutaneous test (OET)
Species: guinea pig
Result: sensitizing

Species: human
Result: sensitizing

Aspiration Hazard
No aspiration hazard expected.

Chronic Toxicity/Effects

Repeated dose toxicity

Information on: glutaral
Assessment of repeated dose toxicity: After repeated exposure the prominent effect is local irritation. The substance may cause damage to the upper respiratory tract after repeated inhalation, as shown in animal studies.

Genetic toxicity

Information on: glutaral
Assessment of mutagenicity: The substance was mutagenic in various test systems with bacterias and cell cultures; however, these results could not be confirmed in tests with mammals.

Carcinogenicity

Assessment of carcinogenicity: None of the components in this product at concentrations greater than 0.1% are listed by IARC; NTP, OSHA or ACGIH as a carcinogen.

Reproductive toxicity

Information on: glutaral
Assessment of reproduction toxicity: The results of animal studies gave no indication of a fertility impairing effect.

Teratogenicity

Information on: glutaral
Assessment of teratogenicity: No indications of a developmental toxic / teratogenic effect were seen in animal studies.

Other Information
The product has not been tested. The statement has been derived from the properties of the individual components.

Symptoms of Exposure

The most important known symptoms and effects are described in the labelling (see section 2) and/or in section 11., Further symptoms and / or effects are not known so far

Medical conditions aggravated by overexposure
Contact may aggravate pulmonary disorders.

12. Ecological Information

Toxicity

Aquatic toxicity
Assessment of aquatic toxicity:
Very toxic to aquatic life. Toxic to aquatic life with long lasting effects.
The ecological data given are those of the active ingredient.

Toxicity to fish
LC50 (96 h) 0.8 mg/l, Salmo gairdneri, syn. O. mykiss (Fish test acute, static)
The details of the toxic effect relate to the nominal concentration.

LC50 (96 h) 6.2 mg/l, Cyprinodon variegatus (Fish test acute, static)
The details of the toxic effect relate to the nominal concentration.

Aquatic invertebrates
EC50 (48 h) 2.1 mg/l, Daphnia magna (Daphnia test acute, static)
The details of the toxic effect relate to the nominal concentration.

EC50 (96 h) 0.78 mg/l, Crassostrea virginica (OPP 72-3 (EPA-Guideline), Flow through.)
The statement of the toxic effect relates to the analytically determined concentration.

Aquatic plants
EC50 (72 h) 0.6 mg/l (growth rate), Desmodesmus subspicatus (OECD Guideline 201, static)
The statement of the toxic effect relates to the analytically determined concentration.

No observed effect concentration (72 h) 0.025 mg/l (growth rate), Desmodesmus subspicatus (OECD Guideline 201, static)
The statement of the toxic effect relates to the analytically determined concentration.

EC50 (72 h) 0.92 mg/l (growth rate), Skeletonema costatum (ISO/DIS 10253, static)
The details of the toxic effect relate to the nominal concentration.

Chronic toxicity to fish
No observed effect concentration (97 d) 1.6 mg/l, Oncorhynchus mykiss (Flow through.)
The details of the toxic effect relate to the nominal concentration.

Chronic toxicity to aquatic invertebrates
No observed effect concentration (21 d) 5.0 mg/l, Daphnia magna (OECD Guideline 211, semistatic)

Assessment of terrestrial toxicity
Toxic effects have been observed in studies with terrestric plants. Toxic effects have been observed in studies with soil living organisms.

Soil living organisms

Toxicity to soil dwelling organisms:
LC50 (14 d) 170 mg/kg, Eisenia foetida (OECD Guideline 207, artificial soil)
The details of the toxic effect relate to the nominal concentration.

EC10 (28 d) 10.45 mg/kg, soil dwelling microorganisms (OECD 217, natural soil)
The details of the toxic effect relate to the nominal concentration.

Toxicity to terrestrial plants

EC20 (19 d) 441 mg/kg, Vicia sativa (OECD Guideline 208)

Other terrestrial non-mammals
LD50 (14 d) 206 mg/kg, Anas platyrhynchos (other)

Microorganisms/Effect on activated sludge

Toxicity to microorganisms
OECD Guideline 209 aerobic
activated sludge, domestic/EC20 (30 min): approx. 15 mg/l
The details of the toxic effect relate to the nominal concentration.

Persistence and degradability

Assessment biodegradation and elimination (H2O)
Readily biodegradable (according to OECD criteria).

Elimination information

90 - 100 % DOC reduction (28 d) (OECD 301 A (new version)) (aerobic, activated sludge, domestic)

Assessment biodegradation and elimination (H2O)

Information on: glutaral

Readily biodegradable (according to OECD criteria).

Elimination information

Information on: glutaral
90 - 100 % DOC reduction (28 d) (OECD 301 A (new version)) (aerobic, activated sludge, domestic)

Assessment of stability in water
In contact with water the substance will hydrolyse slowly.

Information on Stability in Water (Hydrolysis)
$t_{1/2}$ > 1 a (50 °C), (Directive 92/69/EEC, C.7, pH 7)
In contact with water the substance will hydrolyse slowly.

Assessment of stability in water

Information on: glutaral

In contact with water the substance will hydrolyse slowly.

Bioaccumulative potential

Assessment bioaccumulation potential
No significant accumulation in organisms is expected as a result of the distribution coefficient of n-octanol/water (log Pow).

Bioaccumulation potential
Because of the n-octanol/water distribution coefficient (log Pow) accumulation in organisms is not to be expected.

Assessment bioaccumulation potential

Information on: glutaral

No significant accumulation in organisms is expected as a result of the distribution coefficient of n-octanol/water (log Pow).

Mobility in soil

Assessment transport between environmental compartments
The substance will not evaporate into the atmosphere from the water surface.
Adsorption to solid soil phase is possible.

Information on: glutaral

The substance will not evaporate into the atmosphere from the water surface.
Adsorption to solid soil phase is possible.

Additional information

Other ecotoxicological advice:
Data refer to a diluted aqueous solution of the substance.

13. Disposal considerations

Waste disposal of substance:

Dispose of in accordance with national, state and local regulations. It is the waste generator's responsibility to determine if a particular waste is hazardous under RCRA.

Container disposal:
Dispose of in a licensed facility. Recommend crushing, puncturing or other means to prevent unauthorized use of used containers.

RCRA:
This product meets the D002 (characteristic corrosivity) criteria.

14. Transport Information

Land transport
USDOT

Hazard class:	8
Packing group:	II
ID number:	UN 3265
Hazard label:	8, EHSM
Proper shipping name:	CORROSIVE LIQUID, ACIDIC, ORGANIC, N.O.S. (contains GLUTARALDEHYDE)

Sea transport
IMDG

Hazard class:	8
Packing group:	II
ID number:	UN 3265
Hazard label:	8, EHSM
Marine pollutant:	YES
Proper shipping name:	CORROSIVE LIQUID, ACIDIC, ORGANIC, N.O.S. (contains GLUTARALDEHYDE)

Air transport
IATA/ICAO

Hazard class:	8
Packing group:	II
ID number:	UN 3265
Hazard label:	8
Proper shipping name:	CORROSIVE LIQUID, ACIDIC, ORGANIC, N.O.S. (contains GLUTARALDEHYDE)

15. Regulatory Information

Federal Regulations

Registration status:

Biocide	TSCA, US	released / exempt

EPCRA 311/312 (Hazard categories): Refer to SDS section 2 for GHS hazard classes applicable for this product.

State regulations

State RTK	CAS Number	Chemical name
NJ	111-30-8	glutaral
PA	111-30-8	glutaral

Safe Drinking Water & Toxic Enforcement Act, CA Prop. 65:

WARNING: This product can expose you to chemicals including METHANOL, which is known to the State of California to cause birth defects or other reproductive harm. For more information, go to www.P65Warnings.ca.gov.

NFPA Hazard codes:
Health: 3 Fire: 1 Reactivity: 0 Special:

HMIS III rating
Health: 3 Flammability: 1 Physical hazard: 0

Labeling requirements under FIFRA

This chemical is a pesticide product registered by the Environmental Protection Agency and is subject to certain labeling requirements under federal pesticide law. These requirements differ from the classification criteria and hazard information required for safety data sheets, and workplace labels of non-pesticide chemicals. Following is the hazard information as required on the pesticide label.

DANGER:
CORROSIVE.
CAUSES IRREVERSIBLE EYE DAMAGE.
CAUSES SKIN IRRITATION.
HARMFUL IF INHALED.
HARMFUL IF SWALLOWED.
HARMFUL IF ABSORBED THROUGH SKIN.
MAY CAUSE ALLERGIC SKIN REACTION.
CAUSES ASTHMATIC SIGNS AND SYMPTOMS IN HYPER-REACTIVE INDIVIDUALS.
Do not get in eyes, on skin, or on clothing.
Avoid inhalation of vapour.
Not to be used as an aerosol.
Do not swallow.
Wear protective eyeware (goggles or face shield).
Wear chemical resistant protective gloves.
Wear protective clothing.
Wash with plenty of water and soap thoroughly after handling.
Remove contaminated clothing immediately and clean before re-use or dispose it if necessary.

16. Other Information

SDS Prepared by:
BASF NA Product Regulations
SDS Prepared on: 2018/08/31

We support worldwide Responsible Care® initiatives. We value the health and safety of our employees, customers, suppliers and neighbors, and the protection of the environment. Our commitment to Responsible Care is integral to conducting our business and operating our facilities in a safe and environmentally responsible fashion, supporting our customers and suppliers in ensuring the safe and environmentally sound handling of our products, and minimizing the impact of our

operations on society and the environment during production, storage, transport, use and disposal of our products.

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END OF DATA SHEET

SDS no. PID10626
Version 7
Revision date 10/May/2017
Supersedes date 11/Sep/2014

Safety Data Sheet
NOVAMOD*

1. Identification

1.1 Product identifier

Product name NOVAMOD*

Product code PID10626

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Drilling fluid additive.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
200 - 125, 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-780-962-8221

E-mail address sdsmi@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : 0800-720-8000 0800-777-2323 (WGRA)

2. Hazards identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards Not classified

Environmental hazards Not classified

Physical Hazards

Flammable Liquids	Category 4

2.2 Label elements

Signal word
WARNING

Hazard statements
H227 - Combustible liquid

Precautionary statements
P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking
P280 - Wear protective gloves/protective clothing/eye protection/face protection
P370 + P378 - In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish
P403 + P235 - Store in a well-ventilated place. Keep cool

P303 + P361 + P353 - IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P501 - Dispose of contents/container in accordance with local, regional, national, and international regulations as applicable

Hazards not otherwise classified
None known

Unknown acute toxicity 76% of the mixture consists of ingredient(s) of unknown toxicity.

3. Composition/information on Ingredients

3.1 Substances

Not applicable

3.2 Mixtures

Chemical Name	CAS No	Weight-%
n-Dodecane	112-40-3	5 - 10
Alkenes, C>8	68411-00-7	5 - 10
Tetradecane	629-59-4	5 - 10
n-Undecane	1120-21-4	5 - 10
n-Tridecane	629-50-5	5 - 10

Comments
The product contains other ingredients which do not contribute to the overall classification.

4. First aid measures

4.1 First-Aid Measures

Inhalation Move to fresh air. If breathing is difficult, (trained personnel should) give oxygen. If not breathing, give artificial respiration. Get medical attention immediately if symptoms occur.

Ingestion Do NOT induce vomiting. Call a physician or Poison Control Centre immediately. Rinse mouth. Never give anything by mouth to an unconscious person. Obtain medical attention.

Skin contact Wash skin thoroughly with soap and water. Remove contaminated clothing and shoes. Get medical attention if irritation persists.

Eye contact	Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first five minutes, then continue rinsing eye.

4.2 Most important symptoms and effects, both acute and delayed

Main symptoms

Inhalation	Please see Section 11. Toxicological Information for further information.
Ingestion	Please see Section 11. Toxicological Information for further information.
Skin contact	Please see Section 11. Toxicological Information for further information.
Eye contact	Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician	Treat symptomatically

5. Fire-fighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Fog, Alcohol Foam, CO_2, Dry Chemical.

Extinguishing media which must not be used for safety reasons
Do not use a solid water stream as it may scatter and spread fire.

5.2 Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
Combustible liquid. Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks). Vapors may form explosive mixtures with air. Porous combustible materials wetted with product may spontaneously ignite if exposed to air.

Hazardous combustion products
Carbon monoxide, carbon dioxide and unburned hydrocarbons (smoke).

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

6. Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Extinguish all ignition sources. Avoid sparks, flames, heat and smoking. Evacuate personnel to safe areas. Use personal protective equipment. If spilled, take caution, as material can cause surfaces to become very slippery.

6.2 Environmental precautions

Do not allow spilled material to enter sewers, storm drains or surface waters. Large spills released to the environment may disturb the natural chemical balance of soil/fresh water.

Environmental exposure controls
The product should not be allowed to enter drains, water courses or the soil. Avoid release to the environment.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Dike to collect large liquid spills.

Methods for cleaning up
Contain and collect spillage with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local/national regulations (see Section 13). Take precautionary measures against static discharges. Use non-sparking tools and equipment.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and storage

7.1 Precautions for safe handling

Handling
Keep away from heat, sparks and open flame. No smoking. Avoid breathing vapors or mists. Avoid contact with skin, eyes and clothing. Take precautionary measures against static discharges. Avoid static electricity build up with connection to earth. Prevent splashing and leaking of product.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Ensure adequate ventilation.

Storage precautions Keep away from open flames, hot surfaces and sources of ignition. Keep container/package tightly closed and in a well-ventilated place. Follow safe warehousing practices regarding palletizing, banding, shrink-wrapping and/or stacking.

8. Exposure controls/personal protection

8.1 Control parameters

Chemical Name	ACGIH TLV	OSHA PEL
n-Dodecane	Not determined	Not determined
Alkenes, C>8	Not determined	Not determined
Tetradecane	Not determined	Not determined
n-Undecane	Not determined	Not determined
n-Tridecane	Not determined	Not determined

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Apply technical measures to comply with the occupational exposure limits. Keep airborne concentrations below exposure limits.

Personal protective equipment

Eye protection	Tightly fitting safety goggles.
Hand protection	Wear chemical resistant gloves such as nitrile or neoprene. Be aware that liquid may penetrate the gloves. Frequent change is advisable.
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne mist/aerosol of this product, use an organic vapor cartridge with a P-95 pre-filter attached. In work environments containing oil mist/aerosol, use an organic vapor cartridge with a P-95 pre-filter attached.If exposed to vapors from this product, use a NIOSH/MSHA-approved respirator with an organic vapor cartridge.
Skin and body protection	Wear appropriate personal protective clothing to prevent skin contact.
Hygiene measures	Wash hands before breaks and immediately after handling the product, Remove and wash contaminated clothing before re-use.

9. Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state	Liquid
Appearance	Transparent
Color	Amber
Odor	Hydrocarbon-like
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH	Not applicable	
pH @ dilution		
Melting / freezing point	< 0 °C / 32 °F	
Boiling point/range	> 150 °C / 302 °F	
Flash point	> 76 °C / 170 °F	PMCC
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	>1 @ Air = 1	
Specific gravity	0.80 - 0.90	
Bulk density	No information available	
Water solubility	Negligible	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	
log Pow	No information available	
Explosive properties	No information available	
Oxidizing properties	No information available	

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	No information available
Density	No information available

Comments
The data listed above are typical physical and chemical properties that do not constitute product specification. Please refer to Technical Data Sheet for specifications.

10. Stability and reactivity

10.1 Reactivity

Combustible liquid.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Avoid contact with heat, sparks, open flame, and static discharge. Do not freeze.

10.5 Incompatible materials

Strong oxidizing agents.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Inhalation — May cause irritation of respiratory tract. Vapors inhaled in high concentration have a narcotic effect on the central nervous system. Symptoms of overexposure are dizziness, headache, tiredness, nausea, unconsciousness, cessation of breathing.

Eye contact — May cause irritation.

Skin contact — Prolonged skin contact may defat the skin and produce dermatitis.

Ingestion — Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
n-Dodecane	No data available	No data available	> 142 ppm (Rat) 8 h > 5.6 mg/L (Rat) 4 h
Alkenes, C>8	No data available	No data available	No data available
Tetradecane	> 5000 mg/kg (Rat)	> 5000 mg/kg (Rat)	> 5.8 mg/L (Rat) 4 h > 5.6 mg/L (Rat) 4 h
n-Undecane	No data available	No data available	> 2.82 mg/L (Rat) 8 h > 442 ppm (Rat) 8 h > 5.6 mg/L (Rat) 4 h
n-Tridecane	> 5000 mg/kg (Rat)	> 5000 mg/kg (Rabbit)	> 41 ppm (Rat) 8 h > 5.6 mg/L (Rat) 4 h

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
n-Dodecane	No data available	No data available	No data available	No data available
Alkenes, C>8	No data available	No data available	No data available	No data available
Tetradecane	No data available	No data available	No data available	No data available
n-Undecane	No data available	No data available	No data available	No data available

n-Tridecane	No data available	No data available	No data available	No data available

Sensitization Not classified.

Mutagenic effects No evidence of mutagenic properties.

Carcinogenicity No evidence of carcinogenic properties.

Reproductive toxicity No evidence of toxicity to reproduction.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of exposure Inhalation. Skin contact. Eye contact.

Routes of entry Inhalation.

Specific target organ toxicity - Single exposure Not classified

Specific target organ toxicity - Repeated exposure Not classified.

Aspiration hazard Not classified.

12. Ecological information

12.1 Toxicity

Toxicity to algae
See component information below.

Toxicity to fish
See component information below.

Toxicity to daphnia and other aquatic invertebrates
See component information below.

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
n-Dodecane	No information available	No information available	= 0.02856 mg/L EC50 Daphnia magna 48 h
Alkenes, C>8	No information available	No information available	No information available
Tetradecane	No information available	= 0.026 mg/L EC50 Chlorella vulgaris 24 h	= 0.02856 mg/L EC50 Daphnia magna 48 h
n-Undecane	No information available	No information available	= 0.02856 mg/L EC50 Daphnia magna 48 h
n-Tridecane	No information available	No information available	= 0.02856 mg/L EC50 Daphnia magna 48 h

12.2 Persistence and degradability

No product level data available.

12.3 Bioaccumulative potential

No product level data available.

12.4 Mobility in soil

No information available.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal considerations

13.1 Waste treatment methods

Disposal Method	Disposal should be made in accordance with federal, state and local regulations.
Contaminated packaging	If recycling is not practicable, dispose of in compliance with local regulations.

14. Transport information

14.1. UN number

UN No. (DOT)	NA1993
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG)	Not regulated
UN No. (ICAO)	Not regulated

14.2. UN proper shipping name

Combustible liquid, n.o.s., (contains petroleum distillates),
Not regulated for U.S. ground transport in non-bulk containers (<119 gallons).

14.3 Hazard class(es)

DOT Hazard class	Combustible
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG Hazard class	Not regulated
ICAO Hazard class/division	Not regulated

14.4 Packing group

DOT Packing group	PG III
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG Packing group	Not regulated
ICAO Packing group	Not regulated

14.5 Environmental hazard

Marine pollutant	No

14.6 Special precautions

Not applicable

15. Regulatory information

International inventories

USA (TSCA)	Complies
Canada (DSL)	This product contains chemical(s) which is/are not listed on DSL but is/are listed on the NDSL.
European Union (EINECS and ELINCS)	Complies
Philippines (PICCS)	Does not Comply
Japan (ENCS)	Does not Comply
China (IECSC)	Does not Comply
Australia (AICS)	Complies
Korean (KECL)	Does not Comply
New Zealand (NZIoC)	Does not Comply

IMPORTS, Canada
Possible import volume restrictions apply. For details contact the Corporate info in SECTION 1. This product contains chemical(s) which is/are not listed on DSL but is/are listed on the NDSL.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories
Fire hazard. Immediate (acute) health hazard.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
n-Dodecane	N/A	N/A	N/A
Alkenes, C>8	N/A	N/A	N/A
Tetradecane	N/A	N/A	N/A
n-Undecane	N/A	N/A	N/A
n-Tridecane	N/A	N/A	N/A

State Comments
Proposition 65: This product is not known to contain chemicals considered by the State of California's Safe Drinking Water and Toxic Enforcement Act of 1986 as causing cancer and/or reproductive toxicity at levels that are expected to pose a significant risk under anticipated use conditions.

Canadian Classification

This Safety Data Sheet has been prepared in compliance with the Hazardous Products Regulations.

16. Other information

Supersedes date	11/Sep/2014
Revision date	10/May/2017
Version	7
This SDS has been revised in the following section(s)	All sections. Globally Harmonized System (GHS)

HMIS classification

Health	1
Flammability	2

Physical hazard	0
PPE	J

N/A - Not Applicable, N/D - Not Determined.

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SDS no. PID1146
Version 10
Revision date 18/May/2017
Supersedes date 15/Oct/2015

Safety Data Sheet
NUT PLUG* (All Grades)

1. Identification

1.1 Product identifier

Product name NUT PLUG* (All Grades)

Product code PID1146

Synonyms NUT PLUG* FINE, NUT PLUG* MEDIUM, NUT PLUG* COARSE

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Lost circulation material.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
200 - 125, 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-780-962-8221

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : 0800-720-8000 0800-777-2323 (WGRA)

2. Hazards identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Carcinogenicity	Category 1A

Environmental hazards Not classified

Physical Hazards

Combustible dust

2.2 Label elements

Signal word
DANGER

Hazard statements
H350 - May cause cancer
H232 - May form combustible dust concentrations in air

Precautionary statements
P201 - Obtain special instructions before use
P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking
P233 - Keep container tightly closed
P240 - Ground/bond container and receiving equipment
P280 - Wear protective gloves/protective clothing/eye protection/face protection
P309 + P311 - IF exposed or if you feel unwell: Call a POISON CENTER or doctor/physician
P370 + P378 - In case of fire: Use dry sodium carbonate to extinguish
P403 + P235 - Store in a well-ventilated place. Keep cool

P202 - Do not handle until all safety precautions have been read and understood
P241 - Use explosion-proof electrical/ ventilating/ lighting/ equipment
P242 - Use only non-sparking tools
P243 - Take precautionary measures against static discharge
P261 - Avoid breathing dust/fume/gas/mist/vapors/spray
P272 - Contaminated work clothing should not be allowed out of the workplace
P303 + P361 + P353 - IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P333 + P313 - If skin irritation or rash occurs: Get medical advice/attention
P363 - Wash contaminated clothing before reuse
P501 - Dispose of contents/ container to an approved waste disposal plant

Hazards not otherwise classified
None known

Unknown acute toxicity 0% of the mixture consists of ingredient(s) of unknown toxicity.

3. Composition/information on Ingredients

3.1 Substances

Chemical Name	CAS No	Weight-%
Cellulose	9004-34-6	60 - 100
Crystalline silica (impurity)	14808-60-7	<1

3.2 Mixtures

Not applicable

Comments
Percentages (concentrations) represented as a range are due to batch-to-batch variability.

4. First aid measures

4.1 First aid measures

Inhalation — If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion — Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Seek medical attention if irritation occurs.

Skin contact — Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention immediately if symptoms occur.

Eye Contact — Promptly wash eyes with lots of water while lifting eye lids. Remove contact lenses. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed Most important symptoms and effects, both acute and delayed

General advice — The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Symptoms

Inhalation — Please see Section 11. Toxicological Information for further information.

Ingestion — Please see Section 11. Toxicological Information for further information.

Skin contact — Please see Section 11. Toxicological Information for further information.

Eye contact — Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician — Treat symptomatically

5. Fire-fighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Fog, Alcohol Foam, CO_2, Dry Chemical.

Extinguishing media which must not be used for safety reasons
None known.

5.2. Special hazards arising from the substance or mixture Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
Suspended dust may present a dust explosion hazard.

Hazardous combustion products
Carbon oxides (COx).

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment identified in Section 8. Evacuate and ventilate the area. Extinguish all ignition sources. Avoid sparks, flames, heat and smoking. Prevent further leakage or spillage if safe to do so.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil. As local regulations may vary; all waste must be disposed/recycled/reclaimed in accordance with federal, state, and local environmental control regulations.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Cover powder spill with plastic sheet or tarp to minimize spreading.

Methods for cleaning up
Shovel into suitable container for disposal. Take precautionary measures against static discharges. Avoid dust formation. Powdered material may form explosive dust-air mixtures.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and storage

7.1 Precautions for safe handling

Handling
Use personal protective equipment as required. Avoid contact with skin, eyes and clothing. Avoid dust formation in confined areas. Fine dust dispersed in air may ignite. Avoid breathing dust; if exposed to high dust concentration, leave area immediately.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Keep airborne concentrations below exposure limits. Use spark-proof tools and explosion-proof equipment. Ensure adequate ventilation.

Storage precautions Keep container/package tightly closed and in a well-ventilated place.

8. Exposure controls/personal protection

8.1 Control parameters

Exposure limits **No biological limit allocated**

Component	ACGIH TLV	OSHA PEL
Cellulose	10 mg/m³	15 mg/m³ TWA

9004-34-6 (60 - 100)		5 mg/m³ TWA
Crystalline silica (impurity) 14808-60-7 (<1)	0.025 mg/m³	50 µg/m³ TWA respirable fraction

Crystalline silica (impurity)
OSHA - Final PELs - Table Z-3 Mineral Dusts
(250)/(%SiO2 + 5) mppcf TWA, respirable fraction; (10)/(%SiO2 + 2) mg/m³ TWA, respirable fraction

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Apply technical measures to comply with the occupational exposure limits. Keep airborne concentrations below exposure limits.

Personal protective equipment

Eye protection	Tightly fitting safety goggles.
Hand protection	Use protective gloves made of: Neoprene Nitrile Frequent change is advisable
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne particles of this product use at least a NIOSH-approved N95 half-mask disposable or re-useable particulate respirator. In work environments containing oil mist/aerosol use at least a NIOSH-approved P95 half-mask disposable or re-useable particulate respirator.
Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state	Solid
Appearance	Transparent
Color	Tan - Brown
Odor	Odorless
Odor threshold	Not applicable

Property	Values	Remarks
pH		
pH @ dilution		
Melting / freezing point	No information available	
Boiling point/range	No information available	
Flash point	193 °C / 380 °F	PMCC
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	

Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	1.1 - 1.4 sg	@ 20 °C
Bulk density	577–641 kg/m^3 / 36–40 lb/ft3	
Water solubility	Insoluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available Not applicable	
Dynamic viscosity	No information available	
log Pow	No information available	

Explosive properties	Suspended dust may present a dust explosion hazard
Oxidizing properties	None known.

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	None
Density	No information available

Comments
The data listed above are typical physical and chemical properties that do not constitute product specification. Please refer to Technical Data Sheet for specifications.

10. Stability and reactivity

10.1 Reactivity

Dust may form explosive mixture in air.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Keep away from open flames, hot surfaces and sources of ignition.

10.5 Incompatible materials

Oxidizing agents.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Inhalation

Inhalation of dust in high concentration may cause irritation of respiratory system. Harmful: danger of serious damage to health by prolonged exposure through inhalation. Repeated or prolonged inhalation of crystalline silica dust can cause delayed lung injury, and other

diseases, including silicosis and lung cancer.

Eye contact Dust contact with the eyes can lead to mechanical irritation.

Skin contact Contact with dust can cause mechanical irritation or drying of the skin.

Ingestion Irritant; may cause pain or discomfort to mouth, throat and stomach.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Cellulose	> 5 g/kg (Rat)	> 2 g/kg (Rabbit)	> 5800 mg/m³ (Rat) 4 h
Crystalline silica (impurity)	= 500 mg/kg (Rat)	No data available	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Cellulose	No data available	No data available	No data available	Known Human Carcinogen
Crystalline silica (impurity)	Group 1; Monograph 100C [2012] Monograph 100C [2012] (listed under Crystalline silica inhaled in the form of quartz or cristobalite from occupational sources); Monograph 68 [1997] Group 1; Monograph 68 [1997]	A2 Suspected Human Carcinogen	Present	Known Human Carcinogen

Sensitization Not classified.

Mutagenic effects This substance has no evidence of mutagenic properties.

Carcinogenicity Contains a known or suspected carcinogen. Crystalline silica dust is listed by IARC in Group 1 as known to cause lung cancer in humans, if inhaled.

Reproductive toxicity No evidence of toxicity to reproduction.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of exposure Inhalation. Skin contact. Eye contact.

Routes of entry Inhalation.

Specific target organ toxicity - Single exposure Not classified

Specific target organ toxicity - Repeated exposure Not classified.

Target organ effects Respiratory system.

Aspiration hazard Not applicable.

12. Ecological information

12.1 Toxicity

Toxicity to algae
This product is not considered toxic to algae.

Toxicity to fish
This product is not considered toxic to fish.

Toxicity to daphnia and other aquatic invertebrates
This product is not considered toxic to invertebrates.

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Cellulose	No information available	No information available	No information available
Crystalline silica (impurity)	No information available	No information available	No information available

12.2 Persistence and degradability

Not Applicable - Inorganic chemical.

12.3 Bioaccumulative potential

Not Applicable - Inorganic chemical.

12.4 Mobility in soil

Insoluble in water.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal considerations

13.1 Waste treatment methods

Disposal Method Disposal should be made in accordance with federal, state and local regulations.

Contaminated packaging Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

Not regulated

UN No. (DOT) Not regulated
UN No. (TDG) Not regulated
UN/ID No. (ADR/RID/ADN/ADG) Not regulated
UN No. (IMDG) Not regulated
UN No. (ICAO) Not regulated

14.2. UN proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class Not regulated
TDG Hazard class Not regulated

ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG Hazard class	Not regulated
ICAO Hazard class/division	Not regulated

14.4 Packing group

DOT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG Packing group	Not regulated
ICAO Packing group	Not regulated

14.5 Environmental hazard
No

14.6 Special precautions
Not applicable

14.7 Transport in bulk according to Annex I/II of MARPOL 73/78 and the IBC Code
Please contact MISDS@slb.com for info regarding transport in Bulk.

15. Regulatory information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
European Union (EINECS and ELINCS)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Complies
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories
Delayed (chronic) health hazard. Fire Hazard (Combustible Dust)

SARA 302/304, 313, CERCLA RQ, California Proposition 65
Note: If no components are listed below, this product is not subject to the referenced SARA and CERCLA regulations and is not known to contain a Proposition 65 listed chemical at a level that is expected to pose a significant risk under anticipated use conditions.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Cellulose	N/A	N/A	N/A
Crystalline silica (impurity)	N/A	N/A	N/A

State Comments
Proposition 65: This product contains chemical(s) considered by the State of California's Safe Drinking Water and Toxic Enforcement Act of 1986 to cause cancer and/or reproductive toxicity. See table under U.S. Federal and State Regulations for the specific chemicals.

Canadian Classification

This Safety Data Sheet has been prepared in compliance with the Hazardous Products Regulations.

16. Other information

Supersedes date	15/Oct/2015
Revision date	18/May/2017
Version	10
This SDS has been revised in the following section(s)	1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY/UNDERTAKING 2. Hazards Identification 3. Composition/information on Ingredients 6. Accidental release measures 7. Handling and storage 8. EXPOSURE CONTROLS / PERSONAL PROTECTION 11. Toxicological information 16. Updated according to WHMIS 2015.

HMIS classification

Health	1*
Flammability	1
Physical hazard	0
PPE	E

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Disclaimer
The information contained herein is considered in good faith as reliable of the date issued and is based upon on measurements, tests or data derived from supplier's own study or furnished by others. In providing this SDS information, Supplier makes no express or implied warranties as to the information or product; merchantability or fitness of purpose; any express or implied warranty; or non-infringement of intellectual property rights; and supplier assumes no responsibility for any direct, special or consequential damages, results obtained, or the activities of others. To the maximum extent permitted by law, supplier's warranty obligations and buyer's sole remedies are as stated in separate agreement between the parties.

SDS no. 143880
Version 4
Revision date 17/Aug/2020
Supersedes date 19/May/2017

Safety Data Sheet
PECAN NUT PLUG* (All Grades)

1. Identification

1.1 Product identifier

Product name PECAN NUT PLUG* (All Grades)

Product code 143880

Synonyms PECAN NUT PLUG* FINE, PECAN NUT PLUG* MEDIUM, PECAN NUT PLUG* COARSE

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Lost circulation material.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
200 - 125, 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-780-962-8221

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals) , Anne Karin (Anka) Fosse

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : +55 11 3197 5891

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Carcinogenicity	Category 1A
Specific target organ toxicity - Repeated exposure	Category 2

Environmental hazards Not classified

Physical Hazards

Combustible dust

2.2 Label elements

Signal word
DANGER

Hazard Statements
H350i - May cause cancer by inhalation
H373 - May cause damage to organs through prolonged or repeated exposure if inhaled
May form combustible dust concentrations in air

Precautionary Statements
P201 - Obtain special instructions before use
P202 - Do not handle until all safety precautions have been read and understood
P260 - Do not breathe dust, fume, gas, mist, vapors, spray
P280 - Wear protective gloves, protective clothing, eye protection
P308 + P313 - IF exposed or concerned: Get medical advice/attention

P240 - Ground/bond container and receiving equipment
P241 - Use explosion-proof electrical, ventilating, lighting, equipment
P243 - Take precautionary measures against static discharge

Hazards not otherwise classified
None known

Unknown acute toxicity Not applicable.

3. Composition/information on Ingredients

3.1 Substances

Chemical Name	CAS No	Weight-%
Cellulose	Proprietary	60-100
Crystalline silica (impurity)	14808-60-7	0.5-1.5

3.2 Mixtures

Not applicable

Comments
Proprietary component(s) in section 3 of this SDS does not/do not trigger application of trade secret exemption under Hazardous Materials Information Review Act (HMIRA). The proprietary component in this product contributes to combustible dust classification.

4. First Aid Measures

4.1 First aid measures

Inhalation — If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion — Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Get medical attention if symptoms occur.

Skin contact — Wash skin thoroughly with soap and water. Get medical attention if symptoms occur.

Eye Contact — Promptly wash eyes with lots of water while lifting eye lids. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

General advice — The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Symptoms

Inhalation — Please see Section 11. Toxicological Information for further information.

Ingestion — Please see Section 11. Toxicological Information for further information.

Skin contact — Please see Section 11. Toxicological Information for further information.

Eye contact — Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician — Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Water Fog, Alcohol Foam, CO_2, Dry Chemical.

Extinguishing media which must not be used for safety reasons
Do not use a solid water stream as it may scatter and spread fire.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
Combustible material. Dust may form explosive mixture in air.

Hazardous combustion products
Silicon oxide, Carbon oxides (COx).

5.3 Advice for firefighters

Special protective equipment and precautions for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Extinguish all ignition sources. Avoid sparks, flames, heat and smoking. Use personal protective equipment. See also section 8.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Cover powder spill with plastic sheet or tarp to minimize spreading.

Methods for cleaning up
Sweep up and shovel into suitable containers for disposal. Avoid dust formation. Take precautionary measures against static discharges. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Avoid dust formation.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions	Ensure adequate ventilation. Take precautionary measures against static discharges. Keep airborne concentrations below exposure limits.
Storage precautions	Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from open flames, hot surfaces and sources of ignition. Protect from moisture. Avoid contact with:. Oxidizing agents.
Packaging materials	Use specially constructed containers only.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Component Information

Chemical Name	ACGIH TLV	OSHA PEL	Argentina -	Brazil - Occupational	Mexico -

			Occupational Exposure Limits - TWAs (CMPs)	Exposure Limits - TWAs (LTs)	Occupational Exposure Limits - TWAs (LMPE-PPTs)
Cellulose	10 mg/m³	15 mg/m³ TWA 5 mg/m³ TWA	10 mg/m³ TWA	Not determined	10 mg/m³ TWA VLE-PPT
Crystalline silica (impurity)	0.025 mg/m³	50 µg/m³ TWA respirable fraction	0.05 mg/m³ TWA	Not determined	0.025 mg/m³ TWA VLE-PPT (respirable fraction)

Crystalline silica (impurity)
OSHA - Final PELs - Table Z-3 Mineral Dusts
(250)/(%SiO2 + 5) mppcf TWA, respirable fraction; (10)/(%SiO2 + 2) mg/m³ TWA, respirable fraction

IDLH (Immediately Dangerous to Life or Health)
Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Cellulose	Not detemined
Crystalline silica (impurity) 14808-60-7	50 mg/m³ IDLH (respirable dust)

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation. Mechanical ventilation or local exhaust ventilation is required.

Personal protective equipment

Eye protection	Tightly fitting safety goggles.
Hand protection	Use protective gloves made of: Neoprene Nitrile Frequent change is advisable
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne particles of this product use at least a NIOSH-approved N95 half-mask disposable or re-useable particulate respirator. In work environments containing oil mist/aerosol use at least a NIOSH-approved P95 half-mask disposable or re-useable particulate respirator.
Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Solid
Appearance	No information available
Color	Light brown
Odor	Odorless
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH	No information available	
pH @ dilution	No information available	
Melting point	No information available	
Boiling point	No information available	
Flash point	No information available	
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	1.4 - 1.65	
Bulk density	No information available	
Water solubility	Insoluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	
Partition Coefficient (n-octanol/water)	Not determined	

Explosive properties	Suspended dust may present a dust explosion hazard
Oxidizing properties	None known.

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	None
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

Combustible material. Dust may form explosive mixture in air.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization

Hazardous polymerization does not occur.

10.4 Conditions to avoid

Keep away from open flames, hot surfaces and sources of ignition. Avoid dust formation. Take precautionary measures against static charges. Protect from moisture.

10.5 Incompatible materials

Oxidizing agents.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Product information This product contains a small quantity of quartz, crystalline silica. Prolonged and repeated exposure to concentrations of crystalline silica exceeding the workplace exposure limit (WEL) may lead to chronic lung disease such as silicosis.

Inhalation May cause cancer by inhalation. May cause damage to organs through prolonged or repeated exposure. Inhalation of dust in high concentration may cause irritation of respiratory system.

Eye contact Dust may cause mechanical irritation.

Skin contact Prolonged contact may cause redness and irritation.

Ingestion Ingestion may cause stomach discomfort.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Cellulose	5005 mg/kg (rat)	2002 mg/kg (Rabbit)	No data available
Crystalline silica (impurity)	No data available	No data available	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Cellulose	No data available	No data available	No data available	Known Human Carcinogen
Crystalline silica (impurity)	Group 1; Monograph 100C [2012] Monograph 100C [2012] (listed under Crystalline silica inhaled in the form of quartz or cristobalite from occupational sources); Monograph 68 [1997] Group 1; Monograph 68 [1997]	A2 Suspected Human Carcinogen	Present	Known Human Carcinogen

Delayed and immediate effects and

chronic effects from short and long term exposure

Sensitization	This product does not contain any components suspected to be sensitizing.
Mutagenic effects	This product does not contain any known or suspected mutagens.
Carcinogenicity	Contains a known or suspected carcinogen. Crystalline silica dust is listed by IARC in Group 1 as known to cause lung cancer in humans, if inhaled.
Reproductive toxicity	This product does not contain any known or suspected reproductive hazards.
Developmental toxicity	Not known to cause birth defects or have a deleterious effect on a developing fetus.
Routes of Exposure	Skin contact. Inhalation. Eye contact.
Routes of entry	Inhalation.
Specific target organ toxicity - Single exposure	Not classified
Specific target organ toxicity - Repeated exposure	Category 2.
Target organ effects	Lungs.
Aspiration hazard	Not applicable.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
See component information below.

Toxicity to fish
See component information below.

Toxicity to daphnia and other aquatic invertebrates
See component information below.

Toxicology data for the components

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Cellulose	No information available	No information available	No information available
Crystalline silica (impurity)	LC50 Danio rerio (zebra fish) : > 10000 mg/l 96h	EC50: > 1000 mg/l 72h	LC50 Daphnia manga (Water flea): > 10000 mg/l 24h

12.2 Persistence and degradability

Not Applicable - Inorganic chemical.

12.3 Bioaccumulative potential

Not Applicable - Inorganic chemical.

12.4 Mobility

Insoluble in water.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

The product component(s) are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method	Disposal should be made in accordance with federal, state and local regulations.
Contaminated packaging	Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT)	Not regulated
UN No. (MT/ANTT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG/ANTAQ)	Not regulated
UN No. (ICAO/ANAC)	Not regulated
UN No. (DPC)	Not regulated

14.2. UN proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class	Not regulated
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated
DPC Hazard class	Not regulated

14.4 Packing group

DOT Packing group	Not regulated
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated
DPC Packing group	Not regulated

14.5 Environmental hazard

Marine pollutant No

14.6 Special precautions

Not applicable

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Complies
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH

All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories

Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Cellulose	N/A	N/A	N/A
Crystalline silica (impurity)	N/A	N/A	N/A

California Proposition 65

WARNING

This product can expose you to chemicals including those listed below, which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Chemical Name	California Proposition 65
Crystalline silica (impurity) 14808-60-7	Carcinogen

Canadian Classification

This Safety Data Sheet has been prepared in compliance with the Hazardous Products Regulations.

16. Other Information

Supersedes date	19/May/2017
Revision date	17/Aug/2020
Version	4
This SDS has been revised in the following section(s)	Product Code change All sections. No changes with regard to classification have been made.
HMIS classification	
Health	3*
Flammability	1
Physical hazard	0
PPE	X

N/A - Not Applicable, N/D - Not Determined.

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Disclaimer
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SDS no. 141381
Version 3
Revision date 27/Nov/2018
Supersedes date 18/Oct/2018

Safety Data Sheet
POLYPAC* (All Grades)

1. Identification of the Substance/Preparation and of the Company/Undertaking

1.1 Product identifier

Product name POLYPAC* (All Grades)

Product code 141381

Synonyms POLYPAC* ELV, R, UL & POLYPAC* SUPREME R, UL

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Fluid loss reducer. Viscosifier.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
200 - 125, 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-780-962-8221

Schlumberger Serviços de Petróleo LTDA
Rua Internacional 500Cavaleiro – Macaé, RJ. CEP: 27.930-075
Telefone: +55 22 3311-7051

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : 0800-720-8000/0800-777-2323 (WGRA)

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards Not classified

Environmental hazards Not classified

Physical Hazards

Combustible dust

2.2 Label elements

Signal word
WARNING

Hazard Statements
H232 - May form combustible dust concentrations in air

Precautionary Statements

P240 - Ground/bond container and receiving equipment
P241 - Use explosion-proof electrical/ ventilating/ lighting/ equipment
P243 - Take precautionary measures against static discharge

Unknown acute toxicity Not applicable.

3. Composition/information on Ingredients

3.1 Substances

Chemical Name	CAS No	Weight-%
Polyanionic cellulose	Proprietary	60-100

3.2 Mixtures

Not applicable

Comments
Proprietary component(s) in section 3 of this SDS does not/do not trigger application of trade secret exemption under Hazardous Materials Information Review Act (HMIRA). The proprietary component in this product contributes to combustible dust classification.

4. First Aid Measures

4.1 First aid measures

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Get medical attention if symptoms occur.

Skin contact Wash skin thoroughly with soap and water. Get medical attention if irritation persists.

Eye Contact Promptly wash eyes with lots of water while lifting eye lids. Remove contact lenses, if worn. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

General advice The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Symptoms

Inhalation Please see Section 11. Toxicological Information for further information.

Ingestion Please see Section 11. Toxicological Information for further information.

Skin contact Please see Section 11. Toxicological Information for further information.

Eye contact Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing agent suitable for type of surrounding fire.

Extinguishing media which must not be used for safety reasons
None known.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
Suspended dust may present a dust explosion hazard.

Hazardous combustion products
Carbon oxides (COx), Sodium oxides.

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. See also section 8.

6.2 Environmental precautions

Disposal should be in accordance with applicable regional, national and local laws and regulations. Refer to applicable federal, state and local regulations.

Environmental exposure controls
Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Cover powder spill with plastic sheet or tarp to minimize spreading. Prevent further leakage or spillage if safe to do so.

Methods for cleaning up
Sweep up and shovel into suitable containers for disposal. Avoid dust formation. Take precautionary measures against static discharges. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Avoid dust formation. Keep away from heat and sources of ignition.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions	Ensure adequate ventilation. Keep airborne concentrations below exposure limits. Take precautionary measures against static discharges.
Storage precautions	Keep containers tightly closed in a dry, cool and well-ventilated place. Protect from moisture. Strong oxidizing agents.
Packaging materials	Use specially constructed containers only.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Exposure limits **Control as an ACGIH particulate not otherwise specified (PNOS): 10 mg/m³ (Inhalable); 3 mg/m³ (Respirable) and an OSHA particulate not otherwise regulated (PNOR): 15 mg/m³ (Total); 5 mg/m³ (Respirable).**

Component Information

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits - TWAs (CMPs)	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits - TWAs (LMPE-PPTs)
Polyanionic cellulose	Not determined	Not determined	Not determined	Not determined	Not determined

IDLH (Immediately Dangerous to Life or Health)
Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Polyanionic cellulose	Not detemined

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation. Mechanical ventilation or local exhaust ventilation is required.

Personal protective equipment

Eye protection	Tightly fitting safety goggles.
Hand protection	Repeated or prolonged contact Use protective gloves made of: Nitrile Neoprene gloves Frequent change is advisable
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne particles of this product use at least a NIOSH-approved N95 half-mask disposable or re-useable particulate respirator. In work environments containing oil mist/aerosol use at least a NIOSH-approved P95 half-mask disposable or re-useable particulate respirator.
Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Solid
Appearance	Granules Powder
Color	White
Odor	Odorless
Odor threshold	Not applicable

Property	Values	Remarks
pH	Not applicable	
pH @ dilution	6.5 - 8	@ 1% solution
Melting / freezing point	No information available	
Boiling point/range	No information available	
Flash point	No information available	PMCC
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		

Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	1.5 - 1.6	@ 25 °C
Bulk density	400 - 800 kg/m³	
Water solubility	Soluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	> 230°C / 446°F	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	
log Pow	Not determined	

Explosive properties	Suspended dust may present a dust explosion hazard
Oxidizing properties	None known.

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	None
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

Dust may form explosive mixture in air.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static charges. Avoid dust formation. Protect from moisture.

10.5 Incompatible materials

Strong oxidizing agents.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation Inhalation of dust in high concentration may cause irritation of respiratory system.

Eye contact Dust may cause mechanical irritation.

Skin contact Prolonged contact may cause redness and irritation.

Ingestion Ingestion may cause stomach discomfort.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Polyanionic cellulose	= 27000 mg/kg (Rat)	> 2 g/kg (Rabbit)	> 5800 mg/m³ (Rat) 4 h

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Polyanionic cellulose	No data available	No data available	No data available	No data available

Sensitization This product does not contain any components suspected to be sensitizing.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity This product does not contain any known or suspected carcinogens.

Reproductive toxicity This product does not contain any known or suspected reproductive hazards.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of exposure Inhalation.

Routes of entry No route of entry noted.

Specific target organ toxicity - Single exposure Not classified

Specific target organ toxicity - Repeated exposure Not classified.

Aspiration hazard Not applicable.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
This product is not considered toxic to algae.

Toxicity to fish
This product is not considered toxic to fish.

Toxicity to daphnia and other aquatic invertebrates
This product is not considered toxic to invertebrates.

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates

Polyanionic cellulose	No information available	No information available	No information available

12.2 Persistence and degradability

Product is biodegradable.

12.3 Bioaccumulative potential

Does not bioaccumulate.

12.4 Mobility

Soluble in water.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method Disposal should be made in accordance with federal, state and local regulations.

Contaminated packaging Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT)	Not regulated
UN No. (MT/ANTT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG/ANTAQ)	Not regulated
UN No. (ICAO/ANAC)	Not regulated
UN No. (DPC)	Not regulated

14.2. UN proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class	Not regulated
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated
DPC Hazard class	Not regulated

14.4 Packing group

DOT Packing group	Not regulated
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated
DPC Packing group	Not regulated

14.5 Environmental hazard
No

14.6 Special precautions
Not applicable

14.7 Transport in bulk according to Annex I/II of MARPOL 73/78 and the IBC Code
Please contact SDS@slb.com for info regarding transport in Bulk.

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Complies
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH
All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Polyanionic cellulose	N/A	N/A	N/A

California Proposition 65

This product does not contain chemical[s] which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Canadian Classification

This Safety Data Sheet has been prepared in compliance with the Hazardous Products Regulations.

Brazilian Regulations

Brazil Regulation	This SDS was prepared in accordance with Brazil law NBR 14725.
Federal Police	Not determined
Army	Not determined
ANVISA	Not Listed
MTE (NR 15)	No information available

16. Other Information

Supersedes date	18/Oct/2018
Revision date	27/Nov/2018
Version	3
This SDS has been revised in the following section(s)	1, 2, 6, 9, 10, 16

HMIS classification

Health	1
Flammability	1
Physical hazard	0
PPE	E

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SDS no. PID10258
Version 3
Revision date 12/Oct/2020
Supersedes date 01/Jul/2020

Safety Data Sheet
POTASSIUM CHLORIDE

1. Identification

1.1 Product identifier

Product name POTASSIUM CHLORIDE

Product code PID10258

Synonyms Potassium Chloride 88-99%

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Completion fluid additive. Drilling fluid additive.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
200 - 125, 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-780-962-8221

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : +55 11 3197 5891

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards Not classified

Environmental hazards Not classified

Physical Hazards Not classified

2.2 Label elements

Signal word
None

Hazard Statements
This product is not classified as hazardous therefore no (H) hazard statements assigned.

Precautionary Statements
This product is not classified as hazardous therefore has no (P) precautionary statements assigned.

Unknown acute toxicity Not applicable.

3. Composition/information on Ingredients

3.1 Substances

Chemical Name	CAS No	Weight-%
Potassium Chloride	7447-40-7	60-100

3.2 Mixtures

Not applicable

Comments
No Comments.

4. First Aid Measures

4.1 First aid measures

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Get medical attention if symptoms occur.

Skin contact Wash skin thoroughly with soap and water. Get medical attention if irritation persists.

Eye Contact Promptly wash eyes with lots of water while lifting eye lids. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

General advice The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Symptoms

Inhalation	Please see Section 11. Toxicological Information for further information.
Ingestion	Please see Section 11. Toxicological Information for further information.
Skin contact	Please see Section 11. Toxicological Information for further information.
Eye contact	Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Water Fog, Alcohol Foam, CO_2, Dry Chemical.

Extinguishing media which must not be used for safety reasons
None known.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
None known.

Hazardous combustion products
Chlorides.

5.3 Advice for firefighters

Special protective equipment and precautions for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. See also section 8.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Cover powder spill with plastic sheet or tarp to minimize spreading.

Methods for cleaning up
Sweep up and shovel into suitable containers for disposal. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Avoid dust formation.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Ensure adequate ventilation. Keep airborne concentrations below exposure limits.

Storage precautions Keep containers tightly closed in a dry, cool and well-ventilated place. Avoid contact with:. Strong oxidizing agents. Strong acids. Strong alkalies. Protect from moisture.

Packaging materials Use specially constructed containers only.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Exposure limits **Control as an ACGIH particulate not otherwise specified (PNOS): 10 mg/m³ (Inhalable); 3 mg/m³ (Respirable) and an OSHA particulate not otherwise regulated (PNOR): 15 mg/m³ (Total); 5 mg/m³ (Respirable).**

Component Information

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits - TWAs (CMPs)	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits - TWAs (LMPE-PPTs)
Potassium Chloride	Not determined	Not determined	Not determined	Not determined	Not determined

IDLH (Immediately Dangerous to Life or Health)
Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Potassium Chloride 7447-40-7	Not detemined

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation. Mechanical ventilation or local exhaust ventilation is required.

Personal protective equipment

Eye protection	Tightly fitting safety goggles.
Hand protection	Use protective gloves made of: Neoprene Nitrile PVC Frequent change is advisable
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne particles of this product use at least a NIOSH-approved N95 half-mask disposable or re-useable particulate respirator. In work environments containing oil mist/aerosol use at least a NIOSH-approved P95 half-mask disposable or re-useable particulate respirator.
Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Solid
Appearance	Powder Dust
Color	White
Odor	Odorless
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH	Not applicable	
pH @ dilution	~7	@ 1%
Melting point	768-773 °C / 1414-1423 °F	
Boiling point	1406-1413 °C / 2562-2575 °F	
Flash point	No information available	
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	No information available	
Bulk density	No information available	
Water solubility	Soluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	

Partition Coefficient (n-octanol/water)	No information available
Explosive properties	Not applicable
Oxidizing properties	None known.

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	None
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

No specific reactivity hazards associated with this product.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Avoid dust formation. Protect from moisture.

10.5 Incompatible materials

Strong oxidizing agents. Strong acids. Strong alkalies.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation	Inhalation of dust in high concentration may cause irritation of respiratory system.
Eye contact	Dust may cause mechanical irritation.
Skin contact	Prolonged contact may cause redness and irritation.
Ingestion	Ingestion may cause stomach discomfort.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Potassium Chloride	2600 mg/kg (rat)	No data available	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Potassium Chloride	No data available	No data available	No data available	No data available

Delayed and immediate effects and chronic effects from short and long term exposure

Sensitization This product does not contain any components suspected to be sensitizing.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity This product does not contain any known or suspected carcinogens.

Reproductive toxicity This product does not contain any known or suspected reproductive hazards.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of Exposure Inhalation.

Routes of entry Inhalation.

Specific target organ toxicity - Single exposure Not classified

Specific target organ toxicity - Repeated exposure Not classified.

Aspiration hazard Not applicable.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
This product is not considered toxic to algae.

Toxicity to fish
This product is not considered toxic to fish.

Toxicity to daphnia and other aquatic invertebrates
This product is not considered toxic to invertebrates.

Toxicology data for the components

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Potassium Chloride	750 - 1020 mg/L LC50 Pimephales promelas 96 h = 1060 mg/L LC50 Lepomis macrochirus 96 h	= 2500 mg/L EC50 Desmodesmus subspicatus 72 h	= 83 mg/L EC50 Daphnia magna 48 h = 825 mg/L EC50 Daphnia magna 48 h

12.2 Persistence and degradability

Not Applicable - Inorganic chemical.

12.3 Bioaccumulative potential

Not Applicable - Inorganic chemical.

12.4 Mobility

Soluble in water.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method	Disposal should be made in accordance with federal, state and local regulations.
Contaminated packaging	Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT)	Not regulated
UN No. (MT/ANTT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG/ANTAQ)	Not regulated
UN No. (ICAO/ANAC)	Not regulated
UN No. (DPC)	Not regulated

14.2. UN proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class	Not regulated
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated
DPC Hazard class	Not regulated

14.4 Packing group

DOT Packing group	Not regulated
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated
DPC Packing group	Not regulated

14.5 Environmental hazard

Marine pollutant	No

14.6 Special precautions

Not applicable

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Complies
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH

All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories

Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Potassium Chloride	N/A	N/A	N/A

California Proposition 65

This product does not contain chemical[s] which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Brazil Regulation	This SDS was prepared in accordance with Brazil law NBR 14725.
Federal Police	Not determined
Army	Not determined
ANVISA	Not determined

16. Other Information

Supersedes date	01/Jul/2020
Revision date	12/Oct/2020
Version	3
This SDS has been revised in the following section(s)	1, 3, 5, 8, 14, 15, 16 No changes with regard to classification have been made.

HMIS classification

Health	1
Flammability	0
Physical hazard	0
PPE	E

Disclaimer
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SDS no. PID11780
Version 10
Revision date 14/Aug/2020
Supersedes date 03/May/2017

Safety Data Sheet
RHEBUILD*

1. Identification

1.1 Product identifier

Product name RHEBUILD*

Product code PID11780

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Viscosifier.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
200 - 125, 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-780-962-8221

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals) , Anne Karin (Anka) Fosse

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : +55 11 3197 5891

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Serious eye damage/eye irritation	Category 1
Carcinogenicity	Category 2
Specific target organ toxicity - Repeated exposure	Category 2

Environmental hazards Not classified

Physical Hazards Not classified

2.2 Label elements

Signal word
DANGER

Hazard Statements
H318 - Causes serious eye damage
H351 - Suspected of causing cancer
H373 - May cause damage to organs through prolonged or repeated exposure

Precautionary Statements
P201 - Obtain special instructions before use
P202 - Do not handle until all safety precautions have been read and understood
P260 - Do not breathe dust, fume, gas, mist, vapors, spray
P280 - Wear protective gloves, protective clothing, eye protection
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a POISON CENTER or physician
P501 - Dispose of contents/container in accordance with local, regional, national, and international regulations as applicable

P308 + P313 - IF exposed or concerned: Get medical advice/attention

Hazards not otherwise classified
None known

Unknown acute toxicity 50% of the mixture consists of ingredient(s) of unknown toxicity.

3. Composition/information on Ingredients

3.1 Substances

Not applicable

3.2 Mixtures

Chemical Name	CAS No	Weight-%
2-[2-(2-butoxyethoxy)ethoxy]ethanol	143-22-6	30-60
4-methyl-1,3-dioxolan-2-one	108-32-7	1-5
2,2`-Iminodiethanol	111-42-2	< 3
2,2`,2"-nitrilotriethanol	102-71-6	0.1-1

Comments

The product contains other ingredients which do not contribute to the overall classification.

4. First Aid Measures

4.1 First aid measures

Inhalation — If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion — Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Get immediate medical attention.

Skin contact — Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention if irritation persists.

Eye Contact — Promptly wash eyes with lots of water while lifting eye lids. Remove contact lenses, if worn. Continue to rinse for at least 15 minutes. Immediate medical attention is required.

4.2. Most important symptoms and effects, both acute and delayed

General advice — The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Symptoms

Inhalation — Please see Section 11. Toxicological Information for further information.

Ingestion — Please see Section 11. Toxicological Information for further information.

Skin contact — Please see Section 11. Toxicological Information for further information.

Eye contact — Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician — Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Water Fog, Alcohol Foam, CO_2, Dry Chemical.

Extinguishing media which must not be used for safety reasons
Do not use a solid water stream as it may scatter and spread fire.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
Heating of containers may cause pressure rise, with risk of bursting.

Hazardous combustion products

Carbon monoxide, Carbon monoxide, carbon dioxide and unburned hydrocarbons (smoke), Ammonia, Nitrogen oxides (NOx), Fire or high temperatures create:, Hydrogen peroxide.

5.3 Advice for firefighters

Special protective equipment and precautions for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. See also section 8.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Dike far ahead of liquid spill for later disposal. Prevent further leakage or spillage if safe to do so.

Methods for cleaning up
Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Do not breathe vapors or spray mist. Avoid spills and splashing during use.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions	Ensure adequate ventilation. Keep airborne concentrations below exposure limits.
Storage precautions	Keep containers tightly closed in a dry, cool and well-ventilated place. Store at room temperature.
Packaging materials	Use specially constructed containers only.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Component Information

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits - TWAs (CMPs)	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits - TWAs (LMPE-PPTs)
2-[2-(2-butoxyethoxy)ethoxy]ethanol	Not determined	Not determined	Not determined	Not determined	Not determined
4-methyl-1,3-dioxolan-2-one	Not determined	Not determined	Not determined	Not determined	Not determined
2,2`-Iminodiethanol	1 mg/m³	Not determined	2 mg/m³ TWA	Not determined	2 mg/m³ TWA VLE-PPT
2,2`,2"-nitrilotriethanol	5 mg/m³	Not determined	5 mg/m³ TWA	Not determined	5 mg/m³ TWA VLE-PPT

IDLH (Immediately Dangerous to Life or Health)
Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
2-[2-(2-butoxyethoxy)ethoxy]ethanol 143-22-6	-
4-methyl-1,3-dioxolan-2-one 108-32-7	-
2,2`-Iminodiethanol 111-42-2	-
2,2`,2"-nitrilotriethanol 102-71-6	-

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation. Mechanical ventilation or local exhaust ventilation is required.

Personal protective equipment

Eye protection	Tightly fitting safety goggles.
Hand protection	Impervious gloves made of: Nitrile Neoprene Break through time >480 minutes Glove thickness >=0.5 mm Be aware that liquid may penetrate the gloves. Frequent change is advisable.
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne mist/aerosol of this product, use an organic vapor cartridge with a P-95 pre-filter attached. In work environments containing oil mist/aerosol, use an organic vapor cartridge with a P-95 pre-filter attached.If exposed to vapors from this product, use a NIOSH/MSHA-approved

	respirator with an organic vapor cartridge.
Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Liquid
Appearance	No information available
Color	Amber
Odor	Slight
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH	No information available	
pH @ dilution	No information available	
Melting point	No information available	
Boiling point	> 232 °C / > 450 °F	
Flash point	> 93 °C / > 200 °F	
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	0.85 - 1.05	
Bulk density	No information available	
Water solubility	Dispersible	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	
Dynamic viscosity	< 2500 mPa s	@ 25 °C
Partition Coefficient (n-octanol/water)	No information available	

Explosive properties	Not applicable
Oxidizing properties	None known.

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	None
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

MAY FORM EXPLOSIVE PEROXIDES.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Store at room temperature.

10.5 Incompatible materials

No materials to be especially mentioned.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation Inhalation of vapors in high concentration may cause irritation of respiratory system.

Eye contact Causes serious eye damage.

Skin contact Prolonged contact may cause redness and irritation. May be absorbed through the skin in harmful amounts.

Ingestion May cause damage to organs through prolonged or repeated exposure.

LD50 Oral > 2000 mg/kg (rat) Calculated (MIXTURE)

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
2-[2-(2-butoxyethoxy)ethoxy]ethanol	5300 mg/kg (rat)	2002 mg/kg (Rabbit)	No data available
4-methyl-1,3-dioxolan-2-one	29000 mg/kg (rat)	3003 mg/kg (Rabbit)	No data available
2,2`-Iminodiethanol	676.42 mg/kg (rat)	No data available	No data available
2,2`,2"-nitrilotriethanol	4190 mg/kg (rat)	20020 mg/kg (Rabbit)	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
2-[2-(2-butoxyethoxy)ethoxy]ethanol	No data available	No data available	No data available	No data available
4-methyl-1,3-dioxolan-2-one	No data available	No data available	No data available	No data available
2,2`-Iminodiethanol	Group 2B; Monograph 101 [2013] 2B Group 2B; Monograph 77 [2000]	A3 Confirmed Aminal Carcinogen with unknown Relevance to Humans	Present	No data available
2,2`,2"-nitrilotriethanol	No data available	No data available	No data available	No data available

Delayed and immediate effects and chronic effects from short and long term exposure

Sensitization	This product does not contain any components suspected to be sensitizing.
Mutagenic effects	This product does not contain any known or suspected mutagens.
Carcinogenicity	Contains a known or suspected carcinogen.
Reproductive toxicity	This product does not contain any known or suspected reproductive hazards.
Developmental toxicity	Not known to cause birth defects or have a deleterious effect on a developing fetus.
Routes of Exposure	Inhalation. Eye contact. Skin contact. Ingestion.
Routes of entry	Inhalation. Skin absorption.
Specific target organ toxicity - Single exposure	Not classified
Specific target organ toxicity - Repeated exposure	Category 2.
Target organ effects	Liver. Blood. Kidneys.
Aspiration hazard	Not applicable.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
See component information below.

Toxicity to fish
See component information below.

Toxicity to daphnia and other aquatic invertebrates
See component information below.

Toxicology data for the components

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
2-[2-(2-butoxyethoxy)ethoxy]ethanol	2200 - 4600 mg/L LC50 Leuciscus idus 96h = 2400 mg/L LC50 Pimephales promelas 96h	> 500 mg/L EC50 Desmodesmus subspicatus 72h	> 500 mg/L EC50 Daphnia magna 48h
4-methyl-1,3-dioxolan-2-one	= 5300 mg/L LC50 Leuciscus idus 96 h > 1000 mg/L LC50 Cyprinus carpio 96 h	> 500 mg/L EC50 Desmodesmus subspicatus 72 h	> 500 mg/L EC50 Daphnia magna 48 h
2,2`-Iminodiethanol	600 - 1000 mg/L LC50 Lepomis macrochirus 96 h 1200 - 1580 mg/L LC50 Pimephales promelas 96 h 4460 - 4980 mg/L LC50 Pimephales promelas 96 h	2.1 - 2.3 mg/L EC50 Pseudokirchneriella subcapitata 96 h = 7.8 mg/L EC50 Desmodesmus subspicatus 72 h	= 55 mg/L EC50 Daphnia magna 48 h
2,2`,2"-nitrilotriethanol	450 - 1000 mg/L LC50 Lepomis	= 216 mg/L EC50 Desmodesmus	= 1386 mg/L EC50 Daphnia magna

	macrochirus 96 h > 1000 mg/L LC50 Pimephales promelas 96 h 10600 - 13000 mg/L LC50 Pimephales promelas 96 h	subspicatus 72 h = 169 mg/L EC50 Desmodesmus subspicatus 96 h	24 h

12.2 Persistence and degradability

No product level data available.

12.3 Bioaccumulative potential

No product level data available.

12.4 Mobility

Dispersible in water.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

The product component(s) are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method Disposal should be made in accordance with federal, state and local regulations.

Contaminated packaging Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT) NA3082
UN No. (MT/ANTT) Not regulated
UN No. (TDG) Not regulated
UN/ID No. (ADR/RID/ADN/ADG) Not regulated
UN No. (IMDG/ANTAQ) Not regulated
UN No. (ICAO/ANAC) Not regulated
UN No. (DPC) Not regulated

14.2. UN proper shipping name

Other regulated substances, liquid, n.o.s. contains 2,2`-Iminodiethanol
Not regulated for transportation by DOT if shipped in containers < RQ amount.

DOT reportable quantity Product (RQ): 380 gallons (2,2`-Iminodiethanol)
(add RQ if shipped in containers >RQ for DOT only)

14.3 Hazard class(es)

DOT Hazard class 9

ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated
DPC Hazard class	Not regulated

14.4 Packing group

DOT Packing group	PG III
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated
DPC Packing group	Not regulated

14.5 Environmental hazard

Marine pollutant No

14.6 Special precautions

Not applicable

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Does not comply
Japan (ENCS)	Does not comply
China (IECSC)	Does not comply
Australia (AICS)	Does not comply
Korean (KECL)	Complies
New Zealand (NZIoC)	Does not comply

Europe - REACH

All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories

Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
2-[2-(2-butoxyethoxy)ethoxy]ethanol	N/A	N/A	N/A

4-methyl-1,3-dioxolan-2-one	N/A	N/A	N/A
2,2`-Iminodiethanol	N/A	1.0 %	100 lb final RQ 45.4 kg final RQ
2,2`,2"-nitrilotriethanol	N/A	N/A	N/A

California Proposition 65

WARNING

This product can expose you to chemicals including those listed below, which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Chemical Name	California Proposition 65
2,2`-Iminodiethanol 111-42-2	carcinogen

16. Other Information

Supersedes date 03/May/2017

Revision date 14/Aug/2020

Version 10

This SDS has been revised in the following section(s) All sections. No changes with regard to classification have been made.

HMIS classification

Health	3*
Flammability	1
Physical hazard	0
PPE	X

N/A - Not Applicable, N/D - Not Determined.

*A mark of M-I L.L.C., a Schlumberger Company

Disclaimer
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SDS no. 142794
Version 1
Revision date 15/Jun/2018
Supersedes date None

Safety Data Sheet
RheCon

1. Identification of the Substance/Preparation and of the Company/Undertaking

1.1 Product identifier

Product name RheCon

Product code 142794

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Wetting agent.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
200 - 125, 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-780-962-8221

E-mail address sdsmi@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Australia +61 2801 44558, Asia Pacific +65 3158 1074, China +86 10 5100 3039, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, New Zealand +64 9929 1483, USA 001 281 561 1600

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Acute toxicity - Oral	Category 5

Skin corrosion/irritation	Category 3
Serious eye damage/eye irritation	Category 1

Environmental hazards

Physical Hazards

2.2 Label elements

Signal word
DANGER

Hazard Statements
H303 - May be harmful if swallowed
H316 - Causes mild skin irritation
H318 - Causes serious eye damage

Precautionary Statements
P280 - Wear eye protection/ face protection
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a POISON CENTER or doctor/physician

P310 - Immediately call a POISON CENTER or doctor/physician
P332 + P313 - If skin irritation occurs: Get medical advice/attention
P312 - Call a POISON CENTER or doctor/physician if you feel unwell

Unknown acute toxicity 0% of the mixture consists of ingredient(s) of unknown toxicity.

3. Composition/information on Ingredients

3.1 Substances

Chemical Name	CAS No	Weight-%
Polyethylene glycol oleyl ether	9004-98-2	60 - 100

3.2 Mixtures

Not applicable

Chemical Name	CAS No	Weight-%
Polyethylene glycol oleyl ether	9004-98-2	60 - 100

Comments
The exact percentage (concentration) of composition has been withheld as a trade secret

4. First Aid Measures

4.1 First aid measures

Inhalation Move to fresh air. If breathing has stopped, begin artificial respiration. If breathing is difficult, (trained personnel should) give oxygen. Obtain medical attention.

Ingestion Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Seek medical attention.

Skin contact Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Seek medical attention if irritation occurs.

Eye Contact Immediately flush eyes with water for at least 15 minutes. Get medical attention. If easy to do, remove contact lenses. Continue to rinse for at least 15 minutes. Immediate medical attention is required.

4.2. Most important symptoms and effects, both acute and delayed

General advice The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Symptoms

Inhalation Please see Section 11. Toxicological Information for further information.

Ingestion Please see Section 11. Toxicological Information for further information.

Skin contact Please see Section 11. Toxicological Information for further information.

Eye contact Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Water Fog, Alcohol Foam, CO_2, Dry Chemical.

Extinguishing media which must not be used for safety reasons
None known, Do not use a solid water stream as it may scatter and spread fire.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
Heating of containers may cause pressure rise, with risk of bursting.

Hazardous combustion products
Carbon monoxide, carbon dioxide and unburned hydrocarbons (smoke), Nitrogen oxides (NOx).

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Do not get in eyes, on skin, or on clothing. Use personal protective equipment. See also section 8. Solutions extremely slippery when spilled.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Dike far ahead of liquid spill for later disposal.

Methods for cleaning up
Contain and collect spillage with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local/national regulations (see Section 13).

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Avoid contact with skin and eyes. Do not breathe vapors or spray mist. Avoid spills and splashing during use. Keep away from open flames, hot surfaces and sources of ignition.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands and face before breaks and immediately after handling the product. Do not eat, drink or smoke during work.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Ensure adequate ventilation. Keep airborne concentrations below exposure limits.

Storage precautions Keep containers tightly closed in a dry, cool and well-ventilated place Avoid frost. Avoid contact with: Acids Oxidizing agents

8. Exposure Controls/Personal Protection

8.1 Control parameters

Exposure limits

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits - TWAs (CMPs)	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits - TWAs (LMPE-PPTs)
Polyethylene glycol oleyl ether	Not determined	Not determined	Not determined	Not determined	Not determined
Chemical Name	**ACGIH TLV**	**OSHA PEL**	**Argentina - Occupational Exposure Limits -**	**Brazil - Occupational Exposure Limits - TWAs (LTs)**	**Mexico - Occupational Exposure Limits -**

			TWAs (CMPs)		TWAs (LMPE-PPTs)
Polyethylene glycol oleyl ether	Not determined	Not determined	Not determined	Not determined	Not determined

IDLH (Immediately Dangerous to Life or Health)
Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Polyethylene glycol oleyl ether 9004-98-2	Not detemined

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Polyethylene glycol oleyl ether 9004-98-2	-

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation. Provide mechanical general and/or local exhaust ventilation to prevent release of vapor or mist into work environment.

Personal protective equipment

Eye protection	Tightly fitting safety goggles.
Hand protection	Use protective gloves made of: Nitrile Neoprene Be aware that liquid may penetrate the gloves. Frequent change is advisable.
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne mist/aerosol of this product, use an organic vapor cartridge with a P-95 pre-filter attached. In work environments containing oil mist/aerosol, use an organic vapor cartridge with a P-95 pre-filter attached.If exposed to vapors from this product, use a NIOSH/MSHA-approved respirator with an organic vapor cartridge.
Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before breaks and immediately after handling the product, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Liquid
Appearance	Cloudy
Color	Off-white
Odor	Characteristic

Odor threshold	Not applicable

Property	Values	Remarks
pH		
pH @ dilution	5.0 - 7.0	3% aqueous solution
Melting / freezing point		
Boiling point/range	No information available	
Flash point	> 100 °C / > 212 °F	PMCC
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	0.92 (approximately)	@ 60 °C
Bulk density	No information available	
Water solubility	Dispersible	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	
log Pow	No information available	
Explosive properties	No information available	
Oxidizing properties	No information available	

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	No information available
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

No data available.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Avoid frost. Avoid heat, flames and other sources of ignition.

10.5 Incompatible materials

Acids. Oxidizing agents.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation Inhalation of vapors in high concentration may cause irritation of respiratory system.

Eye contact Causes serious eye damage.

Skin contact May cause irritation. Prolonged skin contact may defat the skin and produce dermatitis.

Ingestion MAY BE HARMFUL IF SWALLOWED. Ingestion causes irritation of upper respiratory system and gastrointestinal disturbance.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Polyethylene glycol oleyl ether	= 2700 mg/kg (Rat)	No data available	No data available

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Polyethylene glycol oleyl ether	= 2700 mg/kg (Rat)	No data available	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Polyethylene glycol oleyl ether	No data available	No data available	No data available	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Polyethylene glycol oleyl ether	No data available	No data available	No data available	No data available

Sensitization Not classified.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity This product does not contain any known or suspected carcinogens.

Reproductive toxicity This product does not contain any known or suspected reproductive hazards.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of exposure Skin contact. Inhalation. Ingestion. Eye contact.

Routes of entry Inhalation. Skin absorption.

Specific target organ toxicity - Single exposure Not classified

Specific target organ toxicity - Repeated exposure Not classified.

Aspiration hazard Not classified.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
See component information below.

Toxicity to fish
See component information below.

Toxicity to daphnia and other aquatic invertebrates
See component information below.

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Polyethylene glycol oleyl ether	No information available	No information available	No information available

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Polyethylene glycol oleyl ether	No information available	No information available	No information available

12.2 Persistence and degradability

Not readily biodegradable. Inherently biodegradable.

12.3 Bioaccumulative potential

No product level data available.

12.4 Mobility

Soluble in water.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

The product component(s) are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method — Disposal should be made in accordance with federal, state and local regulations.

Contaminated packaging — Do not re-use empty containers. Empty containers should be taken for local recycling, recovery or waste disposal. Do not burn, or use a cutting torch on, the empty drum.

14. Transport information

14.1. UN number

UN No. (DOT)	Not regulated
UN No. (MT/ANTT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG/ANTAQ)	Not regulated
UN No. (ICAO/ANAC)	Not regulated

14.2. UN proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class	Not regulated
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated

14.4 Packing group

DOT/ANTT Packing group	Not regulated
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated

14.5 Environmental hazard
No

14.6 Special precautions
Not applicable

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Does not comply
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH
All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Polyethylene glycol oleyl ether	N/A	N/A	N/A

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Polyethylene glycol oleyl ether	N/A	N/A	N/A

California Proposition 65

This product does not contain chemical[s] which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

16. Other Information

Revision date	15/Jun/2018
Version	1

HMIS classification

Health	3
Flammability	1
Physical hazard	0
PPE	X

N/A - Not Applicable, N/D - Not Determined.

Disclaimer
The information contained herein is considered in good faith as reliable of the date issued and is based upon on measurements, tests or data derived from supplier's own study or furnished by others. In providing this SDS information, Supplier makes no express or implied warranties as to the information or product; merchantability or fitness of purpose; any express or implied warranty; or non-infringement of intellectual property rights; and supplier assumes no responsibility for any direct, special or consequential damages, results obtained, or the activities of others. To the maximum extent permitted by law, supplier's warranty obligations and buyer's sole remedies are as stated in separate agreement between the parties.
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SDS no. PID11779
Version 8
Revision date 09/Jul/2020
Supersedes date 22/Jun/2015

Safety Data Sheet
RHEDUCE*

1. Identification

1.1 Product identifier

Product name RHEDUCE*

Product code PID11779

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Dispersant. Thinner.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
200 - 125, 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-780-962-8221

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : +55 11 3197 5891

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Skin corrosion/irritation	Category 2
Serious eye damage/eye irritation	Category 2

Environmental hazards Not classified

Physical Hazards Not classified

2.2 Label elements

Signal word
WARNING

Hazard Statements
H315 - Causes skin irritation
H319 - Causes serious eye irritation

Precautionary Statements
P264 - Wash face, hands and any exposed skin thoroughly after handling
P280 - Wear protective gloves, protective clothing, eye protection
P302 + P352 - IF ON SKIN: Wash with plenty of soap and water
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P337 + P313 - If eye irritation persists: Get medical advice/attention
P501 - Dispose of contents/container in accordance with local, regional, national, and international regulations as applicable

Supplementary precautionary statements
P332 + P313 - If skin irritation occurs: Get medical attention
P362 + P364 - Take off contaminated clothing and wash it before reuse

Unknown acute toxicity Not applicable.

3. Composition/information on Ingredients

3.1 Substances

Not applicable

3.2 Mixtures

Chemical Name	CAS No	Weight-%
Alkanes, C10-14	93924-07-3	30-60
Oxyalkylated imidazoline	Proprietary	30-60
Polyhydroxystearic acid	Proprietary	10-30
Alkenes, C>8	68411-00-7	1-5

Comments
The viscosity of this product is high enough that it is not an aspiration risk and the H304 phrase does not apply.

4. First Aid Measures

4.1 First aid measures

Inhalation — If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion — Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Seek medical attention if irritation occurs.

Skin contact — Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention if irritation persists.

Eye Contact — Promptly wash eyes with lots of water while lifting eye lids. Remove contact lenses, if present and easy to do. Continue rinsing. Seek medical attention if irritation occurs.

4.2. Most important symptoms and effects, both acute and delayed

General advice — The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Symptoms

Inhalation — Please see Section 11. Toxicological Information for further information.

Ingestion — Please see Section 11. Toxicological Information for further information.

Skin contact — Please see Section 11. Toxicological Information for further information.

Eye contact — Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician — Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Water Fog, Alcohol Foam, CO_2, Dry Chemical.

Extinguishing media which must not be used for safety reasons
None known.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
None known.

Hazardous combustion products
Carbon oxides (COx).

5.3 Advice for firefighters

Special protective equipment and precautions for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. See also section 8.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Dike far ahead of liquid spill for later disposal.

Methods for cleaning up
Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Do not breathe vapors or spray mist. Avoid spills and splashing during use.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Ensure adequate ventilation.

Storage precautions Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from open flames, hot surfaces and sources of ignition. Avoid contact with:. Strong oxidizing agents.

Packaging materials Use specially constructed containers only.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Exposure limits **Contains no substances with occupational exposure limit values**

Component Information

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational	Brazil - Occupational Exposure Limits -	Mexico - Occupational

			Exposure Limits - TWAs (CMPs)	TWAs (LTs)	Exposure Limits - TWAs (LMPE-PPTs)
Alkanes, C10-14	Not determined	Not determined	Not determined	Not determined	Not determined
Oxyalkylated imidazoline	Not determined	Not determined	Not determined	Not determined	Not determined
Polyhydroxystearic acid	Not determined	Not determined	Not determined	Not determined	Not determined
Alkenes, C>8	Not determined	Not determined	Not determined	Not determined	Not determined

IDLH (Immediately Dangerous to Life or Health)
Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Alkanes, C10-14 93924-07-3	-
Oxyalkylated imidazoline	-
Polyhydroxystearic acid	-
Alkenes, C>8 68411-00-7	-

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation. Mechanical ventilation or local exhaust ventilation is required.

Personal protective equipment

Eye protection — Tightly fitting safety goggles.

Hand protection — Wear chemical resistant gloves such as nitrile or neoprene. Be aware that liquid may penetrate the gloves. Frequent change is advisable.

Respiratory Protection — All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne mist/aerosol of this product, use an organic vapor cartridge with a P-95 pre-filter attached. In work environments containing oil mist/aerosol, use an organic vapor cartridge with a P-95 pre-filter attached.If exposed to vapors from this product, use a NIOSH/MSHA-approved respirator with an organic vapor cartridge.

Skin and body protection — Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.

Hygiene Measures — Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Liquid
Appearance	Viscous
Color	Amber
Odor	Amine
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH	10.6 - 12.6	Conc. sol.
pH @ dilution	No information available	
Melting point	No information available	
Boiling point	No information available	
Flash point	> 93 °C / > 200 °F	PMCC
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	0.83 - 0.87	
Bulk density	No information available	
Water solubility	Insoluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	> 50 cSt	@ 40 °C
Dynamic viscosity	No information available	
Partition Coefficient (n-octanol/water)	No information available	
Explosive properties	No information available	
Oxidizing properties	No information available	

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	No information available
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

No specific reactivity hazards associated with this product.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Keep away from open flames, hot surfaces and sources of ignition.

10.5 Incompatible materials

Strong oxidizing agents.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation Inhalation of vapors in high concentration may cause irritation of respiratory system.

Eye contact Causes serious eye irritation.

Skin contact Causes skin irritation.

Ingestion Ingestion may cause stomach discomfort.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Alkanes, C10-14	3993.99 mg/kg (rat)	3980 mg/kg (Rabbit)	No data available
Oxyalkylated imidazoline	No data available	No data available	No data available
Polyhydroxystearic acid	No data available	No data available	No data available
Alkenes, C>8	No data available	No data available	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Alkanes, C10-14	No data available	No data available	No data available	No data available
Oxyalkylated imidazoline	No data available	No data available	No data available	No data available
Polyhydroxystearic acid	No data available	No data available	No data available	No data available
Alkenes, C>8	No data available	No data available	No data available	No data available

Delayed and immediate effects and chronic effects from short and long term exposure

Sensitization This product does not contain any components suspected to be sensitizing.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity This product does not contain any known or suspected carcinogens.

Reproductive toxicity	This product does not contain any known or suspected reproductive hazards.
Developmental toxicity	Not known to cause birth defects or have a deleterious effect on a developing fetus.
Routes of Exposure	Skin contact. Eye contact.
Routes of entry	None known.
Specific target organ toxicity - Single exposure	Not classified
Specific target organ toxicity - Repeated exposure	Not classified.
Aspiration hazard	The viscosity of this product is high enough that it is not an aspiration risk and the H304 phrase does not apply.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
This product is not considered toxic to algae.

Toxicity to fish
This product is not considered toxic to fish.

Toxicity to daphnia and other aquatic invertebrates
This product is not considered toxic to invertebrates.

Toxicology data for the components

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Alkanes, C10-14	No information available	No information available	= 0.02856 mg/L EC50 Daphnia magna 48 h
Oxyalkylated imidazoline	No information available	No information available	No information available
Polyhydroxystearic acid	No information available	No information available	No information available
Alkenes, C>8	No information available	No information available	No information available

12.2 Persistence and degradability

No product level data available.

12.3 Bioaccumulative potential

No product level data available.

12.4 Mobility

Insoluble in water.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

The product component(s) are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method	Disposal should be made in accordance with federal, state and local regulations.
Contaminated packaging	Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT)	Not regulated
UN No. (MT/ANTT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG/ANTAQ)	Not regulated
UN No. (ICAO/ANAC)	Not regulated
UN No. (DPC)	Not regulated

14.2. UN proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class	Not regulated
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated
DPC Hazard class	Not regulated

14.4 Packing group

DOT Packing group	Not regulated
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated
DPC Packing group	Not regulated

14.5 Environmental hazard

Marine pollutant	No

14.6 Special precautions

Not applicable

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Does not comply
Japan (ENCS)	Does not comply
China (IECSC)	Does not comply
Australia (AICS)	Does not comply
Korean (KECL)	Does not comply
New Zealand (NZIoC)	Does not comply

Europe - REACH

All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories

Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Alkanes, C10-14	N/A	N/A	N/A
Oxyalkylated imidazoline	N/A	N/A	N/A
Polyhydroxystearic acid	N/A	N/A	N/A
Alkenes, C>8	N/A	N/A	N/A

California Proposition 65

This product does not contain chemical[s] which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

16. Other Information

Supersedes date	22/Jun/2015
Revision date	09/Jul/2020
Version	8
This SDS has been revised in the following section(s)	All sections. Product Code change There have been changes with regard to classification.

HMIS classification

Health	1
Flammability	1

Physical hazard	0
PPE	B

N/A - Not Applicable, N/D - Not Determined.

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SDS no. PID11726
Version 11
Revision date 04/Feb/2019
Supersedes date 06/Mar/2018

Safety Data Sheet
RHEFLAT*

1. Identification of the Substance/Preparation and of the Company/Undertaking

1.1 Product identifier

Product name RHEFLAT*

Product code PID11726

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Drilling fluid additive.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

Schlumberger Canada, Ltd.
200, 125 - 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-613-992-4624

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : 0800-720-8000/0800-777-2323 (WGRA)

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards Not classified

Environmental hazards Not classified

Physical Hazards

Flammable Liquids	Category 4

2.2 Label elements

Signal word
WARNING

Hazard Statements

H227 - Combustible liquid

Precautionary Statements
P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking
P370 + P378 - In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish
P403 + P235 - Store in a well-ventilated place. Keep cool
P501 - Dispose of contents/container in accordance with local, regional, national, and international regulations as applicable

P240 - Ground/bond container and receiving equipment
P242 - Use only non-sparking tools
P243 - Take precautionary measures against static discharge

Hazards not otherwise classified
None known

Unknown acute toxicity Not applicable.

3. Composition/information on Ingredients

3.1 Substances

Not applicable

3.2 Mixtures

Chemical Name	CAS No	Weight-%
Fatty acids, C18 unsatd., trimers	68937-90-6	60 - 80
Alkanes, C11 - C14	90622-58-5	30 - 60

Comments
The product contains other ingredients which do not contribute to the overall classification. The exact percentage (concentration) of composition has been withheld as a trade secret

4. First Aid Measures

4.1 First aid measures

Inhalation Move to fresh air. If breathing is difficult, (trained personnel should) give oxygen. If not breathing, give artificial respiration. Get medical attention immediately if symptoms occur.

Ingestion IF SWALLOWED: Rinse mouth. DO NOT induce vomiting. Rinse mouth. Call a physician or poison control center immediately. Get medical attention. Never give anything by mouth to an unconscious person.

Skin contact	Wash skin thoroughly with soap and water. Remove contaminated clothing and shoes. Get medical attention if irritation persists.
Eye Contact	Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first five minutes, then continue rinsing eye.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms

Inhalation	Please see Section 11. Toxicological Information for further information.
Ingestion	Please see Section 11. Toxicological Information for further information.
Skin contact	Please see Section 11. Toxicological Information for further information.
Eye contact	Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Water Fog, Alcohol Foam, CO_2, Dry Chemical.

Extinguishing media which must not be used for safety reasons
Do not use a solid water stream as it may scatter and spread fire.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
Combustible liquid. Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks). Heating of containers may cause pressure rise, with risk of bursting.

Hazardous combustion products
Carbon monoxide, carbon dioxide and unburned hydrocarbons (smoke).

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Extinguish all ignition sources. Avoid sparks, flames, heat and smoking. Evacuate personnel to safe areas. Use personal protective equipment. If spilled, take caution, as material can cause surfaces to become very slippery.

6.2 Environmental precautions

Do not allow spilled material to enter sewers, storm drains or surface waters.

Environmental exposure controls

The product should not be allowed to enter drains, water courses or the soil. Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Dike far ahead of spill to collect runoff water.

Methods for cleaning up
Contain and collect spillage with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local/national regulations (see Section 13). Use clean non-sparking tools to collect absorbed material. Take precautionary measures against static discharges.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Keep away from heat, sparks and open flame. No smoking. Avoid breathing vapors or mists. Avoid contact with skin, eyes and clothing. Wear personal protective equipment. If spilled, take caution, as material can cause surfaces to become very slippery. Take precautionary measures against static discharges. Prevent splashing and leaking of product.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Ensure adequate ventilation.

Storage precautions Keep away from open flames, hot surfaces and sources of ignition. Keep container/package tightly closed and in a well-ventilated place. Follow safe warehousing practices regarding palletizing, banding, shrink-wrapping and/or stacking.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits - TWAs (CMPs)	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits - TWAs (LMPE-PPTs)
Fatty acids, C18 unsatd., trimers	Not determined	Not determined	Not determined	Not determined	Not determined
Alkanes, C11 - C14	Not determined	Not determined	Not determined	Not determined	Not determined

IDLH (Immediately Dangerous to Life or Health)
Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Fatty acids, C18 unsatd., trimers 68937-90-6	-
Alkanes, C11 - C14 90622-58-5	-

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Keep airborne concentrations below exposure limits. Local exhaust ventilation. Ensure adequate ventilation. Apply technical measures to comply with the occupational exposure limits.

Personal protective equipment

Eye protection	Tightly fitting safety goggles.
Hand protection	Wear chemical resistant gloves such as nitrile or neoprene.
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne mist/aerosol of this product, use an organic vapor cartridge with a P-95 pre-filter attached. In work environments containing oil mist/aerosol, use an organic vapor cartridge with a P-95 pre-filter attached.If exposed to vapors from this product, use a NIOSH/MSHA-approved respirator with an organic vapor cartridge.
Skin and body protection	Wear appropriate personal protective clothing to prevent skin contact, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before breaks and immediately after handling the product, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Liquid
Appearance	Opaque
Color	Black
Odor	Hydrocarbon-like
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH	Not applicable	
pH @ dilution		
Melting / freezing point	< 0 °C / 32 °F	
Boiling point/range	> 150 °C / 302 °F	
Flash point	76 °C / 170 °F	PMCC
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	>1 @ Air = 1	
Specific gravity	0.80 - 1.0	
Bulk density	No information available	
Water solubility	Insoluble in water	
Solubility in other solvents	No information available	

Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	> 20.5 mm2/s	@ 40 °C
Dynamic viscosity	No information available	
log Pow	No information available	
Explosive properties	No information available	
Oxidizing properties	No information available	

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	No information available
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

No data available.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Not known.

10.4 Conditions to avoid

Keep away from sources of ignition - No smoking.

10.5 Incompatible materials

Strong oxidizing agents. Acids. Bases.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation	May cause irritation of respiratory tract. Vapors inhaled in high concentration have a narcotic effect on the central nervous system. Symptoms of overexposure are dizziness, headache, tiredness, nausea, unconsciousness, cessation of breathing.
Eye contact	May cause irritation.
Skin contact	May cause skin irritation and/or dermatitis. Prolonged skin contact may defat the skin and produce dermatitis.
Ingestion	Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Fatty acids, C18 unsatd., trimers	No data available	No data available	No data available
Alkanes, C11 - C14	> 5000 mg/kg	>3160 mg/kg	> 290 ppm

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Fatty acids, C18 unsatd., trimers	No data available	No data available	No data available	No data available
Alkanes, C11 - C14	No data available	No data available	No data available	No data available

Sensitization Not classified.

Mutagenic effects No evidence of mutagenic properties.

Carcinogenicity No evidence of carcinogenic properties.

Reproductive toxicity No evidence of toxicity to reproduction.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of exposure Inhalation. Skin contact. Eye contact. Ingestion.

Routes of entry Inhalation.

Specific target organ toxicity - Single exposure Not classified

Specific target organ toxicity - Repeated exposure Not classified.

Neurological effects Central Nervous System Depression: signs/symptoms can include headache, dizziness, drowsiness, muscular weakness, incoordination, slowed reaction time, fatigue blurred vision, slurred speech, giddiness, tremors and convulsions.

Target organ effects Central nervous system.

Aspiration hazard Not classified.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
See component information below.

Toxicity to fish
See component information below.

Toxicity to daphnia and other aquatic invertebrates
See component information below.

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Fatty acids, C18 unsatd., trimers	No information available	No information available	No information available
Alkanes, C11 - C14	= 2890 mg/L LC50 Pimephales promelas 96 h	No information available	< 100 mg/L EC50 Daphnia magna 48 h

12.2 Persistence and degradability

No product level data available.

12.3 Bioaccumulative potential

No product level data available.

12.4 Mobility

No information available.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method	Disposal should be made in accordance with federal, state and local regulations.
Contaminated packaging	Do not burn, or use a cutting torch on, the empty drum. Empty containers may contain flammable or explosive vapors. Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT)	NA1993
UN No. (MT/ANTT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG/ANTAQ)	Not regulated
UN No. (ICAO/ANAC)	Not regulated
UN No. (DPC)	Not regulated

14.2. UN proper shipping name

Combustible liquid, n.o.s., (Contains alkanes)
Not regulated for U.S. ground transport in non-bulk containers (<119 gallons).

14.3 Hazard class(es)

DOT Hazard class	Combustible
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated
DPC Hazard class	Not regulated

14.4 Packing group

DOT Packing group	PG III

ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated
DPC Packing group	Not regulated

14.5 Environmental hazard
No

14.6 Special precautions
Not applicable

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Volume restriction. This product contains chemical(s) which is/are not listed on DSL but is/are listed on the NDSL.
Philippines (PICCS)	Complies
Japan (ENCS)	Complies
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH
All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance.

IMPORTS, Canada
Possible import volume restrictions apply. For details contact the Corporate info in SECTION 1. This product contains chemical(s) which is/are not listed on DSL but is/are listed on the NDSL.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Fatty acids, C18 unsatd., trimers	N/A	N/A	N/A
Alkanes, C11 - C14	N/A	N/A	N/A

California Proposition 65

This product does not contain chemical[s] which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Canadian Classification

This Safety Data Sheet has been prepared in compliance with the Hazardous Products Regulations.

Brazilian Regulations

Brazil Regulation	This SDS was prepared in accordance with Brazil law NBR 14725.
Federal Police	Not determined
Army	Not determined
ANVISA	Not determined
MTE (NR 15)	No information available

16. Other Information

Supersedes date	06/Mar/2018
Revision date	04/Feb/2019
Version	11
This SDS has been revised in the following section(s)	3, 16

HMIS classification

Health	1
Flammability	2
Physical hazard	0
PPE	X

N/A - Not Applicable, N/D - Not Determined.

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Safety Data Sheet
RHEGUARD*
(Escaid 110)

1. Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Product name RHEGUARD*
(Escaid 110)
Product code PID20198A
Country Limitations This SDS is not for use in EU/EEA.

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Oil Based System.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I Drilling Fluids UK Limited
Westhill Business Park
Westhill AB32 6JL Aberdeenshire
Scotland United Kingdom

+47 51577424

SDS@slb.com

1.4 Emergency Telephone Number

Emergency telephone - (24 Hour) Australia +61 2801 44558, Asia Pacific +65 3158 1074, China +86 10 5100 3039, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, New Zealand +64 9929 1483, USA 001 281 561 1600

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS Classification

Health hazards Not classified

Environmental hazards Not classified

Physical Hazards Not classified

2.2 Label elements

Signal word
None

Hazard Statements
This product is not classified as hazardous therefore no (H) hazard statements assigned.

Precautionary statements
This product is not classified as hazardous therefore has no (P) precautionary statements assigned.

-

Contains
Barite

Hydrocarbons, C11-C14, n-alkanes, isoalkanes, cyclics, < 2% aromatics*

Calcium chloride

Crystalline silica (impurity)

Polyamide

2.3 Other hazards

Not classified as PBT/vPvB by current EU criteria

3. Composition/information on Ingredients

3.1 Substances

Not applicable

3.2 Mixtures

Chemical Name	EC No	CAS No	Weight-%
Barite	236-664-5	13462-86-7	30-60
Hydrocarbons, C11-C14, n-alkanes, isoalkanes, cyclics, < 2% aromatics*	926-141-6	RM1004246	10-30
Calcium chloride	233-140-8	10043-52-4	1-5
Crystalline silica (impurity)	238-878-4	14808-60-7	<3
Polyamide	Listed	Proprietary	<1

Comments
The viscosity of this product is high enough that it is not an aspiration risk and the H304 phrase does not apply
The product contains other ingredients which do not contribute to the overall classification.

This product contains a small quantity of quartz, crystalline silica. Prolonged and repeated exposure to concentrations of crystalline silica exceeding the workplace exposure limit (WEL) may lead to chronic lung disease such as silicosis. Because this product is a liquid, under normal and recommended use, exposure to Respirable Crystalline Silica will not apply.

*Substances which have an EC Number that begins with the number "9" is a Provisional List Number. The list numbers published by ECHA do not have any legal significance. The EC substance definition and related classification & labelling has been developed

in the framework of the Regulation (EC) No 1907/2006 (REACH). For information about the related CAS number see section 15 of this SDS.

Drilling fluid is a highly complex and variable blend of several proprietary products. Each drilling fluid is designed to meet the drilling requirements of a specific well. During the drilling process the composition and physical properties of the drilling fluid are constantly changing; therefore, a complete disclosure of a particular fluid's composition is impractical.

4. First Aid Measures

4.1 First aid measures

Inhalation — If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion — Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Seek medical attention.

Skin contact — Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention immediately if symptoms occur.

Eye Contact — Promptly wash eyes with lots of water while lifting eye lids. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

General advice — The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Symptoms

Inhalation — Please see Section 11. Toxicological Information for further information.

Ingestion — Please see Section 11. Toxicological Information for further information.

Skin contact — Please see Section 11. Toxicological Information for further information.

Eye contact — Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician — Treat symptomatically.

5. Firefighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing media appropriate for surrounding material.

Extinguishing media which must not be used for safety reasons
None known.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
None known.

Hazardous combustion products
Thermal decomposition can lead to release of irritating gases and vapours

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. See also section 8.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Dike far ahead of liquid spill for later disposal.

Methods for cleaning up
Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Do not breathe vapors or spray mist. Avoid spills and splashing during use. Repeated or prolonged contact may cause allergic reactions in very susceptible persons.

Hygiene Measures
Use good work and personal hygiene practices to avoid exposure When using do not eat, drink, smoke, sniff Wash hands and face before breaks and immediately after handling the product Remove contaminated clothing

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Ensure adequate ventilation. Keep airborne concentrations below exposure limits.

Storage precautions Keep containers tightly closed in a dry, cool and well-ventilated place

Storage class Chemical storage.

Packaging materials Use specially constructed containers only

8. Exposure Controls/Personal Protection

8.1 Control parameters

Exposure Limits Hydrocarbons, C11-C14, n-alkanes, isoalkanes, cyclics, < 2% aromatics OEL vapour (Total Hydrocarbons/RCP) – TWA 1200 mg/m³ (165 ppm) Above Occupational Exposure Limit (OEL) is a “in-house” calculated value provided from Suppliers of this component and calculated as per CEFIC/HSPA/UK EH 40 guidelines.
Because this product is a liquid, the dust-related Workplace Exposure Limits for the components do not apply.

Component Information

Chemical Name	Arabic	Australia	Egypt
Barite	Not determined	Not determined	Not determined
Hydrocarbons, C11-C14, n-alkanes, isoalkanes, cyclics, < 2% aromatics*	Not determined	Not determined	Not determined
Calcium chloride	Not determined	Not determined	Not determined
Crystalline silica (impurity)	0.1 mg/m³ TWA	0.1mg/m³TWArespirable dust	Not determined
Polyamide	Not determined	Not determined	Not determined
Chemical Name	**India**	**Indonesian**	**Japan**
Barite	Not determined	Not determined	Not determined
Hydrocarbons, C11-C14, n-alkanes, isoalkanes, cyclics, < 2% aromatics*	Not determined	Not determined	Not determined
Calcium chloride	Not determined	Not determined	Not determined
Crystalline silica (impurity)	Not determined	0.1 mg/m³ TWA	0.03 mg/m³ OEL
Polyamide	Not determined	Not determined	Not determined
Chemical Name	**Kazakhstan**	**Kuwait**	**New Zealand**
Barite	6 mg/m³ MAC	Not determined	Not determined
Hydrocarbons, C11-C14, n-alkanes, isoalkanes, cyclics, < 2% aromatics*	Not determined	Not determined	Not determined
Calcium chloride	Not determined	Not determined	Not determined
Crystalline silica (impurity)	1 mg/m³ MAC	0.1 mg/m³ TWA	0.1 mg/m³ TWA Confirmed carcinogen
Polyamide	Not determined	Not determined	Not determined
Chemical Name	**Malaysia**	**Philippines**	**Russia**
Barite	Not determined	Not determined	6 mg/m³ TWA Fibrogenic substance 0242
Hydrocarbons, C11-C14, n-alkanes, isoalkanes, cyclics, < 2% aromatics*	Not determined	Not determined	Not determined
Calcium chloride	Not determined	Not determined	2 mg/m³ MAC (aerosol)

Crystalline silica (impurity)	0.1 mg/m³ TWA	Not determined	3 mg/m³ STEL 1 mg/m³ TWA Fibrogenic substance 1177, 1178
Polyamide	Not determined	Not determined	Not determined
Chemical Name	**Thailand**	**Vietnam**	**Turkey**
Barite	Not determined	Not determined	Not determined
Hydrocarbons, C11-C14, n-alkanes, isoalkanes, cyclics, < 2% aromatics*	Not determined	Not determined	Not determined
Calcium chloride	Not determined	Not determined	Not determined
Crystalline silica (impurity)	0.025 mg/m³ TWA	Not determined	Not determined
Polyamide	Not determined	Not determined	Not determined

8.2 Exposure controls

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation Provide mechanical general and/or local exhaust ventilation to prevent release of vapor or mist into work environment.

Personal protective equipment

Eye protection — Use eye protection according to EN 166, designed to protect against liquid splashes Tightly fitting safety goggles Safety glasses with side-shields

Hand protection — Wear chemically resistant gloves (tested to EN 374) in combination with 'basic' employee training Impervious gloves made of: Neoprene Nitrile PVC
Be aware that liquid may penetrate the gloves. Frequent change is advisable.

Respiratory protection — No personal respiratory protective equipment normally required In case of insufficient ventilation wear suitable respiratory equipment Respirator with combination filter for vapor/particulate Type A/P2 At work in confined or poorly ventilated spaces, respiratory protection with air supply must be used.

Skin and body protection — Wear suitable protective clothing Eye wash and emergency shower must be available at the work place.

Hygiene Measures — Wash hands before eating, drinking or smoking Remove and wash contaminated clothing before re-use

8.2.3 Environmental exposure controls

Environmental exposure — Use appropriate containment to avoid environmental contamination See section 6 for more information

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Liquid
Appearance	Viscous
Odour	Hydrocarbon like
Colour	Grey - Tan
Odour threshold	Not applicable

Property	Values	Remarks
pH	No information available	
pH @ dilution	No information available	
Melting / freezing point	No information available	
Boiling point/range	No information available	
Flash point	> 80 °C / > 176 °F	
Evaporation rate	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	Not applicable	
Lower flammability limit	Not applicable	
Vapour pressure	No information available	
Vapour density	No information available	
Specific gravity	1.0 - 2.4	
Bulk density	No information available	
Relative density	No information available	
Water solubility	Insoluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	
log Pow	No information available	

Explosive properties	No information available
Oxidising properties	No information available

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	No information available
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

No specific reactivity hazards associated with this product.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerisation
Hazardous polymerisation does not occur.

10.4 Conditions to avoid

None known.

10.5 Incompatible materials

No materials to be especially mentioned.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Product information This product contains a small quantity of quartz, crystalline silica. Prolonged and repeated exposure to concentrations of crystalline silica exceeding the workplace exposure limit (WEL) may lead to chronic lung disease such as silicosis. Because this product is a liquid, under normal and recommended use, exposure to Respirable Crystalline Silica will not apply.

Inhalation Vapors may irritate throat and respiratory system.

Eye contact May cause slight irritation.

Skin contact Repeated exposure may cause skin dryness or cracking.

Ingestion Ingestion may cause stomach discomfort.

Unknown acute toxicity Not applicable.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Barite	> 15000 mg/kg (Rat)	No data available	No data available
Hydrocarbons, C11-C14, n-alkanes, isoalkanes, cyclics, < 2% aromatics*	> 5000 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	> 5.2 mg/L (Rat) 4 h
Calcium chloride	= 1000 mg/kg (Rat)	> 5000 mg/kg (Rabbit)	No data available
Crystalline silica (impurity)	No data available	No data available	No data available
Polyamide	> 2020 mg/kg (Rat)	No data available	No data available

Sensitisation Repeated or prolonged contact may cause allergic reactions in very susceptible persons.

Mutagenic effects	This product does not contain any known or suspected mutagens.
Carcinogenicity	Crystalline silica dust is listed by IARC in Group 1 as known to cause lung cancer in humans, if inhaled.
Reproductive toxicity	This product does not contain any known or suspected reproductive hazards.
Routes of Exposure	Inhalation. Skin contact.
Routes of entry	Inhalation.
Specific target organ toxicity - Single exposure	Not classified
Specific target organ toxicity - Repeated exposure	Not classified.
Aspiration hazard	The viscosity of this product is high enough that it is not an aspiration risk and the H304 phrase does not apply.
Other information	Key literature references and sources for data. See Section 16 for more information.

12. Ecological Information

12.1 Toxicity

The product component(s) are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Toxicity to algae
See component information below.

Toxicity to fish
See component information below.

Toxicity to daphnia and other aquatic invertebrates
See component information below.

Toxicology data for the components

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Barite	No information available	No information available	No information available
Hydrocarbons, C11-C14, n-alkanes, isoalkanes, cyclics, < 2% aromatics*	LC50 (Oncorhynchus mykiss (rainbow trout)): 2 - 5 mg/l Exposure time: 96 h Test Type: semi-static test Test substance: WAF Method: OECD Test Guideline 203 Remarks: Information given is based on data obtained from similar substances.	EL50 (Pseudokirchneriella subcapitata (green algae)): > 1 - 3 mg/l Exposure time: 72 h Test Type: static test Test substance: WAF Method: OECD Test Guideline 201 Remarks: Information given is based on data obtained from	EL50 (Water flea (Daphnia magna)): 1,4 mg/l Exposure time: 48 h Test Type: static test Test substance: WAF Method: OECD Test Guideline 202 Remarks: Information given is based on data obtained from similar substances.

		similar substances.	
Calcium chloride	= 10650 mg/L LC50 Lepomis macrochirus 96 h	No information available	2,400 mg/L EC50 (Daphnia magna) = 48 h
Crystalline silica (impurity)	LC50 Danio rerio (zebra fish) : > 10000 mg/l 96h	EC50: > 1000 mg/l 72h	LC50 Daphnia manga (Water flea): > 10000 mg/l 24h
Polyamide	No information available	No information available	No information available

12.2 Persistence and degradability

See component information below.

Chemical Name	Persistence and degradability
Barite	Inorganic compound
Hydrocarbons, C11-C14, n-alkanes, isoalkanes, cyclics, < 2% aromatics*	Inherently biodegradable OECD 301F : 58.6% Duration 28 days
Calcium chloride	Inorganic compound
Crystalline silica (impurity)	Inorganic compound

12.3 Bioaccumulative potential

See component information below.

Chemical Name	Bioaccumulation
Barite	Product/Substance is inorganic
Hydrocarbons, C11-C14, n-alkanes, isoalkanes, cyclics, < 2% aromatics*	Does not bioaccumulate
Calcium chloride	Product/Substance is inorganic
Crystalline silica (impurity)	Product/Substance is inorganic

12.4 Mobility

Mobility
Insoluble in water. See component information below.

Chemical Name	Mobility
Barite	Insoluble in water
Hydrocarbons, C11-C14, n-alkanes, isoalkanes, cyclics, < 2% aromatics*	Insoluble in water
Calcium chloride	Soluble in water
Crystalline silica (impurity)	Insoluble in water

Mobility in soil
See component information below.

Chemical Name	Mobility in soil
Barite	Not expected to adsorb on soil
Hydrocarbons, C11-C14, n-alkanes, isoalkanes, cyclics, < 2% aromatics*	No information available
Calcium chloride	After release, disperses through ground water

Crystalline silica (impurity)	Not expected to adsorb on soil

12.5 Results of PBT and vPvB assessment

Not classified as PBT/vPvB by current EU criteria.

12.6 Other adverse effects.

None known.

12.7 Other information
Key literature references and sources for data. See Section 16 for more information.

13. Disposal considerations

13.1 Waste treatment methods

Waste from residues/unused products Dispose of in accordance with local regulations.

Contaminated packaging Empty containers should be transported/delivered using a registered waste carrier for local recycling or waste disposal.

14. Transport information

14.1. UN number
Not regulated

14.2. UN proper shipping name
The product is not covered by international regulation on the transport of dangerous goods

14.3. Hazard class(es)

ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG Hazard class	Not regulated
ICAO Hazard class/division	Not regulated

14.4 Packing group

ADR/RID/ADN/ADG Packing Group	Not regulated
IMDG Packing group	Not regulated
ICAO Packing group	Not regulated

14.5 Environmental hazard
No

14.6 Special precautions

Not applicable

14.7 Transport in bulk according to Annex I/II of MARPOL 73/78 and the IBC Code
Oil-based muds containing mixtures of products listed in Chapters 17 and 18 of the IBC Code and the latest MEPC.2/Circular are permitted to be carried under Annex II of MARPOL and resolution A.673, (16) Offshore Supply Vessel Code.
Please contact SDS@slb.com for info regarding transport in Bulk.

15. Regulatory Information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

This safety data sheet complies with the requirements of:
The Globally Harmonised System of Classification and Labelling of Chemicals (GHS)

International inventories

USA, Toxic Substances Control Act inventory (TSCA)	Does not comply
Canada (DSL)	This product contains chemical(s) which is/are not listed on DSL but is/are listed on the NDSL.
Philippines (PICCS)	Does not comply
Inventory - Japan - Existing and New Chemicals list	Does not comply
China (IECSC)	Does not comply
Australia (AICS)	Does not comply
Korea (KECL)	Does not comply
Inventory - New Zealand - Inventory of Chemicals (NZIoC)	Does not comply

This SDS is not for use in EU/EEA.

16. Other Information

Prepared by	Global Regulatory Compliance - Chemicals (GRC - Chemicals) , Anne Karin (Anka) Fosse
Revision date	28/Jun/2019
Version	1
This SDS has been revised in the following section(s)	New

Key literature references and sources for data
www.ChemADVISOR.com
Supplier
National Chemical Inventories
National regulatory information
National occupational exposure limits

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SDS no. 142776
Version 4
Revision date 30/Jul/2020
Supersedes date 26/May/2020

Safety Data Sheet
RheMul*

1. Identification

1.1 Product identifier

Product name RheMul*

Product code 142776

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Emulsifier.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

Schlumberger Canada, Ltd.
200, 125 - 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Australia +61 2801 44558, Asia Pacific +65 3158 1074, China +86 10 5100 3039, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, New Zealand +64 9929 1483, USA 001 281 561 1600

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Serious eye damage/eye irritation	Category 1
Skin sensitization	Category 1

Environmental hazards Not classified

Physical Hazards

Flammable Liquids	Category 4

2.2 Label elements

Signal word
DANGER

Hazard Statements
H317 - May cause an allergic skin reaction
H318 - Causes serious eye damage
H227 - Combustible liquid

Precautionary Statements
P280 - Wear protective gloves, protective clothing, eye protection
P302 + P352 - IF ON SKIN: Wash with plenty of soap and water
P333 + P313 - If skin irritation or rash occurs: Get medical advice/attention
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a POISON CENTER or physician
P501 - Dispose of contents/container in accordance with local, regional, national, and international regulations as applicable
P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking
P280 - Wear protective gloves and eye/face protection
P370 + P378 - In case of fire: Use dry sodium carbonate to extinguish
P403 + P235 - Store in a well-ventilated place. Keep cool

Supplementary precautionary statements
P261 - Avoid breathing dust/fume/gas/mist/vapors/spray
P272 - Contaminated work clothing should not be allowed out of the workplace
P362 + P364 - Take off contaminated clothing and wash it before reuse
P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking
P280 - Wear protective gloves/protective clothing and eye/face protection
P370 + P378 - In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish
P403 + P235 - Store in a well-ventilated place. Keep cool
P501 - Dispose of contents/container to industrial incineration plant

Unknown acute toxicity Not applicable.

3. Composition/information on Ingredients

3.1 Substances

Not applicable

3.2 Mixtures

Chemical Name	CAS No	Weight-%
Polyamide	Proprietary	45 - 70
Alkanes, C10-24-branched and linear	172343-37-2	30 - 60
2-[2-(2-butoxyethoxy)ethoxy]ethanol	143-22-6	10 - 30

Comments
The product contains other ingredients which do not contribute to the overall classification. The exact percentage (concentration) of composition has been withheld as a trade secret.
Alkanes, C10-24-branched and linear can use either CAS#172343-37-2 or 848301-67-7.

4. First Aid Measures

4.1 First aid measures

Inhalation — If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion — Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Get medical attention if symptoms occur.

Skin contact — Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Seek immediate medical attention/advice.

Eye Contact — Remove contact lenses, if worn. Immediately flush eyes with water for 15 minutes while holding eyelids open. Seek medical attention.

4.2. Most important symptoms and effects, both acute and delayed

General advice — The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Symptoms

Inhalation — Please see Section 11. Toxicological Information for further information.

Ingestion — Please see Section 11. Toxicological Information for further information.

Skin contact — Please see Section 11. Toxicological Information for further information.

Eye contact — Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician — Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Water spray, dry chemical, carbon dioxide (CO_2), or foam.

Extinguishing media which must not be used for safety reasons
Do not use a solid water stream as it may scatter and spread fire.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
Vapors may form explosive mixtures with air. Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks). Vapors may travel considerable distance to source of ignition and flash back. Heating

of containers may cause pressure rise, with risk of bursting. Combustible material.

5.3 Advice for firefighters

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

If spilled, take caution, as material can cause surfaces to become very slippery. Use personal protective equipment. See also section 8.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Dike far ahead of liquid spill for later disposal.

Methods for cleaning up
Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid breathing vapors or mists. Avoid contact with skin, eyes and clothing. If spilled, take caution, as material can cause surfaces to become very slippery. Persons susceptible to allergic reactions should not handle this product.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions	Ensure adequate ventilation. Keep airborne concentrations below exposure limits. Take precautionary measures against static discharges.
Storage precautions	Keep containers tightly closed in a dry, cool and well-ventilated place. Avoid heat, flames and other sources of ignition. Avoid contact with:. Strong oxidizing agents.
Packaging materials	Use specially constructed containers only.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Exposure limits **Contains no substances with occupational exposure limit values**

Component Information

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits -	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits -

			TWAs (CMPs)		TWAs (LMPE-PPTs)
Polyamide	Not determined	Not determined	Not determined	Not determined	Not determined
Alkanes, C10-24-branched and linear	Not determined	Not determined	Not determined	Not determined	Not determined
2-[2-(2-butoxyethoxy)ethoxy]ethanol	Not determined	Not determined	Not determined	Not determined	Not determined

IDLH (Immediately Dangerous to Life or Health)
Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Polyamide	-
Alkanes, C10-24-branched and linear 172343-37-2	-
2-[2-(2-butoxyethoxy)ethoxy]ethanol 143-22-6	-

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation. Provide mechanical general and/or local exhaust ventilation to prevent release of vapor or mist into work environment.

Personal protective equipment

Eye protection
Use eye protection according to EN 166, designed to protect against liquid splashes. Tightly fitting safety goggles. Safety glasses with side-shields.

Hand protection
Wear chemically resistant gloves (tested to EN 374) in combination with 'basic' employee training
Use protective gloves made of: Nitrile Neoprene
Be aware that liquid may penetrate the gloves. Frequent change is advisable.

Respiratory Protection
All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne mist/aerosol of this product, use an organic vapor cartridge with a P-95 pre-filter attached. In work environments containing oil mist/aerosol, use an organic vapor cartridge with a P-95 pre-filter attached.If exposed to vapors from this product, use a NIOSH/MSHA-approved respirator with an organic vapor cartridge.

Skin and body protection
Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.

Hygiene Measures
Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Liquid
Appearance	No information available
Color	Amber - Dark amber
Odor	Hydrocarbon odor.
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH	Not applicable	
pH @ dilution	5.7 - 6.7	@ 70/5/25: IPA:Product:H20
Melting point	No information available	
Boiling point	> 100 °C / 212 °F	
Flash point	> 82 °C / > 179 °F	ASTM D 93-11
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	No information available	
Bulk density	No information available	
Water solubility	Insoluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	> 850 cPs	@ 40 °C
Dynamic viscosity	No information available	
Partition Coefficient (n-octanol/water)	No information available	
Explosive properties	No information available	
Oxidizing properties	No information available	

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	No information available
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

No specific reactivity hazards associated with this product.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Not known.

10.4 Conditions to avoid

Avoid heat, flames and other sources of ignition. Take precautionary measures against static charges.

10.5 Incompatible materials

Strong oxidizing agents.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation Vapors may irritate throat and respiratory system.

Eye contact Causes serious eye damage.

Skin contact May cause an allergic skin reaction.

Ingestion Ingestion may cause stomach discomfort.

LD50 Oral > 2000 mg/kg (rat) (based on components)

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Polyamide	No data available	No data available	No data available
Alkanes, C10-24-branched and linear	No data available	No data available	No data available
2-[2-(2-butoxyethoxy)ethoxy]ethanol	5300 mg/kg (rat)	2002 mg/kg (Rabbit)	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Polyamide	No data available	No data available	No data available	No data available
Alkanes, C10-24-branched and linear	No data available	No data available	No data available	No data available
2-[2-(2-butoxyethoxy)ethoxy]ethanol	No data available	No data available	No data available	No data available

Delayed and immediate effects and chronic effects from short and long term exposure

Sensitization May cause allergic skin reaction.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity This product does not contain any known or suspected carcinogens.

Reproductive toxicity This product does not contain any known or suspected reproductive hazards.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of Exposure Skin contact.

Routes of entry Skin contact.

Specific target organ toxicity - Not classified

Single exposure
Specific target organ toxicity - Repeated exposure Not classified.

Aspiration hazard The viscosity of this product is high enough that it is not an aspiration risk and the H304 phrase does not apply.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
See component information below.

Toxicity to fish
See component information below.

Toxicity to daphnia and other aquatic invertebrates
See component information below.

Toxicology data for the components

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Polyamide	No information available	No information available	No information available
Alkanes, C10-24-branched and linear	No information available	No information available	No information available
2-[2-(2-butoxyethoxy)ethoxy]ethanol	2200 - 4600 mg/L LC50 Leuciscus idus 96h = 2400 mg/L LC50 Pimephales promelas 96h	> 500 mg/L EC50 Desmodesmus subspicatus 72h	> 500 mg/L EC50 Daphnia magna 48h

12.2 Persistence and degradability

No product level data available.

12.3 Bioaccumulative potential

No product level data available.

12.4 Mobility

Insoluble in water.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method Disposal should be made in accordance with federal, state and local regulations. Waste

Management: Under RCRA, it is the responsibility of the user to determine at the time of disposal, whether the product meets RCRA criteria for the hazardous waste. This is because product uses, transformations, mixtures, processes, etc., may render the resulting materials hazardous. Empty container retains residues. All labeled precautions must be observed.

Contaminated packaging Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT)	NA1993
UN No. (MT/ANTT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG/ANTAQ)	Not regulated
UN No. (ICAO/ANAC)	Not regulated
UN No. (DPC)	Not regulated

14.2. UN proper shipping name

Combustible liquid, n.o.s., (Alkanes, C10-24-branched and linear) Not regulated for U.S. ground transport in non-bulk containers (<119 gallons). Not regulated under TDG, IMDG, ICAO/IATA.

14.3 Hazard class(es)

DOT Hazard class	3
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated
DPC Hazard class	Not regulated

14.4 Packing group

DOT Packing group	III
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated
DPC Packing group	Not regulated

14.5 Environmental hazard

Marine pollutant No

14.6 Special precautions

Not applicable

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies

Philippines (PICCS)	Does not comply
Japan (ENCS)	Does not comply
China (IECSC)	Does not comply
Australia (AICS)	Does not comply
Korean (KECL)	Does not comply
New Zealand (NZIoC)	Does not comply

Europe - REACH

All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories

Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Polyamide	N/A	N/A	N/A
Alkanes, C10-24-branched and linear	N/A	N/A	N/A
2-[2-(2-butoxyethoxy)ethoxy]ethanol	N/A	N/A	N/A

California Proposition 65

This product does not contain chemical[s] which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Canadian Classification

This Safety Data Sheet has been prepared in compliance with the Hazardous Products Regulations.

Brazilian Regulations

Brazil Regulation	This SDS was prepared in accordance with Brazil law NBR 14725.
Federal Police	Not determined
Army	Not determined
ANVISA	Not Listed
MTE (NR 15)	No information available

16. Other Information

Supersedes date	26/May/2020
Revision date	30/Jul/2020
Version	4
This SDS has been revised in the following section(s)	2, 3, 5, 9, 14, 16 There have been changes with regard to classification.
HMIS classification	
Health	3

Flammability	2
Physical hazard	0
PPE	X

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SDS no. 143684
Version 1
Revision date 20/Mar/2020
Supersedes date None

Safety Data Sheet
RHETHIN*
(MIL021)

1. Identification

1.1 Product identifier

Product name RHETHIN*
(MIL021)

Product code 143684

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Thinner. Dispersant. Drilling fluid additive.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
200 - 125, 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-780-962-8221

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : +55 11 3197 5891

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Aspiration toxicity	Category 1

Specific target organ toxicity - Repeated exposure	Category 2

Environmental hazards

Chronic aquatic toxicity	Category 3

Physical Hazards

Flammable Liquids	Category 4

2.2 Label elements

Signal word
DANGER

Hazard Statements
H304 - May be fatal if swallowed and enters airways
H373 - May cause damage to organs through prolonged or repeated exposure
H412 - Harmful to aquatic life with long lasting effects
H227 - Combustible liquid

Precautionary Statements
P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking
P260 - Do not breathe dust, fume, gas, mist, vapors, spray
P273 - Avoid release to the environment
P280 - Wear protective gloves and eye/face protection
P301 + P310 - IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
P314 - Get medical attention if you feel unwell
P331 - Do NOT induce vomiting
P370 + P378 - In case of fire: Use dry sodium carbonate to extinguish
P403 + P235 - Store in a well-ventilated place. Keep cool
P405 - Store locked up
P501 - Dispose of contents/container in accordance with local, regional, national, and international regulations as applicable

Hazards not otherwise classified
None known

Unknown acute toxicity 33% of the mixture consists of ingredient(s) of unknown toxicity.

3. Composition/information on Ingredients

3.1 Substances

Not applicable

3.2 Mixtures

Chemical Name	CAS No	Weight-%
Alkanes, C10-24-branched and linear	172343-37-2	45 - 70
Distillates (petroleum), straight-run middle	64741-44-2	15 - 40

Comments
The product contains other ingredients which do not contribute to the overall classification. The exact percentage (concentration) of composition has been withheld as a trade secret. Alkanes, C10-24-branched and linear can use either CAS#172343-37-2 or 848301-67-7.

4. First Aid Measures

4.1 First aid measures

Inhalation — Move the exposed person to fresh air at once. If breathing is difficult, (trained personnel should) give oxygen. Seek medical attention at once.

Ingestion — Rinse mouth. Do not induce vomiting without medical advice. Risk of product entering the lungs on vomiting after ingestion. If vomiting occurs spontaneously, minimize the risk of aspiration by properly positioning the affected person. Never give anything by mouth to an unconscious person. Seek medical attention.

Skin contact — Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Seek medical attention if irritation occurs.

Eye Contact — Promptly wash eyes with lots of water while lifting eye lids. Remove contact lenses, if worn. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

General advice — The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Symptoms

Inhalation — May cause irritation of respiratory tract. Vapors inhaled in high concentration have a narcotic effect on the central nervous system. Symptoms of overexposure are dizziness, headache, tiredness, nausea, unconsciousness, cessation of breathing.

Ingestion — Aspiration may cause pulmonary edema and pneumonitis. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

Skin contact — May cause irritation. Prolonged skin contact may defat the skin and produce dermatitis.

Eye contact — May cause irritation. May cause redness, itching, and pain.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician — Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Water spray, dry chemical, carbon dioxide (CO_2), or foam.

Extinguishing media which must not be used for safety reasons
Do not use a solid water stream as it may scatter and spread fire.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
Combustible liquid. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).

Hazardous combustion products
Carbon oxides (COx), Nitrogen oxides (NOx).

5.3 Advice for firefighters

Special protective equipment and precautions for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid contact with heat, sparks, open flame, and static discharge. Prevent further leakage or spillage if safe to do so. Contaminated surfaces will be extremely slippery. Evacuate and ventilate the area.

6.2 Environmental precautions

Should not be released into the environment. Do not allow spilled material to enter sewers, storm drains or surface waters. As local regulations may vary; all waste must be disposed/recycled/reclaimed in accordance with federal, state, and local environmental control regulations.

Environmental exposure controls
Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so.

Methods for cleaning up
Dike to collect large spills. Take precautionary measures against static discharges. Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. Ground and bond containers when transferring material. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid breathing vapors or mists. Avoid contact with skin, eyes and clothing. Keep away from heat, sparks and open flame. No smoking. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapors).

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions	Ensure adequate ventilation. Keep airborne concentrations below exposure limits. Take precautionary measures against static discharges. Ensure all equipment is electrically grounded before beginning transfer operations.
Storage precautions	Keep containers tightly closed in a dry, cool and well-ventilated place. Avoid heat, flames and other sources of ignition. Avoid contact with:. Strong oxidizing agents. Strong Lewis acids. Strong mineral acids.

Packaging materials Use specially constructed containers only.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Exposure limits **oil mist : 10mg/m³, for 15 minutes oil mist : 5mg/m³, for 8 hours**

Component Information

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits - TWAs (CMPs)	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits - TWAs (LMPE-PPTs)
Alkanes, C10-24-branched and linear	Not determined	Not determined	Not determined	Not determined	Not determined
Distillates (petroleum), straight-run middle	Not determined	Not determined	Not determined	Not determined	Not determined

IDLH (Immediately Dangerous to Life or Health)
Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Alkanes, C10-24-branched and linear 172343-37-2	-
Distillates (petroleum), straight-run middle 64741-44-2	-

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation. Provide mechanical general and/or local exhaust ventilation to prevent release of vapor or mist into work environment.

Personal protective equipment

Eye protection Tightly fitting safety goggles.

Hand protection Use protective gloves made of: Viton polyvinyl alcohol or nitrile-butyl rubber gloves
Be aware that liquid may penetrate the gloves. Frequent change is advisable.

Respiratory Protection All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne mist/aerosol of this product, use an organic vapor cartridge with a P-95 pre-filter attached. In work environments containing oil mist/aerosol, use an organic vapor cartridge with a P-95 pre-filter attached.If exposed to vapors from this product, use a NIOSH/MSHA-approved respirator with an organic vapor cartridge.

Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Liquid
Appearance	Opaque
Color	Light brown
Odor	Hydrocarbon odor.
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH	No information available	
pH @ dilution	No information available	
Melting point	No information available	
Boiling point	No information available	
Flash point	82.2 °C / 180 °F	PMCC
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	0.83	
Bulk density	No information available	
Water solubility	Insoluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	< 20.5 mm2/s	@ 40 °C
Dynamic viscosity	No information available	
Partition Coefficient (n-octanol/water)	No information available	

Explosive properties	May form explosive mixtures with air
Oxidizing properties	No information available

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	No information available
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

No specific reactivity hazards associated with this product.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Avoid heat, flames and other sources of ignition. Take precautionary measures against static charges.

10.5 Incompatible materials

Strong oxidizing agents. Strong Lewis acids. Strong mineral acids.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Product information Prolonged and repeated contact with solvents over a long period may lead to permanent health problems.

Inhalation May cause irritation of respiratory tract. Vapors inhaled in high concentration have a narcotic effect on the central nervous system.

Eye contact May cause slight irritation.

Skin contact May cause irritation. Repeated exposure may cause skin dryness or cracking.

Ingestion May be fatal if swallowed and enters airways. Potential for aspiration if swallowed. Aspiration may cause pulmonary edema and pneumonitis. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Alkanes, C10-24-branched and linear	No data available	No data available	No data available
Distillates (petroleum), straight-run middle	5005 mg/kg (rat)	2002 mg/kg (Rabbit)	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Alkanes, C10-24-branched and linear	No data available	No data available	No data available	No data available
Distillates (petroleum), straight-run middle	No data available	No data available	No data available	No data available

Delayed and immediate effects and chronic effects from short and long term exposure

Sensitization This product does not contain any components suspected to be sensitizing.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity	This product does not contain any known or suspected carcinogens.
Reproductive toxicity	This product does not contain any known or suspected reproductive hazards.
Developmental toxicity	Not known to cause birth defects or have a deleterious effect on a developing fetus.
Routes of Exposure	Ingestion. Inhalation. Skin contact.
Routes of entry	Ingestion. Inhalation. Skin contact.
Specific target organ toxicity - Single exposure	Not classified
Specific target organ toxicity - Repeated exposure	Category 2.
Target organ effects	Liver. Spleen. Bone marrow.
Aspiration hazard	May be fatal if swallowed and enters airways.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
Harmful to aquatic life with long lasting effects.

Toxicity to fish
Harmful to aquatic life with long lasting effects.

Toxicity to daphnia and other aquatic invertebrates
Harmful to aquatic life with long lasting effects.

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Alkanes, C10-24-branched and linear	No information available	No information available	No information available
Distillates (petroleum), straight-run middle	No information available	No information available	No information available

12.2 Persistence and degradability

No product level data available.

12.3 Bioaccumulative potential

No product level data available.

12.4 Mobility

Insoluble in water.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method	Disposal should be made in accordance with federal, state and local regulations.
Contaminated packaging	Do not burn, or use a cutting torch on, the empty drum. Empty containers may contain flammable or explosive vapors. Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT)	NA1993
UN No. (MT/ANTT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG/ANTAQ)	Not regulated
UN No. (ICAO/ANAC)	Not regulated
UN No. (DPC)	Not regulated

14.2. UN proper shipping name

Combustible liquid, n.o.s., (contains petroleum distillates), Not regulated for U.S. ground transport in non-bulk containers (<119 gallons). Not regulated under TDG, IMDG, ICAO/IATA.

14.3 Hazard class(es)

DOT Hazard class	Combustible liquid
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated
DPC Hazard class	Not regulated

14.4 Packing group

DOT Packing group	III
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated
DPC Packing group	Not regulated

14.5 Environmental hazard

Marine pollutant	No

14.6 Special precautions

Not applicable

14.7 Transport in bulk according to Annex I/II of MARPOL 73/78 and the IBC Code

Please contact SDS@slb.com for info regarding transport in Bulk.

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Does not comply
Japan (ENCS)	Does not comply
China (IECSC)	Does not comply
Australia (AICS)	Complies
Korean (KECL)	Does not comply
New Zealand (NZIoC)	Does not comply

Europe - REACH
All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Alkanes, C10-24-branched and linear	N/A	N/A	N/A
Distillates (petroleum), straight-run middle	N/A	N/A	N/A

California Proposition 65

This product does not contain chemical[s] which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Brazilian Regulations

Brazil Regulation	This SDS was prepared in accordance with Brazil law NBR 14725.
Federal Police	Not determined
Army	Not determined
ANVISA	Not Listed
MTE (NR 15)	No information available

16. Other Information

Revision date	20/Mar/2020
Version	1
This SDS has been revised in the following section(s)	New issue.
HMIS classification	

Health	2*
Flammability	2
Physical hazard	0
PPE	X

*A mark of M-I L.L.C., a Schlumberger Company

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SDS no. 142829
Version 1
Revision date 27/Aug/2018
Supersedes date None

Safety Data Sheet
SAFE-BREAK* Prime

1. Identification of the Substance/Preparation and of the Company/Undertaking

1.1 Product identifier

Product name SAFE-BREAK* Prime

Product code 142829

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Demulsifier.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
200 - 125, 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-780-962-8221

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals) , Sandra McWilliam

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : 0800-720-8000/0800-777-2323 (WGRA)

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards Not classified

Environmental hazards Not classified

Physical Hazards Not classified

2.2 Label elements

Signal word
None

Hazard Statements
This product is not classified as hazardous therefore no (H) hazard statements assigned.

Precautionary Statements
This product is not classified as hazardous therefore has no (P) precautionary statements assigned.

Unknown acute toxicity Not applicable.

3. Composition/information on Ingredients

3.1 Substances

Not applicable

3.2 Mixtures

Chemical Name	CAS No	Weight-%
2-butoxyethanol	111-76-2	3 - 7
Sorbitan monododecanoate, poly(oxy-1,2-ethanediyl) derivs., hexanedioate	74350-59-7	1 - 5

Comments
The exact percentage (concentration) of composition has been withheld as a trade secret

4. First Aid Measures

4.1 First aid measures

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Get medical attention if symptoms occur.

Skin contact Wash skin thoroughly with soap and water. Get medical attention if irritation persists.

Eye Contact Promptly wash eyes with lots of water while lifting eye lids. Remove contact lenses, if worn. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

General advice	The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.
Symptoms	
Inhalation	Please see Section 11. Toxicological Information for further information.
Ingestion	Please see Section 11. Toxicological Information for further information.
Skin contact	Please see Section 11. Toxicological Information for further information.
Eye contact	Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Water spray, dry chemical, carbon dioxide (CO_2), or foam.

Extinguishing media which must not be used for safety reasons
Do not use a solid water stream as it may scatter and spread fire.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
Heating of containers may cause pressure rise, with risk of bursting.

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. See also section 8.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Dike far ahead of liquid spill for later disposal.

Methods for cleaning up
Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Do not breathe vapors or spray mist. Avoid spills and splashing during use.

Hygiene measures
Use good work and personal hygiene practices to avoid exposure. When using do not smoke, eat or drink. Wash hands and face before breaks and immediately after handling the product.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Ensure adequate ventilation. Keep airborne concentrations below exposure limits.

Storage precautions Keep containers tightly closed in a dry, cool and well-ventilated place.

Packaging materials Use specially constructed containers only.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Component Information

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits - TWAs (CMPs)	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits - TWAs (LMPE-PPTs)
2-butoxyethanol	20 ppm	50 ppm TWA 240 mg/m³ TWA	20 ppm TWA	39 ppm TWA LT; 190 mg/m³ TWA LT	26 ppm TWA VLE-PPT; 120 mg/m³ TWA VLE-PPT
Sorbitan monododecanoate, poly(oxy-1,2-ethanediyl) derivs., hexanedioate	Not determined	Not determined	Not determined	Not determined	Not determined

IDLH (Immediately Dangerous to Life or Health)
Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
2-butoxyethanol 111-76-2	700 ppm IDLH
Sorbitan monododecanoate, poly(oxy-1,2-ethanediyl) derivs., hexanedioate	-

74350-59-7	

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation.

Personal protective equipment

Eye protection	Use eye protection according to EN 166, designed to protect against liquid splashes. Tightly fitting safety goggles. Safety glasses with side-shields.
Hand protection	Wear chemically resistant gloves (tested to EN 374) in combination with 'basic' employee training Use protective gloves made of: Neoprene Nitrile PVC Be aware that liquid may penetrate the gloves. Frequent change is advisable.
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne mist/aerosol of this product, use an organic vapor cartridge with a P-95 pre-filter attached. In work environments containing oil mist/aerosol, use an organic vapor cartridge with a P-95 pre-filter attached.If exposed to vapors from this product, use a NIOSH/MSHA-approved respirator with an organic vapor cartridge.
Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Liquid
Appearance	No information available
Color	Light yellow - Yellow
Odor	Slight
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH	7 - 9	
pH @ dilution		
Melting / freezing point	No information available	
Boiling point/range	No information available	
Flash point	180 °C / 356 °F	PMCC
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		

Upper flammability limit	No information available
Lower flammability limit	No information available
Vapor pressure	No information available
Vapor density	No information available
Specific gravity	1.01 Kg/l
Bulk density	No information available
Water solubility	Completely soluble
Solubility in other solvents	No information available
Autoignition temperature	No information available
Decomposition temperature	No information available
Kinematic viscosity	No information available
Dynamic viscosity	No information available
log Pow	Not determined
Explosive properties	Not applicable
Oxidizing properties	None known.

9.2 Other information

Pour point	-18°C/-0.4°F ± 1.0°C
Molecular weight	No information available
VOC content(%)	None
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

No specific reactivity hazards associated with this product.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Not known.

10.4 Conditions to avoid

None known.

10.5 Incompatible materials

Strong oxidizing agents.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation Inhalation of vapors in high concentration may cause irritation of respiratory system.

Eye contact May cause slight irritation.

Skin contact Prolonged contact may cause redness and irritation.

Ingestion Ingestion may cause stomach discomfort.

LD50 Oral > 2000 mg/kg (rat) (based on components)

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
2-butoxyethanol	1200 mg/kg (Guinea pigs)	> 2000 mg/kg (Rat)	400 ppm (Rabbit)
Sorbitan monododecanoate, poly(oxy-1,2-ethanediyl) derivs., hexanedioate	No data available	No data available	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
2-butoxyethanol	No data available	A3 - Confirmed animal carcinogen with unknown relevance to humans	No data available	No data available
Sorbitan monododecanoate, poly(oxy-1,2-ethanediyl) derivs., hexanedioate	No data available	No data available	No data available	No data available

Sensitization This product does not contain any components suspected to be sensitizing.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity This product does not contain any known or suspected carcinogens.

Reproductive toxicity This product does not contain any known or suspected reproductive hazards.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of exposure None known.

Routes of entry No route of entry noted.

Specific target organ toxicity - Single exposure Not classified

Specific target organ toxicity - Repeated exposure Not classified.

Aspiration hazard Not applicable.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
This product is not considered toxic to algae.

Toxicity to fish
This product is not considered toxic to fish.

Toxicity to daphnia and other aquatic invertebrates
This product is not considered toxic to invertebrates.

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
2-butoxyethanol	= 2950 mg/L LC50 Lepomis macrochirus 96 h = 1490 mg/L LC50 Lepomis macrochirus 96 h	No information available	= 1698 - 1940 mg/L (LC50; Daphnia magna) = 1720 mg/L (EC50; water flea)
Sorbitan monododecanoate, poly(oxy-1,2-ethanediyl) derivs., hexanedioate	No information available	46.88 mg/l EC50 72h Skeletonema Costatum Vendor Data	No information available

12.2 Persistence and degradability

No product level data available.

12.3 Bioaccumulative potential

No product level data available.

12.4 Mobility

Soluble in water.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method Disposal should be made in accordance with federal, state and local regulations.

Contaminated packaging Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT) Not regulated
UN No. (MT/ANTT) Not regulated
UN No. (TDG) Not regulated
UN/ID No. (ADR/RID/ADN/ADG) Not regulated
UN No. (IMDG/ANTAQ) Not regulated
UN No. (ICAO/ANAC) Not regulated

14.2. UN proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class	Not regulated
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated

14.4 Packing group

DOT/ANTT Packing group	Not regulated
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated

14.5 Environmental hazard
No

14.6 Special precautions
Not applicable

14.7 Transport in bulk according to Annex I/II of MARPOL 73/78 and the IBC Code
Please contact SDS@slb.com for info regarding transport in Bulk.

15. Regulatory Information

International inventories

USA (TSCA)	U.S. TSCA - Components are listed or exempt from listing.
Canada (DSL)	Canada DSL - Components are listed or exempt from listing.
Philippines (PICCS)	Does not comply
Japan (ENCS)	Does not comply
China (IECSC)	Does not comply
Australia (AICS)	Does not comply
Korean (KECL)	Does not comply
New Zealand (NZIoC)	Does not comply

Europe - REACH
All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will

need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
2-butoxyethanol	N/A	N/A	N/A
Sorbitan monododecanoate, poly(oxy-1,2-ethanediyl) derivs., hexanedioate	N/A	N/A	N/A

California Proposition 65

This product does not contain chemical[s] which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Brazilian Regulations

Brazil Regulation This SDS was prepared in accordance with Brazil law NBR 14725.

Federal Police Not determined

Army Not determined

ANVISA Not determined

16. Other Information

Revision date 27/Aug/2018

Version 1

This SDS has been revised in the following section(s) New issue.

HMIS classification

Health	1
Flammability	1
Physical hazard	0
PPE	B

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SDS no. PID1354
Version 12
Revision date 17/Sep/2018
Supersedes date 31/Jan/2017

Safety Data Sheet
SAFE-BREAK* CBF

1. Identification of the Substance/Preparation and of the Company/Undertaking

1.1 Product identifier

Product name SAFE-BREAK* CBF

Product code PID1354

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Completion fluid additive.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

Schlumberger Canada, Ltd.
200, 125 - 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-613-992-4624

E-mail address sdsmi@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : 0800-720-8000/0800-777-2323 (WGRA)

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Acute toxicity - Oral	Category 4
Acute toxicity - Dermal	Category 5

Skin corrosion/irritation	Category 3
Serious eye damage/eye irritation	Category 2
Specific target organ toxicity - Single exposure	Category 3 - (H336)

Environmental hazards

Chronic aquatic toxicity	Category 3

Physical Hazards

Flammable Liquids	Category 2

2.2 Label elements

Signal word
DANGER

Hazard Statements
H302 - Harmful if swallowed
H313 - May be harmful in contact with skin
H316 - Causes mild skin irritation
H319 - Causes serious eye irritation
H336 - May cause drowsiness or dizziness
H412 - Harmful to aquatic life with long lasting effects
H225 - Highly flammable liquid and vapor

Precautionary Statements
P201 - Obtain special instructions before use
P202 - Do not handle until all safety precautions have been read and understood
P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking
P280 - Wear protective gloves and eye/face protection
P281 - Use personal protective equipment as required
P370 + P378 - In case of fire: Use dry sodium carbonate to extinguish

P261 - Avoid breathing dust/fume/gas/mist/vapors/spray
P264 - Wash face, hands and any exposed skin thoroughly after handling
P270 - Do not eat, drink or smoke when using this product
P271 - Use only outdoors or in a well-ventilated area
P301 + P312 - IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
P330 - Rinse mouth
P312 - Call a POISON CENTER or doctor/physician if you feel unwell
P332 + P313 - If skin irritation occurs: Get medical advice/attention
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P337 + P313 - If eye irritation persists: Get medical advice/attention
P304 + P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing
P303 + P361 + P353 - IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
P312 - Call a POISON CENTER or doctor if you feel unwell
P233 - Keep container tightly closed
P403 + P235 - Store in a well-ventilated place. Keep cool
P240 - Ground/bond container and receiving equipment
P241 - Use explosion-proof electrical/ ventilating/ lighting/ equipment
P242 - Use only non-sparking tools
P243 - Take precautionary measures against static discharge
P273 - Avoid release to the environment

P501 - Dispose of contents/container in accordance with local, regional, national, and international regulations as applicable

Hazards not otherwise classified
None known

Unknown acute toxicity 1% of the mixture consists of ingredient(s) of unknown toxicity.

1 % of the mixture consists of ingredient(s) of unknown acute oral toxicity
1 % of the mixture consists of ingredient(s) of unknown acute dermal toxicity

3. Composition/information on Ingredients

3.1 Substances

Not applicable

3.2 Mixtures

Chemical Name	CAS No	Weight-%
Propan-2-ol	67-63-0	65 - 85
Polyol compound	Proprietary	15 - 40
2-butoxyethanol	111-76-2	1 - 5
Quaternary ammonium salt	Proprietary	1 - 5
Methanol	67-56-1	0.1 - 1
Amine compounds	Proprietary	0.1 - 1

Comments
The product contains other ingredients which do not contribute to the overall classification. The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret

HMIRA Registration Number: 11090 **Filing Date:** 31/Jan/2017

4. First Aid Measures

4.1 First aid measures

Inhalation Move to fresh air. If breathing is difficult, (trained personnel should) give oxygen. If not breathing, give artificial respiration. Get medical attention immediately if symptoms occur.

Ingestion Do not induce vomiting without medical advice. Call a physician or poison control center immediately. Obtain medical attention.

Skin contact Take off contaminated clothing and shoes immediately. Rinse immediately with plenty of water for at least 30 minutes. Get immediate medical attention.

Eye Contact Rinse immediately with plenty of water, also under the eyelids. Remove contact lenses, if worn. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms

Inhalation Please see Section 11. Toxicological Information for further information.

Ingestion Please see Section 11. Toxicological Information for further information.

Skin contact Please see Section 11. Toxicological Information for further information.

Eye contact Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician Treat symptomatically
Keep victim under observation

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Water Fog, Alcohol Foam, CO_2, Dry Chemical.

Extinguishing media which must not be used for safety reasons
Do not use a solid water stream as it may scatter and spread fire.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
Highly flammable. Vapors may form explosive mixtures with air. Flash back possible over considerable distance. Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks). Heating of containers may cause pressure rise, with risk of bursting.

Hazardous combustion products
Carbon monoxide, carbon dioxide and unburned hydrocarbons (smoke), Nitrogen oxides (NOx), Ammonia, Chlorine, chlorine oxides, hydrogen chloride.

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Extinguish all ignition sources. Avoid sparks, flames, heat and smoking. Evacuate and ventilate the area. Use personal protective equipment. Avoid contact with heat, sparks, open flame, and static discharge. Contaminated surfaces will be extremely slippery.

6.2 Environmental precautions

Should not be released into the environment. Do not allow spilled material to enter sewers, storm drains or surface waters.

Environmental exposure controls
Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Dike far ahead of liquid spill for later disposal.

Methods for cleaning up
Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13). Use clean non-sparking tools to collect absorbed material. Take precautionary measures against static discharges.

6.4 Reference to other sections

See section 13 for more information. See section 8 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Keep away from heat, sparks and open flame. No smoking. Take precautionary measures against static discharges. Handle in accordance with good industrial hygiene and safety practice. Do not handle until all safety precautions have been read and understood. Avoid breathing vapors or mists. Avoid contact with skin, eyes and clothing. Wear personal protective equipment. Ensure adequate ventilation.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Keep away from open flames, hot surfaces and sources of ignition. Keep airborne concentrations below exposure limits. Ensure adequate ventilation.

Storage precautions Keep containers tightly closed in a dry, cool and well-ventilated place. Follow safe warehousing practices regarding palletizing, banding, shrink-wrapping and/or stacking. Keep away from open flames, hot surfaces and sources of ignition. To avoid ignition of vapors by static electricity discharge, all metal parts of the equipment must be grounded. Store in original container.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits - TWAs (CMPs)	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits - TWAs (LMPE-PPTs)
Propan-2-ol	200 ppm	400 ppm TWA 980 mg/m³ TWA	400 ppm TWA	310 ppm TWA LT; 765 mg/m³ TWA LT	400 ppm TWA VLE-PPT; 980 mg/m³ TWA VLE-PPT
Polyol compound	Not determined	Not determined	Not determined	Not determined	Not determined
2-butoxyethanol	20 ppm	50 ppm TWA 240 mg/m³ TWA	20 ppm TWA	39 ppm TWA LT; 190 mg/m³ TWA LT	26 ppm TWA VLE-PPT; 120 mg/m³ TWA VLE-PPT
Quaternary ammonium salt	Not determined	Not determined	Not determined	Not determined	Not determined
Methanol	200 ppm	200 ppm TWA 260 mg/m³ TWA	200 ppm TWA	156 ppm TWA LT; 200 mg/m³ TWA LT	200 ppm TWA VLE-PPT; 260 mg/m³ TWA VLE-PPT
Amine compounds	Not determined	Not determined	Not determined	Not determined	Not determined

IDLH (Immediately Dangerous to Life or Health)
Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Propan-2-ol 67-63-0	2000 ppm IDLH (10% LEL)
Polyol compound	-
2-butoxyethanol 111-76-2	700 ppm IDLH

Quaternary ammonium salt	-
Methanol 67-56-1	6000 ppm IDLH
Amine compounds	-

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation, especially in confined areas.

Personal protective equipment

Eye protection	Tightly fitting safety goggles.
Hand protection	Wear chemical resistant gloves such as nitrile or neoprene. Be aware that liquid may penetrate the gloves. Frequent change is advisable.
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne mist/aerosol of this product, use an organic vapor cartridge with a P-95 pre-filter attached. In work environments containing oil mist/aerosol, use an organic vapor cartridge with a P-95 pre-filter attached.If exposed to vapors from this product, use a NIOSH/MSHA-approved respirator with an organic vapor cartridge.
Skin and body protection	Wear appropriate personal protective clothing to prevent skin contact, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before breaks and immediately after handling the product, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Liquid
Appearance	Transparent
Color	Amber
Odor	Alcohol
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH	6.8 - 7.8	
pH @ dilution		No information available
Melting / freezing point	No information available	
Boiling point/range	> 62 °C / 143 °F	
Flash point	17 °C / 62 °F	PMCC
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	

Vapor pressure	No information available
Vapor density	>1 @ Air = 1
Specific gravity	0.84 - 0.87
Bulk density	No information available
Water solubility	Soluble
Solubility in other solvents	No information available
Autoignition temperature	No information available
Decomposition temperature	No information available
Kinematic viscosity	No information available
Dynamic viscosity	No information available
log Pow	No information available
Explosive properties	No information available
Oxidizing properties	No information available

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	No information available
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

Highly flammable liquid and vapor.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Avoid contact with heat, sparks, open flame, and static discharge. Do not freeze.

10.5 Incompatible materials

Strong oxidizing agents. Reducing agents. Acids. Bases.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Product information	Methanol is more toxic to humans and primates than to most experimental animals, due to differences in how it is metabolized. Non-primates do not appear to experience the acidosis or vision effects observed in humans and primates.
Inhalation	May cause drowsiness or dizziness. Inhalation of vapors in high concentration may cause irritation of respiratory system. Vapors inhaled in high concentration have a narcotic effect

	on the central nervous system. Symptoms of overexposure are dizziness, headache, tiredness, nausea, unconsciousness, cessation of breathing.
Eye contact	Causes serious eye irritation. Inhalation, ingestion, or skin absorbtion of methanol can cause blindness.
Skin contact	Prolonged contact may cause redness and irritation. May cause skin irritation and/or dermatitis. Harmful: danger of serious damage to health by prolonged exposure in contact with skin.
Ingestion	Harmful if swallowed. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Propan-2-ol	= 1870 mg/kg (Rat)	= 4059 mg/kg (Rabbit)	= 72600 mg/m³ (Rat) 4 h
Polyol compound	= 28,000 mg/kg (Rat)	> 20,000 mg/kg (Rabbit)	No data available
2-butoxyethanol	= 470 mg/kg (Rat)	= 99 mg/kg (Rabbit)	= 450 ppm (Rat) 4 h
Quaternary ammonium salt	= 250 mg/kg (Rat)	No data available	No data available
Methanol	= 6200 mg/kg (Rat)	= 15800 mg/kg (Rabbit)	= 22500 ppm (Rat) 8 h = 64000 ppm (Rat) 4 h
Amine compounds	= 1500 mg/kg (Rat)	No data available	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Propan-2-ol	No data available	A4	No data available	No data available
Polyol compound	No data available	No data available	No data available	No data available
2-butoxyethanol	No data available	A3 Confirmed Animal Carcinogen with Unknown Relevance to Humans	No data available	No data available
Quaternary ammonium salt	No data available	No data available	No data available	No data available
Methanol	No data available	No data available	No data available	No data available
Amine compounds	No data available	No data available	No data available	No data available

Sensitization	Not classified.
Mutagenic effects	No evidence of mutagenic properties.
Carcinogenicity	No evidence of carcinogenic properties.
Reproductive toxicity	No evidence of toxicity to reproduction.
Developmental toxicity	Contains ingredients that have suspected developmental hazards.
Routes of exposure	Inhalation. Skin contact. Eye contact. Ingestion.
Routes of entry	Inhalation. Skin absorption. Ingestion.
Specific target organ toxicity - Single exposure	Category 3
Specific target organ toxicity - Repeated exposure	Not classified.
Neurological effects	Central nervous system depressant. Central Nervous System Depression: signs/symptoms can include headache, dizziness, drowsiness, muscular weakness, incoordination, slowed reaction time, fatigue blurred vision, slurred speech, giddiness, tremors and convulsions.
Target organ effects	Central nervous system.
Aspiration hazard	Not classified.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
See component information below.

Toxicity to fish
See component information below.

Toxicity to daphnia and other aquatic invertebrates
See component information below.

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Propan-2-ol	> 1400000 µg/L LC50 Lepomis macrochirus 96 h = 11130 mg/L LC50 Pimephales promelas 96 h = 9640 mg/L LC50 Pimephales promelas 96 h	> 1000 mg/L EC50 Desmodesmus subspicatus 96 h > 1000 mg/L EC50 Desmodesmus subspicatus 72 h	= 13299 mg/L EC50 Daphnia magna 48 h
Polyol compound	> 5000 mg/L LC50 Carassius auratus 24 h	No information available	No information available
2-butoxyethanol	= 2950 mg/L LC50 Lepomis macrochirus 96 h = 1490 mg/L LC50 Lepomis macrochirus 96 h	No information available	1698 - 1940 mg/L EC50 Daphnia magna 24 h > 1000 mg/L EC50 Daphnia magna 48 h
Quaternary ammonium salt	No information available	No information available	No information available
Methanol	18 - 20 mL/L LC50 Oncorhynchus mykiss 96 h 19500 - 20700 mg/L LC50 Oncorhynchus mykiss 96 h 13500 - 17600 mg/L LC50 Lepomis macrochirus 96 h > 100 mg/L LC50 Pimephales promelas 96 h = 28200 mg/L LC50 Pimephales promelas 96 h	EC50= 22000 mg/l - Duration h: 96 - Notes: Literature data.	EC50> 10000 mg/l - Duration h: 48 - Notes: Literature data.
Amine compounds	0.1 - 1 mg/L LC50 Brachydanio rerio 96 h	No information available	No information available

12.2 Persistence and degradability

No product level data available.

12.3 Bioaccumulative potential

No product level data available.

12.4 Mobility

No information available.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method	Disposal should be made in accordance with federal, state and local regulations.
Contaminated packaging	Do not burn, or use a cutting torch on, the empty drum. Empty containers may contain flammable or explosive vapors. Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT)	UN1219
UN No. (MT/ANTT)	Not regulated
UN No. (TDG)	UN1219
UN/ID No. (ADR/RID/ADN/ADG)	UN1219
UN No. (IMDG/ANTAQ)	UN1219
UN No. (ICAO/ANAC)	UN1219
UN No. (DPC)	Not regulated

14.2. UN proper shipping name

ISOPROPANOL SOLUTION,

14.3 Hazard class(es)

DOT Hazard class	3
ANTT Hazard class	Not regulated
TDG Hazard class	3
ADR/RID/ADN/ADG Hazard class	3
IMDG/ANTAQ Hazard class	3
ICAO/ANAC Hazard class/division	3
DPC Hazard class	Not regulated

14.4 Packing group

DOT Packing group	PG II
ANTT Packing group	Not regulated
TDG Packing group	PG II
ADR/RID/ADN/ADG Packing group	PG II
IMDG/ANTAQ Packing group	PG II
ICAO/ANAC Packing group	PG II
DPC Packing group	Not regulated

14.5 Environmental hazard

Yes

14.6 Special precautions

Not applicable

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Does not comply
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH
All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

IMPORTS, Canada
No import volume restrictions.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Propan-2-ol	N/A	1.0 %	N/A
Polyol compound	N/A	N/A	N/A
2-butoxyethanol	N/A	N/A	N/A
Quaternary ammonium salt	N/A	N/A	N/A
Methanol	N/A	1.0 %	5000 lb final RQ 2270 kg final RQ
Amine compounds	N/A	N/A	N/A

California Proposition 65

This product does not contain chemical[s] which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Chemical Name	California Proposition 65
Methanol 67-56-1	developmental toxicity

Canadian Classification

This Safety Data Sheet has been prepared in compliance with the Hazardous Products Regulations.

Brazilian Regulations

Brazil Regulation	This SDS was prepared in accordance with Brazil law NBR 14725.
Federal Police	Not determined
Army	Not determined

ANVISA	Not determined
MTE (NR 15)	No information available

16. Other Information

Supersedes date	31/Jan/2017
Revision date	17/Sep/2018
Version	12
This SDS has been revised in the following section(s)	3, 15, 16

HMIS classification

Health	2
Flammability	3
Physical hazard	0
PPE	B

N/A - Not Applicable, N/D - Not Determined.

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SDS no. PID1361
Version 12
Revision date 13/Feb/2018
Supersedes date 09/Feb/2018

Safety Data Sheet
SAFE-CARB* (All Grades)

1. Identification of the Substance/Preparation and of the Company/Undertaking

1.1 Product identifier

Product name SAFE-CARB* (All Grades)

Product code PID1361

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Lost circulation material. Weighting agent. Bridging material.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
200 - 125, 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-780-962-8221

E-mail address sdsmi@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : 0800-720-8000/0800-777-2323 (WGRA)

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Carcinogenicity	Category 1A

Environmental hazards Not classified

Physical Hazards Not classified

2.2 Label elements

Signal word
DANGER

Hazard Statements
H350i - May cause cancer by inhalation

Precautionary statements
P201 - Obtain special instructions before use
P281 - Use personal protective equipment as required
P308 + P313 - IF exposed or concerned: Get medical advice/attention

P202 - Do not handle until all safety precautions have been read and understood
P501 - Dispose of contents/ container to an approved waste disposal plant

Unknown acute toxicity 0% of the mixture consists of ingredient(s) of unknown toxicity.

3. Composition/information on Ingredients

3.1 Substances

Chemical Name	CAS No	Weight-%
Calcium carbonate	471-34-1	60-100
Crystalline silica (impurity)	14808-60-7	<1

3.2 Mixtures

Not applicable

Comments
The product contains other ingredients which do not contribute to the overall classification. The exact percentage (concentration) of composition has been withheld as a trade secret

4. First Aid Measures

4.1 First aid measures

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Get medical attention if symptoms occur.

Skin contact	Wash skin thoroughly with soap and water. Get medical attention if irritation persists.
Eye Contact	Promptly wash eyes with lots of water while lifting eye lids. Remove contact lenses, if worn. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

General advice	The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.
Symptoms	
Inhalation	Please see Section 11. Toxicological Information for further information.
Ingestion	Please see Section 11. Toxicological Information for further information.
Skin contact	Please see Section 11. Toxicological Information for further information.
Eye contact	Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician	Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing media appropriate for surrounding material.

Extinguishing media which must not be used for safety reasons
None known.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
None known.

Hazardous combustion products
Fire or high temperatures create:, Carbon oxides (COx), Magnesium oxide.

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. See also section 8. Avoid contact with heat, sparks, open flame, and static discharge. Keep away from sources of ignition - No smoking. Contaminated surfaces will be extremely slippery. Avoid breathing dust; if exposed to high dust concentration, leave area immediately.

6.2 Environmental precautions

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Cover powder spill with plastic sheet or tarp to minimize spreading.

Methods for cleaning up
Shovel into suitable container for disposal. Avoid dust formation. Take precautionary measures against static discharges. Do not dry sweep dust. Wet dust with water before sweeping or use a vacuum to collect dust. Use non-sparking tools and equipment.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Avoid dust formation. Take precautionary measures against static discharges. Keep away from open flames, hot surfaces and sources of ignition.

Hygiene measures
Wash hands and face before breaks and immediately after handling the product. Remove contaminated clothing.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Ensure adequate ventilation. Keep airborne concentrations below exposure limits.

Storage precautions Keep containers tightly closed in a dry, cool and well-ventilated place. Protect from moisture Store in original container. Keep away from :. Acids Aluminum. Ammonium salts Fluorine. Mercaptans

Packaging materials Use specially constructed containers only.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Exposure limits **No biological limit allocated**

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits - TWAs (CMPs)	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits - TWAs (LMPE-PPTs)
Calcium carbonate	Not determined	Not determined	Not determined	Not determined	Not determined
Crystalline silica (impurity)	0.025 mg/m³	50 µg/m³ TWA respirable fraction	0.05 mg/m³ TWA	Not determined	0.1 mg/m³ TWA VLE-PPT (respirable fraction)

Crystalline silica (impurity)
OSHA - Final PELs - Table Z-3 Mineral Dusts
(250)/(%SiO2 + 5) mppcf TWA, respirable fraction; (10)/(%SiO2 + 2) mg/m³ TWA, respirable fraction

IDLH (Immediately Dangerous to Life or Health)
This product contains substance(s) classified as Immediately Dangerous to Life or Health (IDLH) by the US National Institute for

Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Calcium carbonate 471-34-1	Not detemined
Crystalline silica (impurity) 14808-60-7	50 mg/m³ IDLH (respirable dust)

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Keep airborne concentrations below exposure limits. Ensure adequate ventilation. Local exhaust ventilation. enclosure of the process. Apply technical measures to comply with the occupational exposure limits.

Personal protective equipment

Eye protection	Tightly fitting safety goggles.
Hand protection	Repeated or prolonged contact Use protective gloves made of: Nitrile Neoprene Frequent change is advisable
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne mist/aerosol of this product, use an organic vapor cartridge with a P-95 pre-filter attached. In work environments containing oil mist/aerosol, use an organic vapor cartridge with a P-95 pre-filter attached.If exposed to vapors from this product, use a NIOSH/MSHA-approved respirator with an organic vapor cartridge.
Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Solid
Appearance	Powder Dust
Color	White
Odor	Odorless
Odor threshold	Not applicable

Property	Values	Remarks
pH	Not applicable	
pH @ dilution	8.5 - 9.5	@ 100 g/l
Melting / freezing point	No information available	
Boiling point/range	No information available	
Flash point	No information available	PMCC

Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	2.6 - 2.8	@ 20 °C
Bulk density	No information available	
Water solubility	Insoluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	825 °C / 1517°F	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	
log Pow	No information available	
Explosive properties	Not applicable	
Oxidizing properties	None known.	

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	None
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

No data available.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Avoid dust formation. Protect from moisture.

10.5 Incompatible materials

No materials to be especially mentioned.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity
Product information This product contains a small quantity of quartz, crystalline silica. Prolonged and repeated

exposure to concentrations of crystalline silica exceeding the workplace exposure limit (WEL) may lead to chronic lung disease such as silicosis.

Inhalation Inhalation of dust in high concentration may cause irritation of respiratory system. Harmful: danger of serious damage to health by prolonged exposure through inhalation. Repeated or prolonged inhalation of crystalline silica dust can cause delayed lung injury, and other diseases, including silicosis and lung cancer.

Eye contact Dust may cause mechanical irritation.

Skin contact Prolonged contact may cause redness and irritation.

Ingestion Ingestion may cause stomach discomfort.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Calcium carbonate	= 6450 mg/kg (Rat)	No data available	No data available
Crystalline silica (impurity)	= 500 mg/kg (Rat)	No data available	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Calcium carbonate	No data available	No data available	No data available	No data available
Crystalline silica (impurity)	Group 1; Monograph 100C [2012] Monograph 100C [2012] (listed under Crystalline silica inhaled in the form of quartz or cristobalite from occupational sources); Monograph 68 [1997] Group 1; Monograph 68 [1997]	A2 Suspected Human Carcinogen	Present	Known Human Carcinogen

Sensitization Not classified.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity Crystalline silica dust is listed by IARC in Group 1 as known to cause lung cancer in humans, if inhaled.

Reproductive toxicity This product does not contain any known or suspected reproductive hazards.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of exposure Inhalation.

Routes of entry Inhalation.

Specific target organ toxicity - Single exposure Not classified

Specific target organ toxicity - Repeated exposure Not classified.

Target organ effects Respiratory system. Lungs.

Aspiration hazard Not applicable.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
This product is not considered toxic to algae.

Toxicity to fish
This product is not considered toxic to fish.

Toxicity to daphnia and other aquatic invertebrates
This product is not considered toxic to invertebrates.

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Calcium carbonate	No information available	No information available	No information available
Crystalline silica (impurity)	No information available	No information available	No information available

12.2 Persistence and degradability

Not Applicable - Inorganic chemical.

12.3 Bioaccumulative potential

Not Applicable - Inorganic chemical.

12.4 Mobility

Insoluble in water.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method Disposal should be made in accordance with federal, state and local regulations.

Contaminated packaging Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT) Not regulated
UN No. (MT/ANTT) Not regulated
UN No. (TDG) Not regulated
UN/ID No. (ADR/RID/ADN/ADG) Not regulated
UN No. (IMDG/ANTAQ) Not regulated
UN No. (ICAO/ANAC) Not regulated

14.2. UN proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class	Not regulated
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated

14.4 Packing group

DOT/ANTT Packing group	Not regulated
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated

14.5 Environmental hazard
No

14.6 Special precautions
Not applicable

14.7 Transport in bulk according to Annex I/II of MARPOL 73/78 and the IBC Code
Please contact MISDS@slb.com for info regarding transport in Bulk.

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Complies
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH
Contact REACH@slb.com for REACH information.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Calcium carbonate	N/A	N/A	N/A
Crystalline silica (impurity)	N/A	N/A	N/A

California Proposition 65

WARNING

This product can expose you to chemicals including those listed below, which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Chemical Name	California Proposition 65
Crystalline silica (impurity) 14808-60-7	Carcinogen

16. Other Information

Supersedes date	09/Feb/2018
Revision date	13/Feb/2018
Version	12
This SDS has been revised in the following section(s)	6. Accidental release measures

HMIS classification

Health	1*
Flammability	1
Physical hazard	0
PPE	E

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SDS no. PID1372
Version 2
Revision date 22/Jan/2019
Supersedes date 08/Nov/2018

Safety Data Sheet
SAFE-COR* C

1. Identification of the Substance/Preparation and of the Company/Undertaking

1.1 Product identifier

Product name SAFE-COR* C

Product code PID1372

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Corrosion inhibitor.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
200 - 125, 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-780-962-8221

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : 0800-720-8000/0800-777-2323 (WGRA)

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Skin corrosion/irritation	Category 2
Serious eye damage/eye irritation	Category 1

Environmental hazards Not classified

Physical Hazards Not classified

2.2 Label elements

Signal word
DANGER

Hazard Statements
H315 - Causes skin irritation
H318 - Causes serious eye damage

Precautionary Statements
P280 - Wear protective gloves/protective clothing/eye protection/face protection
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a POISON CENTER or doctor/physician

Supplementary precautionary statements
P264 - Wash face, hands and any exposed skin thoroughly after handling
P302 + P352 - IF ON SKIN: Wash with plenty of soap and water
P332 + P313 - If skin irritation occurs: Get medical advice/attention
P362 - Take off contaminated clothing and wash before reuse

Unknown acute toxicity 60% of the mixture consists of ingredient(s) of unknown toxicity.

3. Composition/information on Ingredients

3.1 Substances

Not applicable

3.2 Mixtures

Chemical Name	CAS No	Weight-%
Aliphatic heterocyclic amines	68909-77-3	60 - 80

Comments
The product contains other ingredients which do not contribute to the overall classification. The exact percentage (concentration) of composition has been withheld as a trade secret

4. First Aid Measures

4.1 First aid measures

Inhalation	If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.
Ingestion	Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Seek medical attention if irritation occurs.
Skin contact	Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention if irritation persists.
Eye Contact	Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first five minutes, then continue rinsing eye. Seek medical attention at once.

4.2. Most important symptoms and effects, both acute and delayed

General advice	The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.
Symptoms	
Inhalation	Please see Section 11. Toxicological Information for further information.
Ingestion	Please see Section 11. Toxicological Information for further information.
Skin contact	Please see Section 11. Toxicological Information for further information.
Eye contact	Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician	Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Water Fog, Alcohol Foam, CO_2, Dry Chemical.

Extinguishing media which must not be used for safety reasons
None known.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
None known.

Hazardous combustion products
Thermal decomposition can lead to release of irritating gases and vapors.

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment identified in Section 8. Extinguish all ignition sources. Avoid sparks, flames, heat and smoking. Evacuate and ventilate the area. Prevent further leakage or spillage if safe to do so.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Dike far ahead of liquid spill for later disposal.

Methods for cleaning up
Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Do not breathe vapors or spray mist. Avoid spills and splashing during use. Persons susceptible to allergic reactions should not handle this product.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Ensure adequate ventilation. Keep airborne concentrations below exposure limits.

Storage precautions Keep containers tightly closed in a dry, cool and well-ventilated place. Follow safe warehousing practices regarding palletizing, banding, shrink-wrapping and/or stacking.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits - TWAs (CMPs)	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits - TWAs (LMPE-PPTs)
Aliphatic heterocyclic amines	20 ppm	20 ppm	Not determined	Not determined	Not determined

IDLH (Immediately Dangerous to Life or Health)
Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Aliphatic heterocyclic amines 68909-77-3	-

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation.

Personal protective equipment

Eye protection	Tightly fitting safety goggles. Face-shield.
Hand protection	Wear chemical resistant gloves such as nitrile or neoprene. PVC Be aware that liquid may penetrate the gloves. Frequent change is advisable.
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne mist/aerosol of this product, use an organic vapor cartridge with a P-95 pre-filter attached. In work environments containing oil mist/aerosol, use an organic vapor cartridge with a P-95 pre-filter attached.If exposed to vapors from this product, use a NIOSH/MSHA-approved respirator with an organic vapor cartridge.
Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	No information available
Appearance	No information available
Color	Dark brown
Odor	Ammoniacal
Odor threshold	Not applicable

Property	Values	Remarks
pH	10.42	
pH @ dilution	No information available	
Melting / freezing point	No information available	
Boiling point/range	249 °C / 306 °F	@ 760 mm Hg
Flash point	152 °C / 306 °F	
Evaporation rate (BuAc =1)	< 1	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	> 1	
Vapor density	< 1 mm Hg (air = 1)	@ 68 °F / 20 °C

Specific gravity	1.09
Bulk density	No information available
Water solubility	Soluble in water
Solubility in other solvents	No information available
Autoignition temperature	No information available
Decomposition temperature	No information available
Kinematic viscosity	No information available
Dynamic viscosity	No information available
log Pow	No information available
Explosive properties	No information available
Oxidizing properties	No information available

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	No information available
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

No specific reactivity hazards associated with this product.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Store at room temperature. Do not freeze.

10.5 Incompatible materials

Acids. Do not add nitrites or other nitrosating agents to this product. May cause formation of nitrosamine.

10.6 Hazardous decomposition products

Thermal decomposition can lead to release of irritating gases and vapors.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation	May cause respiratory irritation.
Eye contact	Corrosive to the eyes and may cause severe damage including blindness.
Skin contact	Causes skin irritation.
Ingestion	Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Aliphatic heterocyclic amines	= 1500 mg/kg (Rat)	No data available	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Aliphatic heterocyclic amines	No data available	No data available	No data available	No data available

Sensitization This product does not contain any components suspected to be sensitizing.

Mutagenic effects No evidence of mutagenic properties.

Carcinogenicity No evidence of carcinogenic properties.

Reproductive toxicity No evidence of toxicity to reproduction.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of exposure Skin contact. Inhalation. Eye contact.

Routes of entry None known.

Specific target organ toxicity - Single exposure Not classified

Specific target organ toxicity - Repeated exposure Not classified.

Aspiration hazard Not applicable.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
EC50 72h : > 100 mg/l.

Toxicity to fish
LC50 96h : > 100 mg/l.

Toxicity to daphnia and other aquatic invertebrates
EC50 48h : > 100 mg/l.

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Aliphatic heterocyclic amines	No information available	No information available	No information available

12.2 Persistence and degradability

Product is biodegradable.

12.3 Bioaccumulative potential

No bioaccumulation expected due to high molecular weight.

12.4 Mobility

The product is water soluble, and may spread in water systems.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method	Disposal should be made in accordance with federal, state and local regulations.
Contaminated packaging	Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA,ADR/RID/ADG).

14.1. UN number

UN No. (DOT)	Not regulated
UN No. (MT/ANTT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG/ANTAQ)	Not regulated
UN No. (ICAO/ANAC)	Not regulated
UN No. (DPC)	Not regulated

14.2. UN proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class	Not regulated
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated
DPC Hazard class	Not regulated

14.4 Packing group

DOT Packing group	Not regulated
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated
DPC Packing group	Not regulated

14.5 Environmental hazard

Marine pollutant	No

14.6 Special precautions

Not applicable

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Does not comply
Japan (ENCS)	Does not comply
China (IECSC)	Does not comply
Australia (AICS)	Complies
Korean (KECL)	Does not comply
New Zealand (NZIoC)	Complies

Europe - REACH
All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Aliphatic heterocyclic amines	N/A	N/A	N/A

California Proposition 65

This product does not contain chemical[s] which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Canadian Classification

This Safety Data Sheet has been prepared in compliance with the Hazardous Products Regulations.

Brazilian Regulations

Brazil Regulation	This SDS was prepared in accordance with Brazil law NBR 14725.
Federal Police	Not determined
Army	Not determined
ANVISA	Not Listed
MTE (NR 15)	No information available

16. Other Information

Supersedes date	08/Nov/2018

Revision date	22/Jan/2019
Version	2
This SDS has been revised in the following section(s)	16

HMIS classification

Health	2
Flammability	1
Physical hazard	0
PPE	X

N/A - Not Applicable, N/D - Not Determined.

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SDS no. PID1370
Version 12
Revision date 19/Aug/2020
Supersedes date 07/Jul/2017

Safety Data Sheet
SAFE-COR*

1. Identification

1.1 Product identifier

Product name SAFE-COR*

Product code PID1370

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Corrosion inhibitor.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
200 - 125, 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-780-962-8221

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals) , Anne Karin (Anka) Fosse

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : +55 11 3197 5891

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Serious eye damage/eye irritation	Category 2

Environmental hazards

Chronic aquatic toxicity	Category 3

Physical Hazards Not classified

2.2 Label elements

Signal word
WARNING

Hazard Statements
H319 - Causes serious eye irritation
H412 - Harmful to aquatic life with long lasting effects

Precautionary Statements
P264 - Wash face, hands and any exposed skin thoroughly after handling
P273 - Avoid release to the environment
P280 - Wear protective gloves, protective clothing, eye protection
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P337 + P313 - If eye irritation persists: Get medical advice/attention
P501 - Dispose of contents/container in accordance with local, regional, national, and international regulations as applicable

Hazards not otherwise classified
None known

Unknown acute toxicity Not applicable.

3. Composition/information on Ingredients

3.1 Substances

Not applicable

3.2 Mixtures

Chemical Name	CAS No	Weight-%
Ethanol, 2,2'-oxybis-, reaction products with ammonia, morpholine derivs. residues	68909-77-3	30 - 60

Comments
The product contains other ingredients which do not contribute to the overall classification.

Hazardous Material Information Review Act registry number (HMIRA registry #) 11100
Filing Date: 31/Jan/2017

4. First Aid Measures

4.1 First aid measures

Inhalation — If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion — Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Seek medical attention if irritation occurs.

Skin contact — Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention if irritation persists.

Eye Contact — Promptly wash eyes with lots of water while lifting eye lids. Remove contact lenses, if worn. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

General advice — The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Symptoms

Inhalation — Please see Section 11. Toxicological Information for further information.

Ingestion — Please see Section 11. Toxicological Information for further information.

Skin contact — Please see Section 11. Toxicological Information for further information.

Eye contact — Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician — Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Water Fog, Alcohol Foam, CO_2, Dry Chemical.

Extinguishing media which must not be used for safety reasons
None known.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
None known.

Hazardous combustion products
Thermal decomposition can lead to release of irritating gases and vapors.

5.3 Advice for firefighters

Special protective equipment and precautions for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. See also section 8.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Dike far ahead of liquid spill for later disposal.

Methods for cleaning up
Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Do not breathe vapors or spray mist. Avoid spills and splashing during use.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Ensure adequate ventilation.

Storage precautions Keep containers tightly closed in a dry, cool and well-ventilated place. Avoid frost. Store at room temperature. Avoid contact with:. Acids. Nitrites.

Packaging materials Use specially constructed containers only.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Exposure limits **Contains no substances with occupational exposure limit values No biological limit allocated**

Component Information

Chemical Name	ACGIH TLV	OSHA PEL	Argentina -	Brazil - Occupational	Mexico -

			Occupational Exposure Limits - TWAs (CMPs)	Exposure Limits - TWAs (LTs)	Occupational Exposure Limits - TWAs (LMPE-PPTs)
Ethanol, 2,2'-oxybis-, reaction products with ammonia, morpholine derivs. residues	Not determined	Not determined	Not determined	Not determined	Not determined

IDLH (Immediately Dangerous to Life or Health)
Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Ethanol, 2,2'-oxybis-, reaction products with ammonia, morpholine derivs. residues 68909-77-3	-

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation. Local exhaust ventilation.

Personal protective equipment

Eye protection	Tightly fitting safety goggles.
Hand protection	Impervious gloves made of: Neoprene PVC Nitrile Break through time >480 minutes Glove thickness 0.4 mm Be aware that liquid may penetrate the gloves. Frequent change is advisable.
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne mist/aerosol of this product, use an organic vapor cartridge with a P-95 pre-filter attached. In work environments containing oil mist/aerosol, use an organic vapor cartridge with a P-95 pre-filter attached.If exposed to vapors from this product, use a NIOSH/MSHA-approved respirator with an organic vapor cartridge.
Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing and gloves, including the inside, before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Liquid
Appearance	No information available
Color	Dark amber
Odor	Slight
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH	~ 11.5	
pH @ dilution	No information available	
Melting point	No information available	
Boiling point	> 100 °C / > 212 °F	
Flash point	151.6 °C / 305 °F	PMCC
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	1.10	
Bulk density	No information available	
Water solubility	Soluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	
Dynamic viscosity	4 cP	@ 25 °C
Partition Coefficient (n-octanol/water)	No information available	

Explosive properties	Not applicable
Oxidizing properties	None known.

9.2 Other information

Pour point	-12°C (<11°F)
Molecular weight	No information available
VOC content(%)	None
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

No specific reactivity hazards associated with this product.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Store at room temperature. Avoid frost.

10.5 Incompatible materials

Acids. Do not add nitrites or other nitrosating agents to this product. May cause formation of nitrosamine.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation Inhalation of vapors in high concentration may cause irritation of respiratory system.

Eye contact Causes serious eye irritation.

Skin contact Prolonged contact may cause redness and irritation.

Ingestion Ingestion may cause stomach discomfort.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Ethanol, 2,2'-oxybis-, reaction products with ammonia, morpholine derivs. residues	1500 mg/kg (rat)	No data available	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Ethanol, 2,2'-oxybis-, reaction products with ammonia, morpholine derivs. residues	No data available	No data available	No data available	No data available

Delayed and immediate effects and chronic effects from short and long term exposure

Sensitization This product does not contain any components suspected to be sensitizing.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity This product does not contain any known or suspected carcinogens.

Reproductive toxicity This product does not contain any known or suspected reproductive hazards.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of Exposure Eye contact.

Routes of entry	None known.
Specific target organ toxicity - Single exposure	Not classified
Specific target organ toxicity - Repeated exposure	Not classified.
Aspiration hazard	Not applicable.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
See component information below.

Toxicity to fish
See component information below.

Toxicity to daphnia and other aquatic invertebrates
See component information below.

Toxicology data for the components

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Ethanol, 2,2'-oxybis-, reaction products with ammonia, morpholine derivs. residues	OECD; Acute LC50; 96 hours Semi-static; Fish > 45 g/l	OECD; Acute ErC50 (growth rate); 72 hours Static; Algae; 45 mg/kg OECD 201 Algae, Growth Inhibitor Test; Chronic NOECr; 72 hours Static; Algae; 3.2 mg/l	OECD; Acute EC50; 48 hours Static, Daphnia; > 100 g/l

12.2 Persistence and degradability

Not readily biodegradable.

12.3 Bioaccumulative potential

No bioaccumulation expected due to high molecular weight.

12.4 Mobility

The product is water soluble, and may spread in water systems.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method Disposal should be made in accordance with federal, state and local regulations.

Contaminated packaging Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT)	Not regulated
UN No. (MT/ANTT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG/ANTAQ)	Not regulated
UN No. (ICAO/ANAC)	Not regulated
UN No. (DPC)	Not regulated

14.2. UN proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class	Not regulated
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated
DPC Hazard class	Not regulated

14.4 Packing group

DOT Packing group	Not regulated
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated
DPC Packing group	Not regulated

14.5 Environmental hazard

Marine pollutant No

14.6 Special precautions

Not applicable

15. Regulatory Information

International inventories

USA (TSCA) Complies

Canada (DSL)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Does not comply
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Does not comply
New Zealand (NZIoC)	Complies

Europe - REACH

All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

IMPORTS, Canada

No import volume restrictions.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories

Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Ethanol, 2,2'-oxybis-, reaction products with ammonia, morpholine derivs. residues	N/A	N/A	N/A

California Proposition 65

This product does not contain chemical[s] which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Canadian Classification

This Safety Data Sheet has been prepared in compliance with the Hazardous Products Regulations.

16. Other Information

Supersedes date	07/Jul/2017
Revision date	19/Aug/2020
Version	12
This SDS has been revised in the following section(s)	All sections. No changes with regard to classification have been made.

HMIS classification

Health	2
Flammability	1
Physical hazard	0
PPE	E

N/A - Not Applicable, N/D - Not Determined.

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Safety Data Sheet
SAFE-SCAV* CA

1. Identification

1.1 Product identifier

Product name SAFE-SCAV* CA

Product code PID1387

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Oxygen Scavenger.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
200 - 125, 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-780-962-8221

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals) , Anne Karin (Anka) Fosse

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : +55 11 3197 5891

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards Not classified

Environmental hazards Not classified

Physical Hazards

Combustible dust

2.2 Label elements

Signal word
WARNING

Hazard Statements
May form combustible dust concentrations in air

Precautionary Statements
P240 - Ground or bond container and receiving equipment
P241 - Use explosion-proof electrical, ventilating, lighting, equipment
P243 - Take precautionary measures against static discharge

Hazards not otherwise classified
None known

Unknown acute toxicity Not applicable.

3. Composition/information on Ingredients

3.1 Substances

Chemical Name	CAS No	Weight-%
Organic salt	Proprietary	60-100

3.2 Mixtures

Not applicable

Comments
Proprietary component(s) in section 3 of this SDS does not/do not trigger application of trade secret exemption under Hazardous Materials Information Review Act (HMIRA). The proprietary component in this product contributes to combustible dust classification.

4. First Aid Measures

4.1 First aid measures

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Get medical attention if symptoms occur.

Skin contact Wash skin thoroughly with soap and water. Get medical attention if irritation persists.

Eye Contact Promptly wash eyes with lots of water while lifting eye lids. Remove contact lenses, if worn. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

General advice	The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.
Symptoms	
Inhalation	Please see Section 11. Toxicological Information for further information.
Ingestion	Please see Section 11. Toxicological Information for further information.
Skin contact	Please see Section 11. Toxicological Information for further information.
Eye contact	Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Water Fog, Alcohol Foam, CO_2, Dry Chemical.

Extinguishing media which must not be used for safety reasons
Do not use water jet.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
Dust may form explosive mixture in air.

Hazardous combustion products
Carbon oxides (COx).

5.3 Advice for firefighters

Special protective equipment and precautions for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Extinguish all ignition sources. Avoid sparks, flames, heat and smoking. Use personal protective equipment. See also section 8. Material becomes slippery when wet. Use caution if wet.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Cover powder spill with plastic sheet or tarp to minimize spreading.

Methods for cleaning up
Sweep up and shovel into suitable containers for disposal. Take precautionary measures against static discharges. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Avoid dust formation. Material becomes slippery when wet. Use caution if wet.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions	Ensure adequate ventilation. Take precautionary measures against static discharges.
Storage precautions	Keep containers tightly closed in a dry, cool and well-ventilated place. Avoid heat, flames and other sources of ignition. Avoid contact with:. Strong oxidizing agents. Strong bases. Metals.
Packaging materials	Use specially constructed containers only.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Component Information

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits - TWAs (CMPs)	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits - TWAs (LMPE-PPTs)
Organic salt	Not determined	Not determined	Not determined	Not determined	Not determined

IDLH (Immediately Dangerous to Life or Health)
Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Organic salt	Not detemined

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation. Mechanical ventilation or local exhaust ventilation is required.

Personal protective equipment

Eye protection	Tightly fitting safety goggles.
Hand protection	Wear chemical resistant gloves such as nitrile or neoprene.
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne particles of this product use at least a NIOSH-approved N95 half-mask disposable or re-useable particulate respirator. In work environments containing oil mist/aerosol use at least a NIOSH-approved P95 half-mask disposable or re-useable particulate respirator.
Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Solid
Appearance	Powder Crystalline
Color	White
Odor	Odorless
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH	Not applicable	
pH @ dilution	5.5 - 8.0	@ 10%
Melting point	No information available	
Boiling point	No information available	
Flash point	Not applicable	
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	1.65	20 °C
Bulk density	No information available	

Water solubility	Soluble in water
Solubility in other solvents	No information available
Autoignition temperature	No information available
Decomposition temperature	No information available
Kinematic viscosity	No information available
Dynamic viscosity	No information available
Partition Coefficient (n-octanol/water)	No information available
Explosive properties	Suspended dust may present a dust explosion hazard
Oxidizing properties	None known.

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	None
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

Dust may form explosive mixture in air.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Avoid dust formation. Avoid heat, flames and other sources of ignition. Take precautionary measures against static charges.

10.5 Incompatible materials

Metals. Strong bases. Strong oxidizing agents.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation	Inhalation of dust in high concentration may cause irritation of respiratory system.
Eye contact	Dust may cause mechanical irritation.
Skin contact	Prolonged contact may cause redness and irritation.

Ingestion Ingestion may cause stomach discomfort.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Organic salt	5005 mg/kg (rat)	No data available	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Organic salt	No data available	No data available	No data available	No data available

Delayed and immediate effects and chronic effects from short and long term exposure

Sensitization This product does not contain any components suspected to be sensitizing.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity This product does not contain any known or suspected carcinogens.

Reproductive toxicity This product does not contain any known or suspected reproductive hazards.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of Exposure None known.

Routes of entry No route of entry noted.

Specific target organ toxicity - Single exposure Not classified

Specific target organ toxicity - Repeated exposure Not classified.

Aspiration hazard Not applicable.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
This product is not considered toxic to algae.

Toxicity to fish
This product is not considered toxic to fish.

Toxicity to daphnia and other aquatic invertebrates
This product is not considered toxic to invertebrates.

Toxicology data for the components

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Organic salt	No information available	No information available	No information available

12.2 Persistence and degradability

Not readily biodegradable.

12.3 Bioaccumulative potential

Does not bioaccumulate.

12.4 Mobility

Soluble in water.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

The product component(s) are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method Disposal should be made in accordance with federal, state and local regulations.

Contaminated packaging Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT) Not regulated
UN No. (MT/ANTT) Not regulated
UN No. (TDG) Not regulated
UN/ID No. (ADR/RID/ADN/ADG) Not regulated
UN No. (IMDG/ANTAQ) Not regulated
UN No. (ICAO/ANAC) Not regulated
UN No. (DPC) Not regulated

14.2. UN proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class Not regulated
ANTT Hazard class Not regulated
TDG Hazard class Not regulated
ADR/RID/ADN/ADG Hazard class Not regulated

IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated
DPC Hazard class	Not regulated

14.4 Packing group

DOT Packing group	Not regulated
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated
DPC Packing group	Not regulated

14.5 Environmental hazard

Marine pollutant	No

14.6 Special precautions

Not applicable

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Complies
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH

All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories

Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Organic salt	N/A	N/A	N/A

California Proposition 65

This product does not contain chemical[s] which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

16. Other Information

Supersedes date	30/Mar/2017
Revision date	13/Aug/2020
Version	10
This SDS has been revised in the following section(s)	All sections. Product Code change No changes with regard to classification have been made.

HMIS classification

Health	1
Flammability	1
Physical hazard	0
PPE	E

N/A - Not Applicable, N/D - Not Determined.

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SDS no. PID1392
Version 11
Revision date 13/Oct/2020
Supersedes date 20/Aug/2020

Safety Data Sheet
SAFE-SCAV* NA

1. Identification

1.1 Product identifier

Product name SAFE-SCAV* NA

Product code PID1392

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Oxygen Scavenger.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
200 - 125, 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-780-962-8221

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : +55 11 3197 5891

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Serious eye damage/eye irritation	Category 2

Environmental hazards Not classified

Physical Hazards Not classified

2.2 Label elements

Signal word
WARNING

Hazard Statements
H319 - Causes serious eye irritation

Precautionary Statements
P264 - Wash face, hands and any exposed skin thoroughly after handling
P280 - Wear protective gloves, protective clothing, eye protection
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P337 + P313 - If eye irritation persists: Get medical advice/attention
P501 - Dispose of contents/container in accordance with local, regional, national, and international regulations as applicable

Hazards not otherwise classified
None known

Unknown acute toxicity Not applicable.

3. Composition/information on Ingredients

3.1 Substances

Not applicable

3.2 Mixtures

Chemical Name	CAS No	Weight-%
Ammonium hydrogensulfite	10192-30-0	30 - 60
Sulphur Dioxide (Impurity)	7446-09-5	0.1 - 1

Comments
The product contains other ingredients which do not contribute to the overall classification.

Hazardous Material Information Review Act registry number (HMIRA registry #) 11093
Filing Date: 31/Jan/2017

4. First Aid Measures

4.1 First aid measures

Inhalation — If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion — Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Seek medical attention if irritation occurs.

Skin contact — Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention immediately if symptoms occur.

Eye Contact — Remove contact lenses, if worn. Promptly wash eyes with lots of water while lifting eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

General advice — The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Symptoms

Inhalation — Please see Section 11. Toxicological Information for further information.

Ingestion — Please see Section 11. Toxicological Information for further information.

Skin contact — Please see Section 11. Toxicological Information for further information.

Eye contact — Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician — Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Water Fog, Alcohol Foam, CO_2, Dry Chemical.

Extinguishing media which must not be used for safety reasons
None known.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
None known.

Hazardous combustion products
Heating or fire can release toxic gas, Sulphur oxides, Nitrogen oxides (NOx), Oxides of:, Ammonia, Amines.

5.3 Advice for firefighters

Special protective equipment and precautions for fire-fighters

As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. See also section 8.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Dike far ahead of liquid spill for later disposal.

Methods for cleaning up
Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
This product slowly releases sulphur dioxide in contact with air. Use only in well-ventilated areas. In case of insufficient ventilation, wear suitable respiratory equipment. Avoid contact with skin and eyes. Do not breathe vapors or spray mist. Avoid spills and splashing during use.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Ensure adequate ventilation. Keep airborne concentrations below exposure limits.

Storage precautions Keep containers tightly closed in a dry, cool and well-ventilated place. Avoid contact with:. Strong oxidizing agents. Acids. Alkalis. Keep at 5-30°C.

Packaging materials Use specially constructed containers only.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Exposure limits **Exposure limit noted is for decomposition product Sulfur dioxide.**

Component Information

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits -	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits -

			TWAs (CMPs)		TWAs (LMPE-PPTs)
Ammonium hydrogensulfite	Not determined	Not determined	Not determined	Not determined	Not determined
Sulphur Dioxide (Impurity)	Not determined	5 ppm TWA 13 mg/m³ TWA	2 ppm TWA	4 ppm TWA LT; 10 mg/m³ TWA LT	Not determined

IDLH (Immediately Dangerous to Life or Health)
Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Ammonium hydrogensulfite 10192-30-0	-
Sulphur Dioxide (Impurity) 7446-09-5	100 ppm IDLH

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation. Mechanical ventilation or local exhaust ventilation is required.

Personal protective equipment

Eye protection — Tightly fitting safety goggles.

Hand protection — Impervious gloves made of: Neoprene Nitrile PVC
Break through time >480 minutes
Glove thickness >=0.4 mm
Be aware that liquid may penetrate the gloves. Frequent change is advisable.

Respiratory Protection — All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne mist/aerosol of this product, use an organic vapor cartridge with a P-95 pre-filter attached. In work environments containing oil mist/aerosol, use an organic vapor cartridge with a P-95 pre-filter attached.If exposed to vapors from this product, use a NIOSH/MSHA-approved respirator with an organic vapor cartridge.

Skin and body protection — Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.

Hygiene Measures — Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Liquid
Appearance	No information available
Color	Straw - Yellow
Odor	Pungent Sulfur
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH	No information available	
pH @ dilution	4.9 - 5-5	1% solution
Melting point	No information available	
Boiling point	105 °C / 221 °F	
Flash point	No information available	
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	18 mmHg	@ 20 °C
Vapor density	<1	(Air = 1.0)
Specific gravity	1.27 - 1.39	
Bulk density	No information available	
Water solubility	Miscible with water.	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	
Partition Coefficient (n-octanol/water)	No information available	

Explosive properties	Not applicable
Oxidizing properties	None known.

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	None
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

Reacts violently with oxidizers. Liberates poisonous sulfur dioxide gas on contact with acid.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Avoid heat, flames and other sources of ignition. Keep at temperatures between 5-30°C.

10.5 Incompatible materials

Strong oxidizing agents. Acids. Alkalis.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Product information This product may release ammonia or amines when heated or during pH adjustment. Ammonia is a severe eye, skin and respiratory irritant. Ammonia has a very strong odor and can be detected at levels as low as 5 ppm. Many amines are also eye, skin and respiratory irritants.

Bisulfites may cause skin sensitization in sulfite sensitive persons. Bisulfites may also cause respiratory sensitization in asthmatics and sulfite sensitive persons.

Inhalation Inhalation of vapors in high concentration may cause irritation of respiratory system.

Eye contact Causes serious eye irritation.

Skin contact Prolonged contact may cause redness and irritation.

Ingestion Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Ammonium hydrogensulfite	No data available	No data available	No data available
Sulphur Dioxide (Impurity)	No data available	No data available	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Ammonium hydrogensulfite	No data available	No data available	No data available	No data available
Sulphur Dioxide (Impurity)	No data available	A4 Not Classifiable as a Human Carcinogen	No data available	No data available

Delayed and immediate effects and chronic effects from short and long term exposure

Sensitization Repeated or prolonged contact may cause allergic reactions in very susceptible persons.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity	This product does not contain any known or suspected carcinogens.
Reproductive toxicity	This product does not contain any known or suspected reproductive hazards.
Developmental toxicity	Not known to cause birth defects or have a deleterious effect on a developing fetus.
Routes of Exposure	Eye contact. Inhalation.
Routes of entry	Eye contact. Inhalation.
Specific target organ toxicity - Single exposure	Not classified
Specific target organ toxicity - Repeated exposure	Not classified.
Aspiration hazard	Not applicable.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
This product is not considered toxic to algae.

Toxicity to fish
This product is not considered toxic to fish.

Toxicity to daphnia and other aquatic invertebrates
This product is not considered toxic to invertebrates.

Toxicology data for the components

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Ammonium hydrogensulfite	OECD 203 Fish LC50 > 464 mg/l - Duration h: 96 - Notes: By analogy to product with similar composition	Algae EC50 = 43.8 mg/l - Duration h: 72 - Notes: By analogy to product with similar composition.	Daphnia magna EC50 = 89 mg/l - Duration h: 48 - Notes: By analogy to product with similar composition
Sulphur Dioxide (Impurity)	No information available	No information available	No information available

12.2 Persistence and degradability

Not Applicable - Inorganic chemical.

12.3 Bioaccumulative potential

Not Applicable - Inorganic chemical.

12.4 Mobility

The product is miscible with water. May spread in water systems.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)

This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

The product component(s) are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method Disposal should be made in accordance with federal, state and local regulations.

Contaminated packaging Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT)	NA3082
UN No. (MT/ANTT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG/ANTAQ)	Not regulated
UN No. (ICAO/ANAC)	Not regulated
UN No. (DPC)	Not regulated

14.2. UN proper shipping name

Other regulated substances, liquid, n.o.s. (contains Ammonium hydrogensulfite)
(add RQ if shipped in containers >RQ for DOT only)

DOT reportable quantity Product (RQ): 862 gallons (Ammonium hydrogensulfite)
(add RQ if shipped in containers >RQ for DOT only)

14.3 Hazard class(es)

DOT Hazard class	9,
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated
DPC Hazard class	Not regulated

14.4 Packing group

DOT Packing group	PG III
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated
DPC Packing group	Not regulated

14.5 Environmental hazard

Marine pollutant No

14.6 Special precautions
Not applicable

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Complies
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH
All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Ammonium hydrogensulfite	N/A	N/A	5000 lb final RQ 2270 kg final RQ
Sulphur Dioxide (Impurity)	500 lb TPQ	N/A	N/A

California Proposition 65

WARNING

This product can expose you to chemicals including those listed below, which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Chemical Name	California Proposition 65

Sulphur Dioxide (Impurity) 7446-09-5	developmental toxicity

Canadian Classification

This Safety Data Sheet has been prepared in compliance with the Hazardous Products Regulations.

Brazil Regulation This SDS was prepared in accordance with Brazil law NBR 14725.

Federal Police Not determined

Army Not determined

ANVISA Not determined

16. Other Information

Supersedes date 20/Aug/2020

Revision date 13/Oct/2020

Version 11

This SDS has been revised in the following section(s) 15, 16 No changes with regard to classification have been made.

HMIS classification

Health	2
Flammability	1
Physical hazard	0
PPE	E

N/A - Not Applicable, N/D - Not Determined.

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SDS no. 143799
Version 2
Revision date 22/Jun/2020
Supersedes date 06/Oct/2015

Safety Data Sheet
SALT SATURATED MUD SYSTEM

1. Identification

1.1 Product identifier

Product name SALT SATURATED MUD SYSTEM

Product code 143799

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Water based system.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
200 - 125, 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-780-962-8221

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : +55 11 3197 5891

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards Not classified

Environmental hazards Not classified

Physical Hazards Not classified

2.2 Label elements

Signal word
None

Hazard Statements
This product is not classified as hazardous therefore no (H) hazard statements assigned.

Precautionary Statements
This product is not classified as hazardous therefore has no (P) precautionary statements assigned.

Unknown acute toxicity 0% of the mixture consists of ingredient(s) of unknown toxicity.

3. Composition/information on Ingredients

3.1 Substances

Not applicable

3.2 Mixtures

Chemical Name	CAS No	Weight-%
Glyoxal	107-22-2	<0.1

Comments
The product contains other ingredients which do not contribute to the overall classification.

Drilling fluid is a highly complex and variable blend of several proprietary products. Each drilling fluid is designed to meet the drilling requirements of a specific well. During the drilling process the composition and physical properties of the drilling fluid are constantly changing; therefore, a complete disclosure of a particular fluid's composition is impractical.

The exact percentage (concentration) of composition has been withheld as a trade secret.

4. First Aid Measures

4.1 First aid measures

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Get medical attention if symptoms occur.

Skin contact Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention immediately if symptoms occur.

Eye Contact Remove contact lenses, if worn. Promptly wash eyes with lots of water while lifting eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

General advice	The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.
Symptoms	
Inhalation	Please see Section 11. Toxicological Information for further information.
Ingestion	Please see Section 11. Toxicological Information for further information.
Skin contact	Please see Section 11. Toxicological Information for further information.
Eye contact	Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing media appropriate for surrounding material.

Extinguishing media which must not be used for safety reasons
None known.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
None known.

Hazardous combustion products
Carbon oxides (COx).

5.3 Advice for firefighters

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment identified in Section 8. Extinguish all ignition sources. Avoid sparks, flames, heat and smoking. Evacuate and ventilate the area.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Dike far ahead of liquid spill for later disposal.

Methods for cleaning up
Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Do not breathe vapors or spray mist. Avoid spills and splashing during use.

Hygiene measures
Use good work and personal hygiene practices to avoid exposure. When using do not smoke, eat or drink. Wash hands and face before breaks and immediately after handling the product. Remove contaminated clothing.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Ensure adequate ventilation.

Storage precautions Keep containers tightly closed in a dry, cool and well-ventilated place. Follow safe warehousing practices regarding palletizing, banding, shrink-wrapping and/or stacking. Avoid contact with:. Strong oxidizing agents.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Component Information

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits - TWAs (CMPs)	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits - TWAs (LMPE-PPTs)
Glyoxal	0.1 mg/m³	Not determined	0.1 mg/m³ TWA	Not determined	0.1 mg/m³ TWA VLE-PPT (inhalable fraction and vapor)

IDLH (Immediately Dangerous to Life or Health)
This product contains substance(s) classified as Immediately Dangerous to Life or Health (IDLH) by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Glyoxal 107-22-2	-

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation.

Personal protective equipment

Eye protection	Safety glasses with side-shields.
Hand protection	Wear chemical resistant gloves such as nitrile or neoprene.
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne mist/aerosol of this product, use an organic vapor cartridge with a P-95 pre-filter attached. In work environments containing oil mist/aerosol, use an organic vapor cartridge with a P-95 pre-filter attached.If exposed to vapors from this product, use a NIOSH/MSHA-approved respirator with an organic vapor cartridge.
Skin and body protection	Wear suitable protective clothing, Provide eyewash station.
Hygiene Measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Liquid
Appearance	Viscous
Color	Light brown
Odor	Hydrocarbon odor.
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH	6.0 - 9.0	
pH @ dilution	No information available	
Melting point	No information available	
Boiling point	100 - 121 °C / 212 - 250 °F	
Flash point	> 93.3 °C / > 200 °F	
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	1.2 - 1.8	@ 20 °C
Bulk density	No information available	
Water solubility	Miscible with water.	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	
Partition Coefficient (n-octanol/water)	No information available	
Explosive properties	No information available	

Oxidizing properties No information available

9.2 Other information

Pour point No information available
Molecular weight No information available
VOC content(%) No information available
Density No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

No specific reactivity hazards associated with this product.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

None known.

10.5 Incompatible materials

Strong oxidizing agents.

10.6 Hazardous decomposition products

Carbon oxides (COx).

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation Inhalation of vapors in high concentration may cause irritation of respiratory system.

Eye contact May cause slight irritation.

Skin contact Prolonged contact may cause redness and irritation.

Ingestion Ingestion may cause stomach discomfort.

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Glyoxal	200 mg/kg (rat)	12700 mg/kg (Rabbit)	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Glyoxal	No data available	A4 Not Classifiable as a	No data available	No data available

		Human Carcinogen		

Delayed and immediate effects and chronic effects from short and long term exposure

Sensitization This product does not contain any components suspected to be sensitizing >0.1%.

Mutagenic effects Contains an known or suspected mutagen.

Carcinogenicity Crystalline silica dust is listed by IARC in Group 1 as known to cause lung cancer in humans, if inhaled.

Reproductive toxicity No evidence of toxicity to reproduction.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of Exposure Eye contact. Skin contact. Inhalation.

Routes of entry Inhalation.

Specific target organ toxicity - Single exposure Not classified

Specific target organ toxicity - Repeated exposure Not classified.

Aspiration hazard Not applicable.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
See component information below.

Toxicity to fish
See component information below.

Toxicity to daphnia and other aquatic invertebrates
See component information below.

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Glyoxal	> 1000 mg/l LC50 Scophthalmus Maximus 96h SLB data	207 mg/l EC50 Skeletonema 72h SLB data	259 mg/L LC50 Acartia 48h SLB Data

12.2 Persistence and degradability

No product level data available.

12.3 Bioaccumulative potential

No data available.

12.4 Mobility

No information available.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method	Disposal should be made in accordance with federal, state and local regulations.
Contaminated packaging	Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT)	Not regulated
UN No. (MT/ANTT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG/ANTAQ)	Not regulated
UN No. (ICAO/ANAC)	Not regulated
UN No. (DPC)	Not regulated

14.2. UN proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class	Not regulated
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated
DPC Hazard class	Not regulated

14.4 Packing group

DOT Packing group	Not regulated
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated
DPC Packing group	Not regulated

14.5 Environmental hazard

No

14.6 Special precautions

Not applicable

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Complies
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH
All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

IMPORTS, Canada
No import volume restrictions.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Glyoxal	N/A	N/A	N/A

California Proposition 65

This product does not contain chemical[s] which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Canadian Classification

This Safety Data Sheet has been prepared in compliance with the Hazardous Products Regulations.

16. Other Information

Supersedes date	06/Oct/2015
Revision date	22/Jun/2020
Version	2
This SDS has been revised in the following section(s)	1, 2, 3, 6, 7, 9, 11, 12, 15, 16 There have been changes with regard to classification.
HMIS classification	

Health	1
Flammability	1
Physical hazard	0
PPE	B

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Safety Data Sheet
SAPP

1. Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Product name SAPP
Product code PID1436

Molecular weight 222.15

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use SAPP dispersant. Thinner.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I Drilling Fluids UK Limited
Westhill Business Park
Westhill AB32 6JL Aberdeenshire
Scotland United Kingdom

+47 51577424

SDS@slb.com

1.4 Emergency Telephone Number

Emergency telephone - (24 Hour) Australia +61 2801 44558, Asia Pacific +65 3158 1074, China +86 10 5100 3039, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, New Zealand +64 9929 1483, USA 001 281 561 1600

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS Classification

Health hazards

Serious eye damage/eye irritation	Category 2

Environmental hazards Not classified

Physical Hazards Not classified

2.2 Label elements

Signal word
WARNING

Hazard Statements
H319 - Causes serious eye irritation

Precautionary statements
P264 - Wash face, hands and any exposed skin thoroughly after handling
P280 - Wear protective gloves/protective clothing/eye protection/face protection
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P337 + P313 - If eye irritation persists: Get medical advice/attention
P501 - Dispose of contents/container in accordance with local, regional, national, and international regulations as applicable

-

Contains
Disodium dihydrogen diphosphate

2.3 Other hazards

Not classified as PBT/vPvB by current EU criteria

Australian statement of hazardous/dangerous nature
Classified as Hazardous according to the criteria of NOHSC.
HAZARDOUS SUBSTANCE. NON-DANGEROUS GOODS.

3. Composition/information on Ingredients

3.1 Substances

Chemical Name	EC No	CAS No	Weight-%
Disodium dihydrogen diphosphate	231-835-0	7758-16-9	60-100

3.2 Mixtures

Not applicable

4. First Aid Measures

4.1 First aid measures

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion	Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Seek medical attention if irritation occurs.
Skin contact	Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention immediately if symptoms occur.
Eye Contact	Remove contact lenses, if worn. Promptly wash eyes with lots of water while lifting eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

General advice	The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.
Symptoms	
Inhalation	Please see Section 11. Toxicological Information for further information.
Ingestion	Please see Section 11. Toxicological Information for further information.
Skin contact	Please see Section 11. Toxicological Information for further information.
Eye contact	Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician	Treat symptomatically.

5. Firefighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing media appropriate for surrounding material.

Extinguishing media which must not be used for safety reasons
None known.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
None known.

Hazardous combustion products
Fire or high temperatures create: Oxides of phosphorus.

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. See also section 8.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Cover powder spill with plastic sheet or tarp to minimise spreading. Prevent further leakage or spillage if safe to do so.

Methods for cleaning up
Sweep up and shovel into suitable containers for disposal. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Avoid dust formation.

Hygiene Measures
Use good work and personal hygiene practices to avoid exposure When using do not smoke, eat or drink. Wash hands and face before breaks and immediately after handling the product Remove contaminated clothing

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions	Ensure adequate ventilation. Keep airborne concentrations below exposure limits.
Storage precautions	Keep containers tightly closed in a dry, cool and well-ventilated place Avoid excessive heat for prolonged periods of time. Protect from moisture Avoid contact with: Strong alkalies.
Storage class	Chemical storage.
Packaging materials	Use specially constructed containers only

8. Exposure Controls/Personal Protection

8.1 Control parameters

Exposure Limits

NUI = Nuisance dust, TWA 4mg/m³ Respirable Dust, 10mg/m³ Total Dust.
No biological limit allocated

Component Information

Chemical Name	Arabic	Australia	Egypt
Disodium dihydrogen diphosphate	Not determined	Not determined	Not determined
Chemical Name	**India**	**Indonesian**	**Japan**
Disodium dihydrogen diphosphate	Not determined	Not determined	Not determined
Chemical Name	**Kazakhstan**	**Kuwait**	**New Zealand**
Disodium dihydrogen diphosphate	Not determined	Not determined	Not determined
Chemical Name	**Malaysia**	**Philippines**	**Russia**
Disodium dihydrogen diphosphate	Not determined	Not determined	Not determined
Chemical Name	**Thailand**	**Vietnam**	**Turkey**
Disodium dihydrogen diphosphate	Not determined	Not determined	Not determined

8.2 Exposure controls

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation

Personal protective equipment

Eye protection
Use eye protection according to EN 166, designed to protect against powders and dusts Tightly fitting safety goggles Safety glasses with side-shields

Hand protection
Wear gloves according to EN 374 to protect against skin effects from powders Repeated or prolonged contact Use protective gloves made of: Nitrile Neoprene PVC Frequent change is advisable

Respiratory protection
No personal respiratory protective equipment normally required In case of insufficient ventilation wear suitable respiratory equipment Half mask with a particle filter P2 (BS EN 143) At work in confined or poorly ventilated spaces, respiratory protection with air supply must be used.

Skin and body protection
Wear suitable protective clothing Eye wash and emergency shower must be available at the work place.

Hygiene Measures
Wash hands before eating, drinking or smoking Remove and wash contaminated clothing before re-use

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Solid
Appearance	Crystalline Powder
Odour	Odourless
Colour	White
Odour threshold	Not applicable

Property	Values	Remarks
pH	No information available	
pH @ dilution	4.0 - 5.0	@ 10 g/l
Melting / freezing point	No information available	
Boiling point/range	No information available	
Flash point	No information available	
Evaporation rate	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	Not applicable	
Lower flammability limit	Not applicable	
Vapour pressure	No information available	
Vapour density	No information available	
Specific gravity	1.8 - 1.9 sg	20 °C
Bulk density	1000-1200 kg/m³	
Relative density	No information available	
Water solubility	Soluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	
log Pow	No information available	

Explosive properties	Not applicable
Oxidising properties	None known

9.2 Other information

Pour point	No information available
Molecular weight	222.15
VOC content(%)	None
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

No specific reactivity hazards associated with this product.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerisation
Hazardous polymerisation does not occur.

10.4 Conditions to avoid

Protect from moisture. Avoid excessive heat for prolonged periods of time.

10.5 Incompatible materials

Strong alkalies.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation Inhalation of dust may cause shortness of breath, tightness of the chest, a sore throat and cough.

Eye contact Causes serious eye irritation.

Skin contact Prolonged skin contact may cause skin irritation.

Ingestion Ingestion may cause stomach discomfort.

Unknown acute toxicity Not applicable.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Disodium dihydrogen diphosphate	= 1800 mg/kg (Rat)	No data available	> 0.58 mg/L (Rat) 4 h

Sensitisation This product does not contain any components suspected to be sensitizing.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity This product does not contain any known or suspected carcinogens.

Reproductive toxicity This product does not contain any known or suspected reproductive hazards.

Routes of Exposure Eye contact.

Routes of entry	No route of entry noted.
Specific target organ toxicity - Single exposure	Not classified
Specific target organ toxicity - Repeated exposure	Not classified.
Aspiration hazard	Not applicable.
Other information	Key literature references and sources for data. See Section 16 for more information.

12. Ecological Information

12.1 Toxicity

The product component(s) are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment. Listed on PLONOR list of OSPAR

Toxicity to algae
This product is not considered toxic to algae.

Toxicity to fish
This product is not considered toxic to fish.

Toxicity to daphnia and other aquatic invertebrates
This product is not considered toxic to invertebrates.

Toxicology data for the components

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Disodium dihydrogen diphosphate	No information available	No information available	No information available

12.2 Persistence and degradability

Not Applicable - Inorganic chemical.

12.3 Bioaccumulative potential

Not Applicable - Inorganic chemical.

12.4 Mobility

Mobility
Soluble in water.

Mobility in soil
No information available.

12.5 Results of PBT and vPvB assessment

Not classified as PBT/vPvB by current EU criteria.

12.6 Other adverse effects.

None known.

12.7 Other information
Key literature references and sources for data. See Section 16 for more information.

13. Disposal considerations

13.1 Waste treatment methods

Waste from residues/unused products	Dispose of in accordance with local regulations.
Contaminated packaging	Empty containers should be transported/delivered using a registered waste carrier for local recycling or waste disposal.

14. Transport information

14.1. UN number
Not regulated

14.2. UN proper shipping name
The product is not covered by international regulation on the transport of dangerous goods

14.3. Hazard class(es)

ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG Hazard class	Not regulated
ICAO Hazard class/division	Not regulated

14.4 Packing group

ADR/RID/ADN/ADG Packing Group	Not regulated
IMDG Packing group	Not regulated
ICAO Packing group	Not regulated

14.5 Environmental hazard
No

14.6 Special precautions
Not applicable

14.7 Transport in bulk according to Annex I/II of MARPOL 73/78 and the IBC Code
Please contact SDS@slb.com for info regarding transport in Bulk.

15. Regulatory Information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

This safety data sheet complies with the requirements of:
The Globally Harmonised System of Classification and Labelling of Chemicals (GHS)

Australian Standard for the Uniform Scheduling of Drugs and Poisons
No poisons schedule number allocated

New Zealand Hazard Classification	Classified
HSNO approval no.	HSR002503
Group number	6.4A

National Code of Practice for the Preparation of Material Safety Data Sheets 2nd Edition [NOHSC: 2011 (2003)].

National Occupational Health and Safety Commission's Approved Criteria for Classifying Hazardous Substances [NOHSC:1008 (2004) 3rd Edition].

National Occupational Health and Safety Commission's Exposure Standards for Atmospheric Contaminants in the occupational Environment [NOHSC:1003 (1995)].

Safe Work Australia.

Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP).

Not classified as dangerous goods in accordance with the Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG)

Occupational Safety and Health (Classification, Labelling and Safety Data Sheet of Hazardous Chemicals) Regulations 2013 [P.U.(A) 310/2013] (CLASS Regulations)
The Industry Code of Practice on Chemical Classification and Hazard Communication 2014 [P.U. (B) 128/2014] (ICOP)

International inventories

USA, Toxic Substances Control Act inventory (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies
Inventory - Japan - Existing and New Chemicals list	Complies
China (IECSC)	Complies

Australia (AICS)	Complies
Korea (KECL)	Complies
Inventory - New Zealand - Inventory of Chemicals (NZIoC)	Complies

16. Other Information

Prepared by	Global Regulatory Compliance - Chemicals (GRC - Chemicals) , Anne Karin (Anka) Fosse
Supercedes Date:	11/Jun/2014
Revision date	06/Jul/2017
Version	2
This SDS has been revised in the following section(s)	All sections Product Code change No changes with regard to classification have been made.

Key literature references and sources for data
www.ChemADVISOR.com
Supplier
National Chemical Inventories
National regulatory information
National occupational exposure limits

Disclaimer
The information contained herein is considered in good faith as reliable of the date issued and is based upon on measurements, tests or data derived from supplier's own study or furnished by others. In providing this SDS information, Supplier makes no express or implied warranties as to the information or product; merchantability or fitness of purpose; any express or implied warranty; or non-infringement of intellectual property rights; and supplier assumes no responsibility for any direct, special or consequential damages, results obtained, or the activities of others. To the maximum extent permitted by law, supplier's warranty obligations and buyer's sole remedies are as stated in separate agreement between the parties.
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SDS no. 141507
Version 1
Revision date 06/Sep/2018
Supersedes date None

Safety Data Sheet
SEAL-N-PEEL* (CaBr2)

1. Identification of the Substance/Preparation and of the Company/Undertaking

1.1 Product identifier

Product name SEAL-N-PEEL* (CaBr2)

Product code 141507

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Drilling fluid system.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

Schlumberger Canada, Ltd.
200, 125 - 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-613-992-4624

E-mail address MISDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : 0800-720-8000/0800-777-2323 (WGRA)

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Serious eye damage/eye irritation	Category 1
Carcinogenicity	Category 1A

Environmental hazards Not classified

Physical Hazards Not classified

2.2 Label elements

Signal word
DANGER

Hazard Statements
H318 - Causes serious eye damage
H350 - May cause cancer

Precautionary Statements
P201 - Obtain special instructions before use
P280 - Wear protective gloves/protective clothing/eye protection/face protection
P281 - Use personal protective equipment as required
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P308 + P313 - IF exposed or concerned: Get medical advice/attention
P310 - Immediately call a POISON CENTER or doctor/physician

P202 - Do not handle until all safety precautions have been read and understood

Unknown acute toxicity Not applicable.

3. Composition/information on Ingredients

3.1 Substances

Not applicable

3.2 Mixtures

Chemical Name	CAS No	Weight-%
Calcium bromide	7789-41-5	10 - 30
Castor oil, sulfated, sodium salt	68187-76-8	1 - 5

Comments
The exact percentage (concentration) of composition has been withheld as a trade secret

4. First Aid Measures

4.1 First aid measures

Inhalation	If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.
Ingestion	Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Seek medical attention if irritation occurs.
Skin contact	Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention immediately if symptoms occur.
Eye Contact	Remove contact lenses, if worn. Promptly wash eyes with lots of water while lifting eye lids. Continue to rinse for at least 15 minutes. Seek medical attention.

4.2. Most important symptoms and effects, both acute and delayed

General advice	The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.
Symptoms	
Inhalation	Please see Section 11. Toxicological Information for further information.
Ingestion	Please see Section 11. Toxicological Information for further information.
Skin contact	Please see Section 11. Toxicological Information for further information.
Eye contact	Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician	Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing media appropriate for surrounding material.

Extinguishing media which must not be used for safety reasons
None known.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
None known.

Hazardous combustion products
Thermal decomposition can lead to release of irritating gases and vapors.

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. See also section 8. If spilled, take caution, as material can cause surfaces to become very slippery.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Dike far ahead of liquid spill for later disposal.

Methods for cleaning up
Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Do not breathe vapors or spray mist. Avoid spills and splashing during use. If spilled, take caution, as material can cause surfaces to become very slippery.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Ensure adequate ventilation.

Storage precautions Keep containers tightly closed in a dry, cool and well-ventilated place. Avoid excessive heat for prolonged periods of time. Avoid contact with:. Strong oxidizing agents. Strong acids.

Packaging materials Use specially constructed containers only.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Exposure limits **Because this product is a liquid, the dust-related Workplace Exposure Limits for the components do not apply.**

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits - TWAs (CMPs)	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits - TWAs (LMPE-PPTs)
Calcium bromide	Not determined	Not determined	Not determined	Not determined	Not determined
Castor oil, sulfated, sodium salt	Not determined	Not determined	Not determined	Not determined	Not determined

IDLH (Immediately Dangerous to Life or Health)
This product contains substance(s) classified as Immediately Dangerous to Life or Health (IDLH) by the US National Institute for

Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Calcium bromide 7789-41-5	-
Castor oil, sulfated, sodium salt 68187-76-8	-

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation. Mechanical ventilation or local exhaust ventilation is required.

Personal protective equipment

Eye protection	Tightly fitting safety goggles.
Hand protection	Use protective gloves made of: Nitrile Neoprene PVC Be aware that liquid may penetrate the gloves. Frequent change is advisable.
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne mist/aerosol of this product, use an organic vapor cartridge with a P-95 pre-filter attached. In work environments containing oil mist/aerosol, use an organic vapor cartridge with a P-95 pre-filter attached.If exposed to vapors from this product, use a NIOSH/MSHA-approved respirator with an organic vapor cartridge.
Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Liquid
Appearance	Viscous
Color	Light brown
Odor	Hydrocarbon-like
Odor threshold	Not applicable

Property	Values	Remarks
pH	6-9	
pH @ dilution	6-10	@ 10%
Melting / freezing point	No information available	
Boiling point/range	100 °C / 212 °F	
Flash point	> 93 °C / > 200 °F	PMCC
Evaporation rate (BuAc =1)	No information available	

Flammability (solid, gas)	Not applicable
Flammability Limit in Air	
Upper flammability limit	No information available
Lower flammability limit	No information available
Vapor pressure	No information available
Vapor density	No information available
Specific gravity	No information available
Bulk density	No information available
Water solubility	Miscible with water.
Solubility in other solvents	No information available
Autoignition temperature	No information available
Decomposition temperature	No information available
Kinematic viscosity	15-50 cPs
Dynamic viscosity	No information available
log Pow	No information available
Explosive properties	No information available
Oxidizing properties	No information available

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	No information available
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

No specific reactivity hazards associated with this product.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Avoid excessive heat for prolonged periods of time.

10.5 Incompatible materials

Strong oxidizing agents. Strong acids.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation	Inhalation of vapors in high concentration may cause irritation of respiratory system. Repeated or prolonged inhalation of crystalline silica dust can cause delayed lung injury,

and other diseases, including silicosis and lung cancer.

Eye contact Causes serious eye damage.

Skin contact Prolonged skin contact may cause skin irritation.

Ingestion Ingestion may cause stomach discomfort.

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Calcium bromide	= 4100 mg/kg (Rat)	No data available	No data available
Castor oil, sulfated, sodium salt	OECD 423 Oral Rat LD50> 2000 mg/kg - Duration: 1h - Lamberti internal data	OECD 402 Skin Rat LD50> 2000 mg/kg - Duration: 24h - By analogy to product with similar composition	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Calcium bromide	No data available	No data available	No data available	No data available
Castor oil, sulfated, sodium salt	No data available	No data available	No data available	No data available

Sensitization This product does not contain any components suspected to be sensitizing.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity Crystalline silica dust is listed by IARC in Group 1 as known to cause lung cancer in humans, if inhaled.

Reproductive toxicity This product does not contain any known or suspected reproductive hazards.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of exposure Eye contact.

Routes of entry No route of entry noted.

Specific target organ toxicity - Single exposure Not classified

Specific target organ toxicity - Repeated exposure Not classified.

Aspiration hazard Not applicable.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
This product is not considered toxic to algae.

Toxicity to fish
This product is not considered toxic to fish.

Toxicity to daphnia and other aquatic invertebrates
This product is not considered toxic to invertebrates.

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other

			aquatic invertebrates
Calcium bromide	No information available	No information available	No information available
Castor oil, sulfated, sodium salt	No information available	No information available	No information available

12.2 Persistence and degradability

No product level data available.

12.3 Bioaccumulative potential

No product level data available.

12.4 Mobility

The product is miscible with water. May spread in water systems.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method Disposal should be made in accordance with federal, state and local regulations.

Contaminated packaging Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT) Not regulated
UN No. (MT/ANTT) Not regulated
UN No. (TDG) Not regulated
UN/ID No. (ADR/RID/ADN/ADG) Not regulated
UN No. (IMDG/ANTAQ) Not regulated
UN No. (ICAO/ANAC) Not regulated
UN No. (DPC) Not regulated

14.2. UN proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class Not regulated
ANTT Hazard class Not regulated
TDG Hazard class Not regulated
ADR/RID/ADN/ADG Hazard class Not regulated
IMDG/ANTAQ Hazard class Not regulated
ICAO/ANAC Hazard class/division Not regulated
DPC Hazard class Not regulated

14.4 Packing group

DOT Packing group	Not regulated
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated
DPC Packing group	Not regulated

14.5 Environmental hazard
No

14.6 Special precautions
Not applicable

14.7 Transport in bulk according to Annex I/II of MARPOL 73/78 and the IBC Code
Please contact MISDS@slb.com for info regarding transport in Bulk.

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Does not comply
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH
All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Calcium bromide	N/A	N/A	N/A
Castor oil, sulfated, sodium salt	N/A	N/A	N/A

California Proposition 65

WARNING

This product can expose you to chemicals including those listed below, which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Chemical Name	California Proposition 65
Crystalline silica (impurity) 14808-60-7	Carcinogen

Canadian Classification

This Safety Data Sheet has been prepared in compliance with the Hazardous Products Regulations.

16. Other Information

Revision date 06/Sep/2018

Version 1

This SDS has been revised in the following section(s) This SDS have been made in a new database and therefore a new layout. No changes with regard to classification have been made. Updated according to GHS/CLP.

HMIS classification

Health	3*
Flammability	1
Physical hazard	0
PPE	X

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SDS no. 13246
Version 3
Revision date 18/Sep/2018
Supersedes date 20/May/2015

Safety Data Sheet
SEAL-N-PEEL* (KCl-NaCl-NaBr)

1. Identification of the Substance/Preparation and of the Company/Undertaking

1.1 Product identifier

Product name SEAL-N-PEEL* (KCl-NaCl-NaBr)

Product code 13246

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Drilling fluid system.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

Schlumberger Serviços de Petróleo LTDA
Rua Internacional 500Cavaleiro – Macaé, RJ. CEP: 27.930-075
Telefone: +55 22 3311-7051

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : 0800-720-8000/0800-777-2323 (WGRA)

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Carcinogenicity	Category 1A

Environmental hazards Not classified

Physical Hazards Not classified

2.2 Label elements

Precautionary Statements
P201 - Obtain special instructions before use
P281 - Use personal protective equipment as required
P308 + P313 - IF exposed or concerned: Get medical advice/attention

P201 - Obtain special instructions before use
P202 - Do not handle until all safety precautions have been read and understood
P281 - Use personal protective equipment as required
P308 + P313 - IF exposed or concerned: Get medical advice/attention
P405 - Store locked up
P501 - Dispose of contents/ container to an approved waste disposal plant

Unknown acute toxicity 1.3% of the mixture consists of ingredient(s) of unknown toxicity.

3. Composition/information on Ingredients

3.1 Substances

Not applicable

3.2 Mixtures

Chemical Name	CAS No	Weight-%
Crystalline silica (impurity)	14808-60-7	0.1 - 1

Comments
The product contains other ingredients which do not contribute to the overall classification. Drilling fluid is a highly complex and variable blend of several proprietary products. Each drilling fluid is designed to meet the drilling requirements of a specific well. During the drilling process the composition and physical properties of the drilling fluid are constantly changing; therefore, a complete disclosure of a particular fluid's composition is impractical.

4. First Aid Measures

4.1 First aid measures

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Get medical attention if symptoms occur.

Skin contact Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention immediately if symptoms occur.

Eye Contact Remove contact lenses, if worn. Promptly wash eyes with lots of water while lifting eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

General advice	The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.
Symptoms	
Inhalation	Please see Section 11. Toxicological Information for further information.
Ingestion	Please see Section 11. Toxicological Information for further information.
Skin contact	Please see Section 11. Toxicological Information for further information.
Eye contact	Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing media appropriate for surrounding material.

Extinguishing media which must not be used for safety reasons
None known.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
None known.

Hazardous combustion products
Carbon oxides (COx).

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment identified in Section 8. Extinguish all ignition sources. Avoid sparks, flames, heat and smoking. Evacuate and ventilate the area. Prevent further leakage or spillage if safe to do so.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Dike far ahead of liquid spill for later disposal.

Methods for cleaning up
Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Do not breathe vapors or spray mist. Avoid spills and splashing during use.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Ensure adequate ventilation. Keep airborne concentrations below exposure limits.

Storage precautions Keep containers tightly closed in a dry, cool and well-ventilated place. Follow safe warehousing practices regarding palletizing, banding, shrink-wrapping and/or stacking.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Component Information

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits - TWAs (CMPs)	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits - TWAs (LMPE-PPTs)
Crystalline silica (impurity)	0.025 mg/m³	50 µg/m³ TWA respirable fraction	0.05 mg/m³ TWA	Not determined	0.1 mg/m³ TWA VLE-PPT (respirable fraction)

Crystalline silica (impurity)
OSHA - Final PELs - Table Z-3 Mineral Dusts
(250)/(%SiO2 + 5) mppcf TWA, respirable fraction; (10)/(%SiO2 + 2) mg/m³ TWA, respirable fraction

IDLH (Immediately Dangerous to Life or Health)
This product contains substance(s) classified as Immediately Dangerous to Life or Health (IDLH) by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Crystalline silica (impurity) 14808-60-7	50 mg/m³ IDLH (respirable dust)

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation.

Personal protective equipment

Eye protection	Tightly fitting safety goggles.
Hand protection	Wear chemical resistant gloves such as nitrile or neoprene.
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne mist/aerosol of this product, use an organic vapor cartridge with a P-95 pre-filter attached. In work environments containing oil mist/aerosol, use an organic vapor cartridge with a P-95 pre-filter attached.If exposed to vapors from this product, use a NIOSH/MSHA-approved respirator with an organic vapor cartridge.
Skin and body protection	Wear suitable protective clothing, Provide eyewash station.
Hygiene Measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	No information available
Appearance	Viscous
Color	Light brown
Odor	Hydrocarbon odor.
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH	6.0 - 9.0	
pH @ dilution	No information available	
Melting / freezing point	No information available	
Boiling point/range	100 - 121 °C / 212 - 250 °F	
Flash point	> 93.3 °C / > 200 °F	
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	1.02 - 1.8	@ 20 °C
Bulk density	No information available	
Water solubility	Miscible with water.	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	
log Pow	No information available	
Explosive properties	No information available	
Oxidizing properties	No information available	

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	No information available
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

No specific reactivity hazards associated with this product.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

None known.

10.5 Incompatible materials

Strong oxidizing agents.

10.6 Hazardous decomposition products

Carbon oxides (COx).

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation	Inhalation of vapors in high concentration may cause irritation of respiratory system.
Eye contact	May cause slight irritation.
Skin contact	Prolonged contact may cause redness and irritation.
Ingestion	Ingestion may cause stomach discomfort.

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Crystalline silica (impurity)	= 500 mg/kg (Rat)	No data available	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Crystalline silica (impurity)	Group 1; Monograph 100C [2012] Monograph 100C [2012] (listed under Crystalline silica inhaled in the form of quartz or cristobalite from occupational sources);	A2 Suspected Human Carcinogen	Present	Known Human Carcinogen

	Monograph 68 [1997] Group 1; Monograph 68 [1997]			

Sensitization This product does not contain any components suspected to be sensitizing.

Mutagenic effects No evidence of mutagenic properties.

Carcinogenicity Crystalline silica dust is listed by IARC in Group 1 as known to cause lung cancer in humans, if inhaled.

Reproductive toxicity No evidence of toxicity to reproduction.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of exposure Eye contact. Skin contact. Inhalation.

Routes of entry Inhalation.

Specific target organ toxicity - Single exposure Not classified

Specific target organ toxicity - Repeated exposure Not classified.

Target organ effects Respiratory system.

Aspiration hazard Not applicable.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
See component information below.

Toxicity to fish
See component information below.

Toxicity to daphnia and other aquatic invertebrates
See component information below.

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Crystalline silica (impurity)	LC50 Danio rerio (zebra fish) : > 10000 mg/l 96h	EC50: > 1000 mg/l 72h	LC50 Daphnia manga (Water flea): > 10000 mg/l 24h

12.2 Persistence and degradability

No product level data available.

12.3 Bioaccumulative potential

No data available.

12.4 Mobility

No information available.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method	Disposal should be made in accordance with federal, state and local regulations.
Contaminated packaging	Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT)	Not regulated
UN No. (MT/ANTT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG/ANTAQ)	Not regulated
UN No. (ICAO/ANAC)	Not regulated
UN No. (DPC)	Not regulated

14.2. UN proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class	Not regulated
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated
DPC Hazard class	Not regulated

14.4 Packing group

DOT Packing group	Not regulated
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated
DPC Packing group	Not regulated

14.5 Environmental hazard

No

14.6 Special precautions

Not applicable

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Does not comply
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH
All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

IMPORTS, Canada
No import volume restrictions.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Crystalline silica (impurity)	N/A	N/A	N/A

California Proposition 65

WARNING

This product can expose you to chemicals including those listed below, which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Chemical Name	California Proposition 65
Crystalline silica (impurity) 14808-60-7	Carcinogen

Canadian Classification

This Safety Data Sheet has been prepared in compliance with the Hazardous Products Regulations.

Brazilian Regulations
Brazil Regulation This SDS was prepared in accordance with Brazil law NBR 14725.

Federal Police	Not determined
Army	Not determined
ANVISA	Not Listed
MTE (NR 15)	No information available

16. Other Information

Supersedes date	20/May/2015
Revision date	18/Sep/2018
Version	3
This SDS has been revised in the following section(s)	1, 15, 16
HMIS classification	
Health	1*
Flammability	1
Physical hazard	0

Disclaimer
The information contained herein is considered in good faith as reliable of the date issued and is based upon on measurements, tests or data derived from supplier's own study or furnished by others. In providing this SDS information, Supplier makes no express or implied warranties as to the information or product; merchantability or fitness of purpose; any express or implied warranty; or non-infringement of intellectual property rights; and supplier assumes no responsibility for any direct, special or consequential damages, results obtained, or the activities of others. To the maximum extent permitted by law, supplier's warranty obligations and buyer's sole remedies are as stated in separate agreement between the parties.
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Safety Data Sheet
SODA ASH

1. Identification

1.1 Product identifier

Product name SODA ASH

Product code PID1477

Synonyms SODIUM CARBONATE

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use pH modifier.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
200 - 125, 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-780-962-8221

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : +55 11 3197 5891

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Serious eye damage/eye irritation	Category 2

Environmental hazards Not classified

Physical Hazards Not classified

2.2 Label elements

Signal word
WARNING

Hazard Statements
H319 - Causes serious eye irritation

Precautionary Statements
P264 - Wash face, hands and any exposed skin thoroughly after handling
P280 - Wear protective gloves, protective clothing, eye protection
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P337 + P313 - If eye irritation persists: Get medical advice/attention
P501 - Dispose of contents/container in accordance with local, regional, national, and international regulations as applicable

Unknown acute toxicity Not applicable.

3. Composition/information on Ingredients

3.1 Substances

Chemical Name	CAS No	Weight-%
Sodium carbonate	497-19-8	60-100

3.2 Mixtures

Not applicable

Comments
No Comments.

4. First Aid Measures

4.1 First aid measures

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth

to an unconscious person. Seek medical attention if irritation occurs.

Skin contact Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention if irritation persists.

Eye Contact Promptly wash eyes with lots of water while lifting eye lids. Remove contact lenses, if worn. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

General advice The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Symptoms

Inhalation Please see Section 11. Toxicological Information for further information.

Ingestion Please see Section 11. Toxicological Information for further information.

Skin contact Please see Section 11. Toxicological Information for further information.

Eye contact Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Water Fog, Alcohol Foam, CO_2, Dry Chemical.

Extinguishing media which must not be used for safety reasons
None known.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
None known.

Hazardous combustion products
Carbon oxides (COx), Sodium oxides.

5.3 Advice for firefighters

Special protective equipment and precautions for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. See also section 8.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Cover powder spill with plastic sheet or tarp to minimize spreading and keep powder dry.

Methods for cleaning up
Avoid dust formation. Sweep up and shovel into suitable containers for disposal. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Avoid dust formation.

Hygiene measures
Use good work and personal hygiene practices to avoid exposure. When using do not smoke, eat or drink. Wash hands before eating, drinking or smoking. Remove contaminated clothing.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Ensure adequate ventilation. Keep airborne concentrations below exposure limits.

Storage precautions Keep containers tightly closed in a dry, cool and well-ventilated place. Protect from moisture. Avoid contact with:. Metals. Strong oxidizing agents. Strong acids.

Packaging materials Use specially constructed containers only.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Exposure limits **Control as an ACGIH particulate not otherwise specified (PNOS): 10 mg/m³ (Inhalable); 3 mg/m³ (Respirable) and an OSHA particulate not otherwise regulated (PNOR): 15 mg/m³ (Total); 5 mg/m³ (Respirable).**

Component Information

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits - TWAs (CMPs)	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits - TWAs (LMPE-PPTs)
Sodium carbonate	Not determined	Not determined	Not determined	Not determined	Not determined

IDLH (Immediately Dangerous to Life or Health)
Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Sodium carbonate 497-19-8	Not detemined

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation. Mechanical ventilation or local exhaust ventilation is required. Provide appropriate exhaust ventilation at places where dust is formed.

Personal protective equipment

Eye protection	Tightly fitting safety goggles.
Hand protection	Wear chemical resistant gloves such as nitrile or neoprene. Frequent change is advisable
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne particles of this product use at least a NIOSH-approved N95 half-mask disposable or re-useable particulate respirator. In work environments containing oil mist/aerosol use at least a NIOSH-approved P95 half-mask disposable or re-useable particulate respirator.
Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Solid
Appearance	Powder Dust
Color	White
Odor	Odorless
Odor threshold	Not applicable

Property	Values	Remarks
pH	No information available	
pH @ dilution	> 12	@ 10 g/l
Melting point	851 °C / 1564 °F	
Boiling point	No information available	
Flash point	Non-flammable	
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	No information available	
Bulk density	No information available	
Water solubility	Soluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	> 400°C (752°F)	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	
Partition Coefficient (n-octanol/water)	Not determined	
Explosive properties	Not applicable	
Oxidizing properties	None known.	

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	None
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

Reacts violently with acids.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Avoid dust formation. Protect from moisture.

10.5 Incompatible materials

Oxidizing agents.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation Inhalation of dust may cause shortness of breath, tightness of the chest, a sore throat and cough.

Eye contact Causes serious eye irritation.

Skin contact Prolonged contact may cause redness and irritation.

Ingestion Ingestion may cause stomach discomfort.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Sodium carbonate	4090 mg/kg (rat)	No data available	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Sodium carbonate	No data available	No data available	No data available	No data available

Delayed and immediate effects and chronic effects from short and long term exposure

Sensitization This product does not contain any components suspected to be sensitizing.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity This product does not contain any known or suspected carcinogens.

Reproductive toxicity This product does not contain any known or suspected reproductive hazards.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of Exposure Eye contact. Inhalation.

Routes of entry No route of entry noted.

Specific target organ toxicity - Single exposure Not classified

Specific target organ toxicity - Repeated exposure Not classified.

Aspiration hazard Not applicable.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
See component information below.

Toxicity to fish
See component information below.

Toxicity to daphnia and other aquatic invertebrates
See component information below.

Toxicology data for the components

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Sodium carbonate	310 - 1220 mg/L LC50 Pimephales promelas 96 h = 300 mg/L LC50 Lepomis macrochirus 96 h	= 242 mg/L EC50 Nitzschia 120 h	= 265 mg/L EC50 Daphnia magna 48 h

12.2 Persistence and degradability

Not Applicable - Inorganic chemical.

12.3 Bioaccumulative potential

Not Applicable - Inorganic chemical.

12.4 Mobility

Soluble in water.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method Disposal should be made in accordance with federal, state and local regulations.

Contaminated packaging Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT)	Not regulated
UN No. (MT/ANTT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG/ANTAQ)	Not regulated
UN No. (ICAO/ANAC)	Not regulated
UN No. (DPC)	Not regulated

14.2. UN proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class	Not regulated
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated
DPC Hazard class	Not regulated

14.4 Packing group

DOT Packing group	Not regulated
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated
DPC Packing group	Not regulated

14.5 Environmental hazard

Marine pollutant	No

14.6 Special precautions

Not applicable

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Complies
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH

All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that

it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Sodium carbonate	N/A	N/A	N/A

California Proposition 65

This product does not contain chemical[s] which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Brazil Regulation This SDS was prepared in accordance with Brazil law NBR 14725.

Federal Police Not determined

Army Not determined

ANVISA Not determined

16. Other Information

Supersedes date 03/Jul/2020

Revision date 13/Oct/2020

Version 3

This SDS has been revised in the following section(s) 3, 15, 16 No changes with regard to classification have been made.

HMIS classification

Health	1
Flammability	0
Physical hazard	0
PPE	E

Disclaimer
The information contained herein is considered in good faith as reliable of the date issued and is based upon on measurements, tests or data derived from supplier's own study or furnished by others. In providing this SDS information, Supplier makes no express or implied warranties as to the information or product; merchantability or fitness of purpose; any express or implied warranty; or non-infringement of intellectual property rights; and supplier assumes no responsibility for any direct, special or consequential damages, results obtained, or the activities of others. To the maximum extent permitted by law, supplier's warranty obligations and buyer's sole remedies are as stated in separate agreement between the parties.
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SDS no. PID1490
Version 1
Revision date 12/Jan/2018
Supersedes date None

Safety Data Sheet
SODIUM BROMIDE BRINE

1. Identification

1.1 Product identifier

Product name SODIUM BROMIDE BRINE

Product code PID1490

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Completion brine.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
200 - 125, 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-780-962-8221

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : 0800-720-8000/0800-777-2323 (WGRA)

2. Hazards identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards Not classified

Environmental hazards Not classified

Physical Hazards Not classified

2.2 Label elements

Signal word
None

Hazard statements
This product is not classified as hazardous therefore no (H) hazard statements assigned.

Precautionary statements
This product is not classified as hazardous therefore has no (P) precautionary statements assigned.

Hazards not otherwise classified
None known

Unknown acute toxicity Not applicable.

3. Composition/information on Ingredients

3.1 Substances

Not applicable

3.2 Mixtures

Chemical Name	CAS No	Weight-%
Sodium bromide	7647-15-6	30 - 60

Comments
The product contains other ingredients which do not contribute to the overall classification.

4. First aid measures

4.1 First aid measures

Inhalation Keep at rest. Move the exposed person to fresh air at once. If breathing is difficult, (trained personnel should) give oxygen. Get medical attention if any discomfort continues.

Ingestion Immediate medical attention is required. Do not induce vomiting without medical advice. Rinse mouth. Never give anything by mouth to an unconscious person. Call a physician or poison control center immediately.

Skin contact Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get immediate medical attention.

Eye Contact Rinse immediately with plenty of water, also under the eyelids. Remove contact lenses, if worn. Continue to rinse for at least 15 minutes. Get immediate medical attention.

4.2. Most important symptoms and effects, both acute and delayed

General advice Seek medical attention for all burns, regardless how minor they may seem. The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as

soon as possible.

Symptoms

Inhalation Please see Section 11. Toxicological Information for further information.

Ingestion Please see Section 11. Toxicological Information for further information.

Skin contact Please see Section 11. Toxicological Information for further information.

Eye contact Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician Treat symptomatically

5. Fire-fighting measures

5.1 Extinguishing media

Suitable extinguishing media
Extinguishing media - large fires, Water spray, fog or alcohol-resistant foam, Extinguishing media - small fires, Water spray, Carbon dioxide (CO_2), Dry powder.

Extinguishing media which must not be used for safety reasons
None known.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
None known.

Hazardous combustion products
Bromine, bromine oxides and hydrogen bromide.

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Do not get on skin or clothing. Wash thoroughly after handling. Do not breathe vapors or spray mist. Use personal protective equipment. See also section 8.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Dike far ahead of liquid spill for later disposal.

Methods for cleaning up
Contain and collect spillage with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local/national regulations (see Section 13).

6.4 Reference to other sections

See section 13 for more information.

7. Handling and storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Keep away from heat, sparks and open flame. No smoking. Avoid contact with skin, eyes and clothing. Avoid spills and splashing during use. Do not breathe vapors or spray mist.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Ensure adequate ventilation. Keep airborne concentrations below exposure limits.

Storage precautions Keep containers tightly closed in a dry, cool and well-ventilated place. Follow safe warehousing practices regarding palletizing, banding, shrink-wrapping and/or stacking. Store in original container.

Packaging materials Use specially constructed containers only.

8. Exposure controls/personal protection

8.1 Control parameters

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits - TWAs (CMPs)	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits - TWAs (LMPE-PPTs)
Sodium bromide	0.1 ppm, 0.2 STEL (Br)	0.1 ppm (Br)	Not determined	Not determined	Not determined

IDLH (Immediately Dangerous to Life or Health)
Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Sodium bromide 7647-15-6	-

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard

present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Keep airborne concentrations below exposure limits. Ensure adequate ventilation. Local exhaust ventilation. Apply technical measures to comply with the occupational exposure limits.

Personal protective equipment

Eye protection	Tightly fitting safety goggles.
Hand protection	Impervious gloves made of: Nitrile Rubber Be aware that liquid may penetrate the gloves. Frequent change is advisable.
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne mist/aerosol of this product, use an organic vapor cartridge with a P-95 pre-filter attached. In work environments containing oil mist/aerosol, use an organic vapor cartridge with a P-95 pre-filter attached.If exposed to vapors from this product, use a NIOSH/MSHA-approved respirator with an organic vapor cartridge.
Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state	Liquid
Appearance	Clear
Color	Colorless
Odor	Odorless
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH	Approximately 5.7	
pH @ dilution		
Melting / freezing point		
Boiling point/range	No information available	
Flash point	> 93 °C / > 200 °F	PMCC
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	1.008 - 1.500	
Bulk density	No information available	
Water solubility	Soluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	
log Pow	Not determined	

Explosive properties	Not applicable
Oxidizing properties	None known.

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	None
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and reactivity

10.1 Reactivity

No data available.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Protect from light. Do not freeze.

10.5 Incompatible materials

Oxidizing agents. Acids. Alkali metals. Halogens. Halogenated compounds.

10.6 Hazardous decomposition products

See also section 5.2.

11. Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Product information	.
Inhalation	May cause respiratory irritation.
Eye contact	May cause irritation.
Skin contact	Components of the product may be absorbed into the body through the skin. Prolonged contact may cause redness and irritation.
Ingestion	Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Sodium bromide	= 3500 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Sodium bromide	No data available	No data available	No data available	No data available

Sensitization	Not classified.
Mutagenic effects	This substance has no evidence of mutagenic properties.
Carcinogenicity	This substance has no evidence of carcinogenic properties.
Reproductive toxicity	None known.
Developmental toxicity	Not known to cause birth defects or have a deleterious effect on a developing fetus.
Routes of exposure	Eye contact. Skin contact. Inhalation.
Routes of entry	Ingestion.
Specific target organ toxicity - Single exposure	Not classified
Specific target organ toxicity - Repeated exposure	Not classified.
Aspiration hazard	Not classified.

12. Ecological information

12.1 Toxicity

Toxicity to algae
See component information below.

Toxicity to fish
See component information below.

Toxicity to daphnia and other aquatic invertebrates
See component information below.

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Sodium bromide	0.054 - 0.081 mg/L LC50 Oncorhynchus mykiss 96 h > 1000 mg/L LC50 Lepomis macrochirus 96 h 15614 - 17428 mg/L LC50 Pimephales promelas 96 h = 16000 mg/L LC50 Poecilia reticulata 96 h > 1000 mg/L LC50 Oncorhynchus mykiss 96 h = 24000 mg/L LC50 Oryzias latipes 96 h 24000 - 96000 mg/L LC50 Oryzias latipes 96 h 16000 - 24000 mg/L LC50 Poecilia reticulata 96 h	5800 - 24000 mg/L EC50 Scenedesmus pannonicus 96 h	5700 - 10800 mg/L EC50 Daphnia magna 48 h 5800 - 48000 mg/L EC50 Daphnia magna 48 h

12.2 Persistence and degradability

No product level data available.

12.3 Bioaccumulative potential

No data available.

12.4 Mobility

Soluble in water.

12.5 Results of PBT and vPvB assessment

This substance is not considered to be persistent, bioaccumulating or toxic (PBT)

12.6 Other adverse effects.

None known.

13. Disposal considerations

13.1 Waste treatment methods

Disposal Method	Recover and reclaim or recycle, if practical. Should this product become a waste, dispose of in a permitted industrial landfill. Ensure that the containers are empty by the RCRA criteria prior to disposal in a permitted industrial landfill.
Contaminated packaging	Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT)	Not regulated
UN No. (MT/ANTT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG/ANTAQ)	Not regulated
UN No. (ICAO/ANAC)	Not regulated

14.2. UN proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class	Not regulated
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated

14.4 Packing group

DOT/ANTT Packing group	Not regulated
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated

14.5 Environmental hazard

No

14.6 Special precautions

Not applicable

14.7 Transport in bulk according to Annex I/II of MARPOL 73/78 and the IBC Code
Not applicable Please contact MISDS@slb.com for info regarding transport in Bulk.

15. Regulatory information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Complies
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH
All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Sodium bromide	N/A	N/A	N/A

California Proposition 65

This product does not contain chemical[s] which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Canadian Classification

This product has been classified in accordance with the hazard criteria of the CPR and the SDS contains all the information required by the CPR.

16. Other information

Revision date	12/Jan/2018
Version	1
This SDS has been revised in the following section(s)	New
HMIS classification	

Health	1*
Flammability	0
Physical hazard	0
PPE	J

N/A - Not Applicable, N/D - Not Determined.

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

SDS no. PID1494
Version 1
Revision date 07/Jan/2019
Supersedes date None

Safety Data Sheet
SODIUM BROMIDE

1. Identification of the Substance/Preparation and of the Company/Undertaking

1.1 Product identifier

Product name SODIUM BROMIDE

Product code PID1494

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Completion fluid additive. Drilling fluid additive.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : 0800-720-8000/0800-777-2323 (WGRA)

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards Not classified

Environmental hazards Not classified

Physical Hazards Not classified

2.2 Label elements

Signal word
None

Hazard Statements
This product is not classified as hazardous therefore no (H) hazard statements assigned.

Precautionary Statements
This product is not classified as hazardous therefore has no (P) precautionary statements assigned.

Unknown acute toxicity Not applicable.

3. Composition/information on Ingredients

3.1 Substances

Chemical Name	CAS No	Weight-%
Sodium bromide	7647-15-6	60-100

3.2 Mixtures

Not applicable

Comments
The exact percentage (concentration) of composition has been withheld as a trade secret

4. First Aid Measures

4.1 First aid measures

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Get medical attention if symptoms occur.

Skin contact Wash skin thoroughly with soap and water. Get medical attention if irritation persists.

Eye Contact Promptly wash eyes with lots of water while lifting eye lids. Remove contact lenses, if worn. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

General advice The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Symptoms

Inhalation Please see Section 11. Toxicological Information for further information.

Ingestion Please see Section 11. Toxicological Information for further information.

Skin contact Please see Section 11. Toxicological Information for further information.

Eye contact Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing agent suitable for type of surrounding fire.

Extinguishing media which must not be used for safety reasons
None known.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
None known.

Hazardous combustion products
Bromine, bromine oxides and hydrogen bromide.

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. See also section 8.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Cover powder spill with plastic sheet or tarp to minimize spreading.

Methods for cleaning up
Sweep up and shovel into suitable containers for disposal. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Avoid dust formation.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Ensure adequate ventilation. Keep airborne concentrations below exposure limits.

Storage precautions Keep containers tightly closed in a dry, cool and well-ventilated place. Protect from moisture. Avoid contact with:. Strong oxidizing agents. Strong acids. Bromine trifluoride.

Packaging materials Use specially constructed containers only.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Exposure limits **NUI = Nuisance dust, TWA 4mg/m³ Respirable Dust, 10mg/m³ Total Dust.**

Component Information

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits - TWAs (CMPs)	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits - TWAs (LMPE-PPTs)
Sodium bromide	Not determined	Not determined	Not determined	Not determined	Not determined

IDLH (Immediately Dangerous to Life or Health)
Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Sodium bromide 7647-15-6	Not detemined

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation. Mechanical ventilation or local exhaust ventilation is required.

Personal protective equipment

Eye protection Tightly fitting safety goggles.
Hand protection Use protective gloves made of: Butyl PVC Frequent change is advisable
Respiratory Protection All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne mist/aerosol of

	this product, use an organic vapor cartridge with a P-95 pre-filter attached. In work environments containing oil mist/aerosol, use an organic vapor cartridge with a P-95 pre-filter attached.If exposed to vapors from this product, use a NIOSH/MSHA-approved respirator with an organic vapor cartridge.
Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Solid
Appearance	Powder Dust
Color	White
Odor	Odorless
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH	Not applicable	
pH @ dilution		
Melting / freezing point	775 °C / 1427 °F	
Boiling point/range	1390 °C / 2534 °F	
Flash point	No information available	PMCC
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	1 mmHg	@ 806 °C
Vapor density	No information available	
Specific gravity	No information available	
Bulk density	No information available	
Water solubility	Soluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	800°C / 1472°F	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	
log Pow	No information available	
Explosive properties	Not applicable	
Oxidizing properties	None known.	

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	None
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

No specific reactivity hazards associated with this product.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Avoid dust formation. Protect from moisture.

10.5 Incompatible materials

Strong oxidizing agents. Strong acids. Bromine trifluoride.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation Inhalation of dust in high concentration may cause irritation of respiratory system.

Eye contact Dust may cause mechanical irritation.

Skin contact Prolonged contact may cause redness and irritation.

Ingestion Ingestion may cause stomach discomfort.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Sodium bromide	= 3500 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Sodium bromide	No data available	No data available	No data available	No data available

Sensitization This product does not contain any components suspected to be sensitizing.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity This product does not contain any known or suspected carcinogens.

Reproductive toxicity This product does not contain any known or suspected reproductive hazards.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of exposure Inhalation.

Routes of entry Inhalation.

Specific target organ toxicity - Single exposure Not classified

Specific target organ toxicity - Not classified.

Repeated exposure

Aspiration hazard Not applicable.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
This product is not considered toxic to algae.

Toxicity to fish
This product is not considered toxic to fish.

Toxicity to daphnia and other aquatic invertebrates
This product is not considered toxic to invertebrates.

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Sodium bromide	0.054 - 0.081 mg/L LC50 Oncorhynchus mykiss 96 h > 1000 mg/L LC50 Lepomis macrochirus 96 h 15614 - 17428 mg/L LC50 Pimephales promelas 96 h = 16000 mg/L LC50 Poecilia reticulata 96 h > 1000 mg/L LC50 Oncorhynchus mykiss 96 h = 24000 mg/L LC50 Oryzias latipes 96 h 24000 - 96000 mg/L LC50 Oryzias latipes 96 h 16000 - 24000 mg/L LC50 Poecilia reticulata 96 h	5800 - 24000 mg/L EC50 Scenedesmus pannonicus 96 h	5700 - 10800 mg/L EC50 Daphnia magna 48 h 5800 - 48000 mg/L EC50 Daphnia magna 48 h

12.2 Persistence and degradability

Not Applicable - Inorganic chemical.

12.3 Bioaccumulative potential

Not Applicable - Inorganic chemical.

12.4 Mobility

Soluble in water.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method Disposal should be made in accordance with federal, state and local regulations.

Contaminated packaging Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT)	Not regulated
UN No. (MT/ANTT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG/ANTAQ)	Not regulated
UN No. (ICAO/ANAC)	Not regulated
UN No. (DPC)	Not regulated

14.2. UN proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class	Not regulated
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated
DPC Hazard class	Not regulated

14.4 Packing group

DOT Packing group	Not regulated
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated
DPC Packing group	Not regulated

14.5 Environmental hazard

No

14.6 Special precautions

Not applicable

14.7 Transport in bulk according to Annex I/II of MARPOL 73/78 and the IBC Code

Please contact SDS@slb.com for info regarding transport in Bulk.

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Complies
China (IECSC)	Complies
Australia (AICS)	Complies

Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH

All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories

Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Sodium bromide	N/A	N/A	N/A

California Proposition 65

This product does not contain chemical[s] which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

16. Other Information

Revision date	07/Jan/2019
Version	1
This SDS has been revised in the following section(s)	1, 15, 16

HMIS classification

Health	1
Flammability	0
Physical hazard	0
PPE	E

Disclaimer

The information contained herein is considered in good faith as reliable of the date issued and is based upon on measurements, tests or data derived from supplier's own study or furnished by others. In providing this SDS information, Supplier makes no express or implied warranties as to the information or product; merchantability or fitness of purpose; any express or implied warranty; or non-infringement of intellectual property rights; and supplier assumes no responsibility for any direct, special or consequential damages, results obtained, or the activities of others. To the maximum extent permitted by law, supplier's warranty obligations and buyer's sole remedies are as stated in separate agreement between the parties.

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HALLIBURTON

SAFETY DATA SHEET
SOURSCAV®

according to Regulation (EC) No. 2015/830

Revision Date: 10-Dec-2019 **Revision Number:** 30
Preparation Date 10-Dec-2019 **Internal ID Code** HM003675

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product Identifier

Product Name SOURSCAV®
Internal ID Code HM003675

1.2. Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Hydrogen Sulfide Scavenger
Sector of uses SU2 - Mining, (including offshore industries)
Product category(ies) PC20 - Products such as pH-regulators, flocculants, precipitants, neutralization agents, other unspecific
Process categories PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises
Uses advised against Consumer use

1.3. Details of the supplier of the safety data sheet

Halliburton Energy Services
Halliburton House, Howemoss Place
Kirkhill Industrial Estate
Dyce
Aberdeen, AB21 0GN
United Kingdom
+44 1224 776888

www.halliburton.com

For further information, please contact
E-mail Address: fdunexchem@halliburton.com

1.4. Emergency telephone number

+44 8 08 189 0979 / 1-760-476-3961
Global Incident Response Access Code: 334305
Contract Number: 14012

Emergency telephone - Article 45 - (EC)1272/2008	
Austria	Poison Information Centre (AT): +43-(0)1-406 43 43
Belgium	Poison center (BE): +32 70 245 245
Bulgaria	Bulgarian poison centre: +359 2 915-44-09 or +359 2 915-43-46
Croatia	Centar za kontrolu otrovanja (CKO): (+385 1) 23-48-342 (Poison Control Center (PCC) - Institute for Medical Research and Occupational Health)
Cyprus	1401; +357 22 88 7171
Czech Republic	+420 224 919 293; +420 224 915 402
Denmark	Poison Control Hotline (DK): +45 82 12 12 12
Estonia	16662 (Local Poison Information Centre); (+372) 626 93 90 (International Poison Information Centre)
Europe	112
Finland	Poison Information Centre (FI):+358 9 471 977
France	ORFILA (FR): + 01 45 42 59 59
Germany	Poison Center Berlin (DE): +49 030 30686 790
Greece	+30 210 779 3777
Hungary	+36 (06) 80 201-199
Latvia	(+371) 67042473 (International number for the National Toxicology Centre)
Ireland	National Poisons Information Centre (IE): +353 1 8379964
Italy	Poison Center, Milan (IT): +39 02 6610 1029
Netherlands	National Poisons Information Center (NL): +31 30 274 88 88 (NB: this service is only

	available to health professionals)
Norway	Poisons Information (NO):+ 47 22 591300
Poland	Poison Control and Information Centre, Warsaw (PL): +48 22 619 66 54; +48 22 619 08 97
Portugal	CIAV - Centro de Informação Antivenenos (Portuguese Poison Centre): + 351 213 303 271
Romania	+40 21 318 36 06
Spain	Poison Information Service (ES): +34 91 562 04 20
Sweden	Poisons Information Center (SV):+46 8 33 12 31
Switzerland	Poison Center: Tel 145; +41 44 251 51 51
Turkey	Ulusal Zehir Danisma Merkezi (UZEM) :114 Acil Saglik Hizmetleri : 112
United Kingdom	NHS Direct (UK): +44 0845 46 47

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Regulation (EC) No 1272/2008

Not classified

2.2. Label Elements

Not classified

Hazard Pictograms

Signal Word: **None**

Hazard Statements:
Not Classified

Precautionary Statements:
None

Contains

Substances	**CAS Number**
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA

2.3. Other Hazards

This substance is not considered to be persistent, bioaccumulating nor toxic (PBT).
This substance is not considered to be very persistent nor very bioaccumulating (vPvB).

SECTION 3: Composition/information on ingredients

3.1. Substances Substance

Substances	EINECS	CAS Number	PERCENT (w/w)	EU - CLP Substance Classification	REACH Reg. No
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA	NA	60 - 100%	Not classified	No data available

For the full text of the H-phrases mentioned in this Section, see Section 16

SECTION 4: First aid measures

4.1. Description of first aid measures

Inhalation	If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.
Eyes	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.
Skin	Wash with soap and water. Get medical attention if irritation persists.
Ingestion	Do NOT induce vomiting. Give nothing by mouth. Obtain immediate medical attention.

4.2. Most important symptoms and effects, both acute and delayed

May be harmful if swallowed.

4.3. Indication of any immediate medical attention and special treatment needed

Notes to Physician Treat symptomatically

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable Extinguishing Media

Water fog, carbon dioxide, foam, dry chemical.

Extinguishing media which must not be used for safety reasons

None known.

5.2. Special hazards arising from the substance or mixture

Special exposure hazards in a fire

Decomposition in fire may produce harmful gases.

5.3. Advice for firefighters

Special protective equipment for firefighters

Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Use appropriate protective equipment. Avoid contact with skin, eyes and clothing. Avoid creating and breathing dust. Ensure adequate ventilation.
See Section 8 for additional information

6.2. Environmental precautions

None known.

6.3. Methods and material for containment and cleaning up

Scoop up and remove.

6.4. Reference to other sections

See Section 8 and 13 for additional information.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Avoid creating or inhaling dust. Avoid contact with eyes, skin, or clothing. Ensure adequate ventilation. Wash hands after use. Launder contaminated clothing before reuse. Use appropriate protective equipment.

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice.

7.2. Conditions for safe storage, including any incompatibilities

Store away from acids. Store away from oxidizers. Store in a cool, dry location. Keep container closed when not in use. Store away from direct sunlight. Product has a shelf life of 24 months.

7.3. Specific end use(s)

Exposure scenario No information available
Other Guidelines No information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Exposure Limits

Substances	CAS Number	EU	UK	Netherlands	France
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA	Not applicable	Not applicable	Not applicable	Not applicable

Substances	CAS Number	Germany	Spain	Portugal	Finland
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA	Not applicable	Not applicable	Not applicable	Not applicable

Substances	CAS Number	Austria	Ireland	Switzerland	Norway
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA	Not applicable	Not applicable	Not applicable	Not applicable

Substances	CAS Number	Italy	Poland	Hungary	Czech Republic
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA	Not applicable	Not applicable	Not applicable	Not applicable

Substances	CAS Number	Denmark	Romania	Croatia	Cyprus
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA	Not applicable	Not applicable	Not applicable	Not applicable

Derived No Effect Level (DNEL) No information available

Worker

General Population

Predicted No Effect Concentration (PNEC) No information available.

8.2. Exposure controls

Engineering Controls A well ventilated area to control dust levels.

Personal protective equipment If engineering controls and work practices cannot prevent excessive exposures, the selection and proper use of personal protective equipment should be determined by an industrial hygienist or other qualified professional based on the specific application of this product.

Respiratory Protection Not normally needed. But if significant exposures are possible then the following respirator is recommended:
Dust/mist respirator. (N95, P2/P3)

Hand Protection Normal work gloves.

Skin Protection	Normal work coveralls.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	None known.

Environmental Exposure Controls No information available

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical State: Solid
Odor: Mild burnt sugar

Color Light yellow-green
Odor Threshold: No information available

Property Remarks/ - Method	Values
pH:	4-5.5
Freezing Point / Range	No data available
Melting Point / Range	No data available
Pour Point / Range	No data available
Boiling Point / Range	No data available
Flash Point	No data available
Flammability (solid, gas)	No data available
Upper flammability limit	No data available
Lower flammability limit	No data available
Evaporation rate	No data available
Vapor Pressure	No data available
Vapor Density	No data available
Specific Gravity	1.73
Water Solubility	Soluble in water
Solubility in other solvents	No data available
Partition coefficient: n-octanol/water	No data available
Autoignition Temperature	No data available
Decomposition Temperature	No data available
Viscosity	No data available
Explosive Properties	No information available
Oxidizing Properties	No information available

9.2. Other information

VOC Content (%) No data available

SECTION 10: Stability and reactivity

10.1. Reactivity
Not expected to be reactive.

10.2. Chemical stability
Stable

10.3. Possibility of hazardous reactions
Will Not Occur

10.4. Conditions to avoid
None anticipated

10.5. Incompatible materials
Strong oxidizers. Strong acids.

10.6. Hazardous decomposition products
Carbon monoxide and carbon dioxide. Metal oxides.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute Toxicity

Inhalation May cause mild respiratory irritation.

Eye Contact May cause mechanical irritation to eye.

Skin Contact None known.

Ingestion May be harmful if swallowed. May cause abdominal pain, vomiting, nausea, and diarrhea.

Chronic Effects/Carcinogenicity No data available to indicate product or components present at greater than 0.1% are chronic health hazards.

Toxicology data for the components

Substances	CAS Number	LD50 Oral	LD50 Dermal	LC50 Inhalation
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA	No data available	No data available	No data available

Rat = Rat, Rabbit = Rabbit, dust = dust

SECTION 12: Ecological information

12.1. Toxicity

Substances	CAS Number	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Toxicity to Invertebrates
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA	No information available	No information available	No information available	No information available

growth rate = growth rate, similar substance = similar substance, activated sludge = activated sludge, reproduction = reproduction

12.2. Persistence and degradability

Substances	CAS Number	Persistence and Degradability
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA	No information available

12.3. Bioaccumulative potential

Does not bioaccumulate.

Substances	CAS Number	Bioaccumulation
Contains no hazardous substances in	NA	No information available

concentrations above cut-off values according to the competent authority		

12.4. Mobility in soil

Substances	CAS Number	Mobility
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA	No information available

12.5. Results of PBT and vPvB assessment

This substance is not considered to be persistent, bioaccumulating nor toxic (PBT). This substance is not considered to be very persistent nor very bioaccumulating (vPvB).

Substances	PBT and vPvB assessment
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	Not applicable

12.6. Other adverse effects

Endocrine Disruptor Information

This product does not contain any known or suspected endocrine disruptors

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Disposal methods Bury in a licensed landfill according to federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

SECTION 14: Transport information

IMDG/IMO

UN Number Not restricted
UN proper shipping name: Not restricted
Transport Hazard Class(es): Not applicable
Packing Group: Not applicable
Environmental Hazards: Not applicable

ADN

UN Number Not restricted
UN proper shipping name: Not restricted
Packing Group Not applicable
Environmental Hazards: Not applicable

ADR/RID

UN Number Not restricted
UN proper shipping name: Not restricted
Packing Group Not applicable
Environmental Hazards: Not applicable

IATA/ICAO

UN Number Not restricted
UN proper shipping name: Not restricted
Transport Hazard Class(es): Not applicable
Packing Group: Not applicable
Environmental Hazards: Not applicable

14.1. UN Number Not restricted

14.2. UN proper shipping name: Not restricted

14.3.

14.4. Packing Group Not applicable

14.5. Environmental Hazards: Not applicable

14.6. Special Precautions for User None

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

International Inventories

US TSCA Inventory	All components listed on inventory or are exempt.
Canadian Domestic Substances List (DSL)	All components listed on inventory or are exempt.

Legend
TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
EINECS/ELINCS - European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List

Denmark PR No.: 2314995

Germany, Water Endangering Classes (WGK) WGK 0: Generally not water endangering.

Take note of Directive 92/85/EEC regarding maternity protection or stricter national regulations, where applicable.
Take note of Directive 94/33/EC on the protection of young people at work or stricter national regulations, where applicable.

Substances	CAS Number	Seveso III	TA LUFT
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA	Not applicable	Not applicable

Substances	CAS Number	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA	Not applicable	Not applicable

15.2. Chemical safety assessment
No information available

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3
None

Key or legend to abbreviations and acronyms used in the safety data sheet
bw – body weight
CAS – Chemical Abstracts Service
CLP – REGULATION (EC) No 1272/2008 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on Classification, Labelling and Packaging of substances and mixtures
EC – European Commission

EC10 – Effective Concentration 10%
EC50 – Effective Concentration 50%
EEC – European Economic Community
ErC50 – Effective Concentration growth rate 50%
IBC Code – International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk
LC50 – Lethal Concentration 50%
LD50 – Lethal Dose 50%
LL0 – Lethal Loading 0%
LL50 – Lethal Loading 50%
MARPOL – International Convention for the Prevention of Pollution from Ships
mg/kg – milligram/kilogram
mg/L – milligram/liter
NIOSH – National Institute for Occupational Safety and Health
NOEC – No Observed Effect Concentration
NTP – National Toxicology Program
OEL – Occupational Exposure Limit
PBT – Persistent Bioaccumulative and Toxic
PC – Chemical Product category
PEL – Permissible Exposure Limit
ppm – parts per million
PROC – Process category
REACH – REGULATION (EC) No 1907/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals
STEL – Short Term Exposure Limit
SU – Sector of Use category

Key literature references and sources for data
www.ChemADVISOR.com/
NZ CCID

Revision Date: 10-Dec-2019
Revision Note
Not applicable

This safety data sheet complies with the requirements of Regulation (EC) No. 2015/830

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End of Safety Data Sheet

SDS no. PID11775
Version 9
Revision date 13/Oct/2020
Supersedes date 18/Aug/2020

Safety Data Sheet
SUREWET*

1. Identification

1.1 Product identifier

Product name SUREWET*

Product code PID11775

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Emulsifier. Wetting agent.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
200 - 125, 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-780-962-8221

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : +55 11 3197 5891

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards Not classified

Environmental hazards Not classified

Physical Hazards Not classified

2.2 Label elements

Signal word
None

Hazard Statements
This product is not classified as hazardous therefore no (H) hazard statements assigned.

Precautionary Statements
This product is not classified as hazardous therefore has no (P) precautionary statements assigned.

Unknown acute toxicity Not applicable.

3. Composition/information on Ingredients

3.1 Substances

This product does not contain any hazardous ingredients, or ingredients with national workplace exposure limits.

3.2 Mixtures

Not applicable

Comments
No Comments.

4. First Aid Measures

4.1 First aid measures

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Get medical attention if symptoms occur.

Skin contact Wash skin thoroughly with soap and water. Get medical attention if irritation persists.

Eye Contact Promptly wash eyes with lots of water while lifting eye lids. Remove contact lenses, if worn. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

General advice The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Symptoms

Inhalation	Please see Section 11. Toxicological Information for further information.
Ingestion	Please see Section 11. Toxicological Information for further information.
Skin contact	Please see Section 11. Toxicological Information for further information.
Eye contact	Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Water Fog, Alcohol Foam, CO_2, Dry Chemical.

Extinguishing media which must not be used for safety reasons
None known.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
None known.

5.3 Advice for firefighters

Special protective equipment and precautions for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. See also section 8.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Dike far ahead of liquid spill for later disposal. Prevent further leakage or spillage if safe to do so.

Methods for cleaning up

Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Do not breathe vapors or spray mist. Avoid spills and splashing during use.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions	Ensure adequate ventilation.
Storage precautions	Keep containers tightly closed in a dry, cool and well-ventilated place. Avoid contact with:. Strong oxidizing agents.
Packaging materials	Use specially constructed containers only.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Exposure limits **The product does not contain any hazardous materials with occupational exposure limits established.**

IDLH (Immediately Dangerous to Life or Health)
Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation. Mechanical ventilation or local exhaust ventilation is required.

Personal protective equipment

Eye protection	Tightly fitting safety goggles. Safety glasses with side-shields.
Hand protection	Impervious gloves made of: PVC Nitrile Neoprene Break through time >480 minutes Glove thickness >= 0.4 mm Be aware that liquid may penetrate the gloves. Frequent change is advisable.
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne mist/aerosol of this product, use an organic vapor cartridge with a P-95 pre-filter attached. In work environments containing oil mist/aerosol, use an organic vapor cartridge with a P-95 pre-filter attached.If exposed to vapors from this product, use a NIOSH/MSHA-approved respirator with an organic vapor cartridge.
Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Liquid
Appearance	No information available
Color	Light yellow
Odor	Slight
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH	No information available	
pH @ dilution	No information available	
Melting point	No information available	
Boiling point	No information available	
Flash point	184 °C / 363 °F	
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	0.891	@ 20 °C
Bulk density	No information available	
Water solubility	Insoluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	
Partition Coefficient (n-octanol/water)	No information available	

Explosive properties	Not applicable
Oxidizing properties	None known.

9.2 Other information

Pour point	4.4 – 15.6°C / 40 – 60°F
Molecular weight	No information available
VOC content(%)	None
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

No specific reactivity hazards associated with this product.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

None known.

10.5 Incompatible materials

Strong oxidizing agents.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation	Inhalation of vapors in high concentration may cause irritation of respiratory system.
Eye contact	May cause slight irritation.
Skin contact	Prolonged contact may cause redness and irritation.
Ingestion	Ingestion may cause stomach discomfort.

LD50 Oral	> 5000 mg/kg (rat)

Delayed and immediate effects and chronic effects from short and long term exposure	
Sensitization	This product does not contain any components suspected to be sensitizing.
Mutagenic effects	This product does not contain any known or suspected mutagens.
Carcinogenicity	This product does not contain any known or suspected carcinogens.
Reproductive toxicity	This product does not contain any known or suspected reproductive hazards.
Developmental toxicity	Not known to cause birth defects or have a deleterious effect on a developing fetus.
Routes of Exposure	None known.
Routes of entry	No route of entry noted.
Specific target organ toxicity - Single exposure	Not classified
Specific target organ toxicity - Repeated exposure	Not classified.
Aspiration hazard	Not applicable.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
This product is not considered toxic to algae.

Toxicity to fish
Fish LC50 > 100 mg/l.

Toxicity to daphnia and other aquatic invertebrates
This product is not considered toxic to invertebrates.

12.2 Persistence and degradability

Product is biodegradable.

12.3 Bioaccumulative potential

Bioaccumulative potential.

12.4 Mobility

Insoluble in water.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method Disposal should be made in accordance with federal, state and local regulations.

Contaminated packaging Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT)	Not regulated
UN No. (MT/ANTT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG/ANTAQ)	Not regulated
UN No. (ICAO/ANAC)	Not regulated
UN No. (DPC)	Not regulated

14.2. UN proper shipping name
The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class	Not regulated
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated
DPC Hazard class	Not regulated

14.4 Packing group

DOT Packing group	Not regulated
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated
DPC Packing group	Not regulated

14.5 Environmental hazard

Marine pollutant	No

14.6 Special precautions
Not applicable

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Complies
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH
All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

California Proposition 65

This product does not contain chemical[s] which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Canadian Classification

This Safety Data Sheet has been prepared in compliance with the Hazardous Products Regulations.

Brazil Regulation	This SDS was prepared in accordance with Brazil law NBR 14725.
Federal Police	Not determined
Army	Not determined
ANVISA	Not determined

16. Other Information

Supersedes date	18/Aug/2020
Revision date	13/Oct/2020

Version	9
This SDS has been revised in the following section(s)	15, 16 No changes with regard to classification have been made.

HMIS classification

Health	1
Flammability	1
Physical hazard	0
PPE	B

N/A - Not Applicable, N/D - Not Determined.

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SDS no. PID1709
Version 15
Revision date 22/Jun/2020
Supersedes date None

Safety Data Sheet
VG-PLUS*

1. Identification

1.1 Product identifier

Product name VG-PLUS*

Product code PID1709

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Viscosifier.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
200 - 125, 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-780-962-8221

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : +55 11 3197 5891

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Carcinogenicity	Category 1A
Specific target organ toxicity - Repeated exposure	Category 2

Environmental hazards Not classified

Physical Hazards

Combustible dust

2.2 Label elements

Signal word
DANGER

Hazard Statements
H350i - May cause cancer by inhalation
H373 - May cause damage to organs through prolonged or repeated exposure if inhaled
H232 - May form combustible dust concentrations in air

Precautionary Statements
P201 - Obtain special instructions before use
P260 - Do not breathe dust, fume, gas, mist, vapors, spray
P281 - Use personal protective equipment as required
P308 + P313 - IF exposed or concerned: Get medical advice/attention
P314 - Get medical attention if you feel unwell

P202 - Do not handle until all safety precautions have been read and understood
P240 - Ground/bond container and receiving equipment
P241 - Use explosion-proof electrical, ventilating, lighting, equipment
P243 - Take precautionary measures against static discharge
P501 - Dispose of contents and container to an approved waste disposal plant

Unknown acute toxicity 0% of the mixture consists of ingredient(s) of unknown toxicity.

3. Composition/information on Ingredients

3.1 Substances

Chemical Name	CAS No	Weight-%
Crystalline silica (impurity)	14808-60-7	< 1

3.2 Mixtures

Not applicable

Comments
The exact percentage (concentration) of composition has been withheld as a trade secret.

4. First Aid Measures

4.1 First aid measures

Inhalation — If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion — Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Get medical attention if symptoms occur.

Skin contact — Wash skin thoroughly with soap and water. Get medical attention if irritation persists.

Eye Contact — Promptly wash eyes with lots of water while lifting eye lids. Remove contact lenses, if worn. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

General advice — The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Symptoms

Inhalation — Please see Section 11. Toxicological Information for further information.

Ingestion — Please see Section 11. Toxicological Information for further information.

Skin contact — Please see Section 11. Toxicological Information for further information.

Eye contact — Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician — Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing media appropriate for surrounding material.

Extinguishing media which must not be used for safety reasons
Do not use water jet.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
Suspended dust may present a dust explosion hazard.

Hazardous combustion products
Carbon oxides (COx), Nitrogen oxides (NOx), Hydrogen chloride gas.

5.3 Advice for firefighters

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Extinguish all ignition sources. Avoid sparks, flames, heat and smoking. Use personal protective equipment. See also section 8. If spilled, take caution, as material can cause surfaces to become very slippery.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Cover powder spill with plastic sheet or tarp to minimize spreading.

Methods for cleaning up
Sweep up and shovel into suitable containers for disposal. Take precautionary measures against static discharges. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Avoid dust formation. If spilled, take caution, as material can cause surfaces to become very slippery.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Ensure adequate ventilation. Take precautionary measures against static discharges. Keep airborne concentrations below exposure limits.

Storage precautions Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from open flames, hot surfaces and sources of ignition. Protect from moisture. Avoid contact with:. Oxidizing agents.

Packaging materials Use specially constructed containers only.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Exposure limits **No biological limit allocated**

Component Information

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits - TWAs (CMPs)	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits - TWAs (LMPE-PPTs)

Crystalline silica (impurity)	0.025 mg/m³	50 µg/m³ TWA respirable fraction	0.05 mg/m³ TWA	Not determined	0.025 mg/m³ TWA VLE-PPT (respirable fraction)

Crystalline silica (impurity)
OSHA - Final PELs - Table Z-3 Mineral Dusts
(250)/(%SiO2 + 5) mppcf TWA, respirable fraction; (10)/(%SiO2 + 2) mg/m³ TWA, respirable fraction

IDLH (Immediately Dangerous to Life or Health)
Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Crystalline silica (impurity) 14808-60-7	50 mg/m³ IDLH (respirable dust)

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation. Mechanical ventilation or local exhaust ventilation is required.

Personal protective equipment

Eye protection	Tightly fitting safety goggles. Safety glasses with side-shields.
Hand protection	Repeated or prolonged contact Use protective gloves made of: Neoprene Nitrile Frequent change is advisable
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne mist/aerosol of this product, use an organic vapor cartridge with a P-95 pre-filter attached. In work environments containing oil mist/aerosol, use an organic vapor cartridge with a P-95 pre-filter attached.If exposed to vapors from this product, use a NIOSH/MSHA-approved respirator with an organic vapor cartridge.
Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Solid
Appearance	Powder Dust
Color	Off-white
Odor	Odorless
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH		
pH @ dilution	No information available	
Melting point	No information available	
Boiling point	No information available	
Flash point	Not applicable No information available	PMCC
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	> = 0.05 g/l	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	1.5 sg	20 °C
Bulk density	528 kg/m³ (33 lb/ft³)	
Water solubility	Insoluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	190 °C / 374 °F	
Decomposition temperature	200°C / 392°F	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	
Partition Coefficient (n-octanol/water)	No information available	

Explosive properties	Suspended dust may present a dust explosion hazard
Oxidizing properties	No information available

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	No information available
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

Dust may form explosive mixture in air.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static charges. Avoid dust formation. Protect from moisture.

10.5 Incompatible materials

Oxidizing agents.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation Inhalation of dust in high concentration may cause irritation of respiratory system. Harmful: danger of serious damage to health by prolonged exposure through inhalation. May cause cancer by inhalation. Repeated or prolonged inhalation of crystalline silica dust can cause delayed lung injury, and other diseases, including silicosis and lung cancer.

Eye contact Dust contact with the eyes can lead to mechanical irritation.

Skin contact Repeated exposure may cause skin dryness or cracking.

Ingestion Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Crystalline silica (impurity)	No data available	No data available	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Crystalline silica (impurity)	Group 1; Monograph 100C [2012] Monograph 100C [2012] (listed under Crystalline silica inhaled in the form of quartz or cristobalite from occupational sources); Monograph 68 [1997] Group 1; Monograph 68 [1997]	A2 Suspected Human Carcinogen	Present	Known Human Carcinogen

Delayed and immediate effects and chronic effects from short and long term exposure

Sensitization Not classified.

Mutagenic effects No evidence of mutagenic properties.

Carcinogenicity	Contains a known or suspected carcinogen. Crystalline silica dust is listed by IARC in Group 1 as known to cause lung cancer in humans, if inhaled.
Reproductive toxicity	No evidence of toxicity to reproduction.
Developmental toxicity	Not known to cause birth defects or have a deleterious effect on a developing fetus.
Routes of Exposure	Skin contact. Inhalation. Eye contact.
Routes of entry	Inhalation.
Specific target organ toxicity - Single exposure	Not classified
Specific target organ toxicity - Repeated exposure	Category 2.
Target organ effects	Respiratory system. Lungs.
Aspiration hazard	Not applicable.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
This product is not considered toxic to algae.

Toxicity to fish
This product is not considered toxic to fish.

Toxicity to daphnia and other aquatic invertebrates
This product is not considered toxic to invertebrates.

Toxicology data for the components

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Crystalline silica (impurity)	LC50 Danio rerio (zebra fish) : > 10000 mg/l 96h	EC50: > 1000 mg/l 72h	LC50 Daphnia manga (Water flea): > 10000 mg/l 24h

12.2 Persistence and degradability

Not readily biodegradable. See component information below.

12.3 Bioaccumulative potential

Does not bioaccumulate. See component information below.

12.4 Mobility

Insoluble in water. See component information below.

See component information below.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method Disposal should be made in accordance with federal, state and local regulations.

Contaminated packaging Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT)	Not regulated
UN No. (MT/ANTT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG/ANTAQ)	Not regulated
UN No. (ICAO/ANAC)	Not regulated
UN No. (DPC)	Not regulated

14.2. UN proper shipping name
The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class	Not regulated
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated
DPC Hazard class	Not regulated

14.4 Packing group

DOT Packing group	Not regulated
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated
DPC Packing group	Not regulated

14.5 Environmental hazard
No

14.6 Special precautions

Not applicable

14.7 Transport in bulk according to Annex I/II of MARPOL 73/78 and the IBC Code
Please contact SDS@slb.com for info regarding transport in Bulk.

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Does not comply
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH
All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Crystalline silica (impurity)	N/A	N/A	N/A

California Proposition 65

This product does not contain chemical[s] which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

16. Other Information

Revision date 22/Jun/2020

Version 15

HMIS classification

Health	1*
Flammability	1
Physical hazard	0
PPE	E

*A mark of M-I L.L.C., a Schlumberger Company

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SDS no. PID10001
Version 9
Revision date 07/Aug/2020
Supersedes date 12/Jan/2017

Safety Data Sheet
VG-SUPREME*

1. Identification

1.1 Product identifier

Product name VG-SUPREME*

Product code PID10001

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Viscosifier.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

Schlumberger Canada, Ltd.
200, 125 - 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals) , Anne Karin (Anka) Fosse

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : +55 11 3197 5891

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Carcinogenicity	Category 1A
Specific target organ toxicity - Repeated exposure	Category 2

Environmental hazards Not classified

Physical Hazards

Combustible dust

2.2 Label elements

Signal word
DANGER

Hazard Statements
H350i - May cause cancer by inhalation
H373 - May cause damage to organs through prolonged or repeated exposure
May form combustible dust concentrations in air

Precautionary Statements
P201 - Obtain special instructions before use
P202 - Do not handle until all safety precautions have been read and understood
P280 - Wear protective gloves, protective clothing, eye protection
P308 + P313 - IF exposed or concerned: Get medical advice/attention
P314 - Get medical attention if you feel unwell
P501 - Dispose of contents/container in accordance with local, regional, national, and international regulations as applicable

P260 - Do not breathe dust, fume, gas, mist, vapors, spray
P240 - Ground/bond container and receiving equipment
P241 - Use explosion-proof electrical, ventilating, lighting, equipment
P243 - Take precautionary measures against static discharge

Unknown acute toxicity Not applicable.

3. Composition/information on Ingredients

3.1 Substances

Chemical Name	CAS No	Weight-%
Organophilic clay	Proprietary	60-100
Crystalline silica (impurity)	14808-60-7	<3

3.2 Mixtures

Not applicable

Comments
Proprietary component(s) in section 3 of this SDS does not/do not trigger application of trade secret exemption under Hazardous Materials Information Review Act (HMIRA). The proprietary component in this product contributes to combustible dust classification.

4. First Aid Measures

4.1 First aid measures

Inhalation — If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion — Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Get medical attention if symptoms occur.

Skin contact — Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention immediately if symptoms occur.

Eye Contact — Remove contact lenses, if worn. Promptly wash eyes with lots of water while lifting eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

General advice — The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Symptoms

Inhalation — Please see Section 11. Toxicological Information for further information.

Ingestion — Please see Section 11. Toxicological Information for further information.

Skin contact — Please see Section 11. Toxicological Information for further information.

Eye contact — Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician — Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Water spray, fog or regular foam, Carbon dioxide (CO_2), Dry powder, Dry sand.

Extinguishing media which must not be used for safety reasons
Do not use a solid water stream as it may scatter and spread fire.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
Dust may form explosive mixture in air.

Hazardous combustion products
Carbon oxides (COx), Hydrogen chloride gas, Nitrogen oxides (NOx).

5.3 Advice for firefighters

Special protective equipment and precautions for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. See also section 8. Extinguish all ignition sources. Avoid sparks, flames, heat and smoking.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Cover powder spill with plastic sheet or tarp to minimize spreading.

Methods for cleaning up
Sweep up and shovel into suitable containers for disposal. Avoid dust formation. Take precautionary measures against static discharges. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Avoid dust formation. Material becomes slippery when wet. Use caution if wet.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions	Ensure adequate ventilation. Keep airborne concentrations below exposure limits. Take precautionary measures against static discharges.
Storage precautions	Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from open flames, hot surfaces and sources of ignition. Protect from moisture. Avoid contact with:. Strong oxidizing agents.
Packaging materials	Use specially constructed containers only.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Component Information

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational	Brazil - Occupational Exposure Limits -	Mexico - Occupational

			Exposure Limits - TWAs (CMPs)	TWAs (LTs)	Exposure Limits - TWAs (LMPE-PPTs)
Organophilic clay	Not determined	Not determined	Not determined	Not determined	Not determined
Crystalline silica (impurity)	0.025 mg/m³	50 µg/m³ TWA respirable fraction	0.05 mg/m³ TWA	Not determined	0.025 mg/m³ TWA VLE-PPT (respirable fraction)

Crystalline silica (impurity)
OSHA - Final PELs - Table Z-3 Mineral Dusts
(250)/(%SiO2 + 5) mppcf TWA, respirable fraction; (10)/(%SiO2 + 2) mg/m³ TWA, respirable fraction

IDLH (Immediately Dangerous to Life or Health)
Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Organophilic clay	Not detemined
Crystalline silica (impurity) 14808-60-7	50 mg/m³ IDLH (respirable dust)

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation.

Personal protective equipment

Eye protection	Tightly fitting safety goggles.
Hand protection	Wear chemical resistant gloves such as nitrile or neoprene. Frequent change is advisable
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne particles of this product use at least a NIOSH-approved N95 half-mask disposable or re-useable particulate respirator. In work environments containing oil mist/aerosol use at least a NIOSH-approved P95 half-mask disposable or re-useable particulate respirator.
Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Solid
Appearance	Powder Dust
Color	Off-white
Odor	Odorless
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH	Not applicable	
pH @ dilution	No information available	
Melting point	No information available	
Boiling point	No information available	
Flash point	No information available	
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	1.7	
Bulk density	No information available	
Water solubility	Insoluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	
Partition Coefficient (n-octanol/water)	No information available	

Explosive properties	Suspended dust may present a dust explosion hazard
Oxidizing properties	None known.

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	None
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

Dust may form explosive mixture in air.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static charges. Protect from moisture. Avoid dust formation.

10.5 Incompatible materials

Strong oxidizing agents.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation Inhalation of dust in high concentration may cause irritation of respiratory system.

Eye contact Dust may cause mechanical irritation.

Skin contact Prolonged contact may cause redness and irritation.

Ingestion Ingestion may cause stomach discomfort.

LD50 Oral > 8000 mg/kg (rat) (based on similar product)

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Organophilic clay	5005 mg/kg (rat)	No data available	No data available
Crystalline silica (impurity)	No data available	No data available	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Organophilic clay	No data available	No data available	No data available	No data available
Crystalline silica (impurity)	Group 1; Monograph 100C [2012] Monograph 100C [2012] (listed under Crystalline silica inhaled in the form of quartz or cristobalite from occupational sources); Monograph 68 [1997] Group 1; Monograph 68 [1997]	A2 Suspected Human Carcinogen	Present	Known Human Carcinogen

Delayed and immediate effects and chronic effects from short and long term exposure

Sensitization This product does not contain any components suspected to be sensitizing.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity	Crystalline silica dust is listed by IARC in Group 1 as known to cause lung cancer in humans, if inhaled.
Reproductive toxicity	This product does not contain any known or suspected reproductive hazards.
Developmental toxicity	Not known to cause birth defects or have a deleterious effect on a developing fetus.
Routes of Exposure	Inhalation.
Routes of entry	Inhalation.
Specific target organ toxicity - Single exposure	Not classified
Specific target organ toxicity - Repeated exposure	Category 2.
Aspiration hazard	Not applicable.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
This product is not considered toxic to algae. PRODUCT: > 1000 mg/L (Marine alga; 48 hrs).

Toxicity to fish
This product is not considered toxic to fish.

Toxicity to daphnia and other aquatic invertebrates
This product is not considered toxic to invertebrates. PRODUCT: > 2000 mg/L (Marine invertebrate; 48 hrs).

Toxicology data for the components

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Organophilic clay	No information available	No information available	No information available
Crystalline silica (impurity)	LC50 Danio rerio (zebra fish) : > 10000 mg/l 96h	EC50: > 1000 mg/l 72h	LC50 Daphnia manga (Water flea): > 10000 mg/l 24h

12.2 Persistence and degradability

Product is not biodegradable.

12.3 Bioaccumulative potential

Does not bioaccumulate.

12.4 Mobility

Insoluble in water.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

The product component(s) are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method	Disposal should be made in accordance with federal, state and local regulations.
Contaminated packaging	Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT)	Not regulated
UN No. (MT/ANTT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG/ANTAQ)	Not regulated
UN No. (ICAO/ANAC)	Not regulated
UN No. (DPC)	Not regulated

14.2. UN proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class	Not regulated
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated
DPC Hazard class	Not regulated

14.4 Packing group

DOT Packing group	Not regulated
ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated
DPC Packing group	Not regulated

14.5 Environmental hazard

Marine pollutant	No

14.6 Special precautions

Not applicable

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Complies
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH

All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories

Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Organophilic clay	N/A	N/A	N/A
Crystalline silica (impurity)	N/A	N/A	N/A

California Proposition 65

WARNING

This product can expose you to chemicals including those listed below, which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Chemical Name	California Proposition 65
Crystalline silica (impurity) 14808-60-7	Carcinogen

16. Other Information

Supersedes date 12/Jan/2017

Revision date	07/Aug/2020
Version	9
This SDS has been revised in the following section(s)	All sections. No changes with regard to classification have been made.

HMIS classification

Health	1*
Flammability	1
Physical hazard	0
PPE	X

*A mark of M-I L.L.C., a Schlumberger Company

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SDS no. PID2234
Version 10
Revision date 13/Oct/2020
Supersedes date 17/Aug/2020

Safety Data Sheet
WALNUT NUTPLUG* (All Grades)

1. Identification

1.1 Product identifier

Product name WALNUT NUTPLUG* (All Grades)

Product code PID2234

Synonyms WALNUT NUT PLUG* FINE, WALNUT NUT PLUG* MEDIUM, WALNUT NUT PLUG* COARSE

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Lost circulation material.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.
P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
200 - 125, 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-780-962-8221

E-mail address SDS@slb.com

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals)

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Asia Pacific +65 3158 1074, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, USA +1 281 561 1600, Canada +1 800 579 7421, Argentina: +54 11 5984 3690, Brazil : +55 11 3197 5891

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Carcinogenicity	Category 1A
Specific target organ toxicity - Repeated exposure	Category 2

Environmental hazards Not classified

Physical Hazards

Combustible dust

2.2 Label elements

Signal word
DANGER

Hazard Statements
H350i - May cause cancer by inhalation
H373 - May cause damage to organs through prolonged or repeated exposure if inhaled
May form combustible dust concentrations in air

Precautionary Statements
P201 - Obtain special instructions before use
P202 - Do not handle until all safety precautions have been read and understood
P260 - Do not breathe dust, fume, gas, mist, vapors, spray
P280 - Wear protective gloves, protective clothing, eye protection
P308 + P313 - IF exposed or concerned: Get medical advice/attention

P240 - Ground/bond container and receiving equipment
P241 - Use explosion-proof electrical, ventilating, lighting, equipment
P243 - Take precautionary measures against static discharge

Hazards not otherwise classified
None known

Unknown acute toxicity Not applicable.

3. Composition/information on Ingredients

3.1 Substances

Chemical Name	CAS No	Weight-%
Cellulose	Proprietary	60-100
Crystalline silica (impurity)	14808-60-7	<1

3.2 Mixtures

Not applicable

Comments
Proprietary component(s) in section 3 of this SDS does not/do not trigger application of trade secret exemption under Hazardous

Materials Information Review Act (HMIRA). The proprietary component in this product contributes to combustible dust classification.

4. First Aid Measures

4.1 First aid measures

Inhalation — If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion — Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Get medical attention if symptoms occur.

Skin contact — Wash skin thoroughly with soap and water. Get medical attention if symptoms occur.

Eye Contact — Promptly wash eyes with lots of water while lifting eye lids. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

General advice — The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Symptoms

Inhalation — Please see Section 11. Toxicological Information for further information.

Ingestion — Please see Section 11. Toxicological Information for further information.

Skin contact — Please see Section 11. Toxicological Information for further information.

Eye contact — Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician — Treat symptomatically

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Water Fog, Alcohol Foam, CO_2, Dry Chemical.

Extinguishing media which must not be used for safety reasons
Do not use a solid water stream as it may scatter and spread fire.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
Combustible material. Dust may form explosive mixture in air.

Hazardous combustion products
Silicon oxide, Carbon oxides (COx).

5.3 Advice for firefighters

Special protective equipment and precautions for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Extinguish all ignition sources. Avoid sparks, flames, heat and smoking. Use personal protective equipment. See also section 8.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Cover powder spill with plastic sheet or tarp to minimize spreading.

Methods for cleaning up
Sweep up and shovel into suitable containers for disposal. Avoid dust formation. Take precautionary measures against static discharges. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Avoid dust formation.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions	Ensure adequate ventilation. Take precautionary measures against static discharges. Keep airborne concentrations below exposure limits.
Storage precautions	Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from open flames, hot surfaces and sources of ignition. Protect from moisture. Avoid contact with:. Oxidizing agents.
Packaging materials	Use specially constructed containers only.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Component Information

Chemical Name	ACGIH TLV	OSHA PEL	Argentina - Occupational Exposure Limits - TWAs (CMPs)	Brazil - Occupational Exposure Limits - TWAs (LTs)	Mexico - Occupational Exposure Limits - TWAs (LMPE-PPTs)
Cellulose	10 mg/m³	15 mg/m³ TWA 5 mg/m³ TWA	10 mg/m³ TWA	Not determined	10 mg/m³ TWA VLE-PPT
Crystalline silica (impurity)	0.025 mg/m³	50 µg/m³ TWA respirable fraction	0.05 mg/m³ TWA	Not determined	0.025 mg/m³ TWA VLE-PPT (respirable fraction)

Crystalline silica (impurity)
OSHA - Final PELs - Table Z-3 Mineral Dusts
(250)/(%SiO2 + 5) mppcf TWA, respirable fraction; (10)/(%SiO2 + 2) mg/m³ TWA, respirable fraction

IDLH (Immediately Dangerous to Life or Health)
Immediately Dangerous to Life or Health (IDLH) is established by the US National Institute for Occupational Safety and Health (NIOSH). The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protection equipment every effort should be made to exit immediately.

Chemical Name	IDLH (Immediately Dangerous to Life or Health)
Cellulose	Not detemined
Crystalline silica (impurity) 14808-60-7	50 mg/m³ IDLH (respirable dust)

8.2 Exposure controls

A risk assessment is recommended to be performed by a qualified and trained personnel to analyze the worksite and recommends the appropriate controls such as engineering controls, work practice controls, and administrative controls as primary means of reducing employee exposure. When there is a remaining hazards after applying the primary controls, Personal Protective Equipment (PPE) must be used.

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation. Mechanical ventilation or local exhaust ventilation is required.

Personal protective equipment

Eye protection	Tightly fitting safety goggles.
Hand protection	Use protective gloves made of: Neoprene Nitrile Frequent change is advisable
Respiratory Protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.If exposed to airborne particles of this product use at least a NIOSH-approved N95 half-mask disposable or re-useable particulate respirator. In work environments containing oil mist/aerosol use at least a NIOSH-approved P95 half-mask disposable or re-useable particulate respirator.
Skin and body protection	Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.
Hygiene Measures	Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing

before re-use.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state	Solid
Appearance	No information available
Color	Light brown
Odor	Odorless
Odor threshold	Not applicable

Property	Values	Remarks
pH	No information available	
pH @ dilution	No information available	
Melting point	No information available	
Boiling point	No information available	
Flash point	193 °C / 380 °F	PMCC
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	1.1 - 1.4	@ 20 °C
Bulk density	577-641 kg/m³/36-40 lb/ft3	
Water solubility	Insoluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available Not applicable	
Dynamic viscosity	No information available	
Partition Coefficient (n-octanol/water)	Not determined	

Explosive properties	Suspended dust may present a dust explosion hazard
Oxidizing properties	None known.

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	None
Density	No information available

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

Combustible material. Dust may form explosive mixture in air.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Keep away from open flames, hot surfaces and sources of ignition. Avoid dust formation. Take precautionary measures against static charges. Protect from moisture.

10.5 Incompatible materials

Oxidizing agents.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Product information This product contains a small quantity of quartz, crystalline silica. Prolonged and repeated exposure to concentrations of crystalline silica exceeding the workplace exposure limit (WEL) may lead to chronic lung disease such as silicosis.

Inhalation May cause cancer by inhalation. May cause damage to organs through prolonged or repeated exposure. Inhalation of dust in high concentration may cause irritation of respiratory system.

Eye contact Dust may cause mechanical irritation.

Skin contact Prolonged contact may cause redness and irritation.

Ingestion Ingestion may cause stomach discomfort.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Cellulose	5005 mg/kg (rat)	2002 mg/kg (Rabbit)	No data available
Crystalline silica (impurity)	No data available	No data available	No data available

Chemical Name	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Cellulose	No data available	No data available	No data available	Known Human Carcinogen
Crystalline silica (impurity)	Group 1; Monograph 100C [2012] Monograph 100C [2012] (listed under Crystalline silica inhaled in the form of quartz or cristobalite from	A2 Suspected Human Carcinogen	Present	Known Human Carcinogen

	occupational sources); Monograph 68 [1997] Group 1; Monograph 68 [1997]			

Delayed and immediate effects and chronic effects from short and long term exposure

Sensitization This product does not contain any components suspected to be sensitizing.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity Contains a known or suspected carcinogen. Crystalline silica dust is listed by IARC in Group 1 as known to cause lung cancer in humans, if inhaled.

Reproductive toxicity This product does not contain any known or suspected reproductive hazards.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of Exposure Skin contact. Inhalation. Eye contact.

Routes of entry Inhalation.

Specific target organ toxicity - Single exposure Not classified

Specific target organ toxicity - Repeated exposure Category 2.

Target organ effects Lungs.

Aspiration hazard Not applicable.

12. Ecological Information

12.1 Toxicity

Toxicity to algae
This product is not considered toxic to algae.

Toxicity to fish
This product is not considered toxic to fish.

Toxicity to daphnia and other aquatic invertebrates
This product is not considered toxic to invertebrates.

Toxicology data for the components

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Cellulose	No information available	No information available	No information available
Crystalline silica (impurity)	LC50 Danio rerio (zebra fish) : > 10000 mg/l 96h	EC50: > 1000 mg/l 72h	LC50 Daphnia manga (Water flea): > 10000 mg/l 24h

12.2 Persistence and degradability

Not Applicable - Inorganic chemical.

12.3 Bioaccumulative potential

Not Applicable - Inorganic chemical.

12.4 Mobility

Insoluble in water.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

The product component(s) are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal Method	Disposal should be made in accordance with federal, state and local regulations.
Contaminated packaging	Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number

UN No. (DOT)	Not regulated
UN No. (MT/ANTT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG/ANTAQ)	Not regulated
UN No. (ICAO/ANAC)	Not regulated
UN No. (DPC)	Not regulated

14.2. UN proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class	Not regulated
ANTT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated
DPC Hazard class	Not regulated

14.4 Packing group

DOT Packing group	Not regulated

ANTT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated
DPC Packing group	Not regulated

14.5 Environmental hazard

Marine pollutant No

14.6 Special precautions

Not applicable

15. Regulatory Information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Complies
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Europe - REACH

All products supplied from the European Economic Area (EEA) are compliant with the REACH Regulation EC 1907/2006.For products supplied from the EEA, Schlumberger and/or its suppliers have pre-registered and is registering all of the substances that it and/or its suppliers manufactures in or imports into the EEA that are subject to Title II of the REACH Regulation. All products supplied from outside the EEA are subject to REACH only if imported into the EEA. The importer of the products must comply with REACH for each imported substance. Contact REACH@slb.com for REACH information.

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories

Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Chemical Name	SARA 302 / TPQs	SARA 313	CERCLA RQ
Cellulose	N/A	N/A	N/A
Crystalline silica (impurity)	N/A	N/A	N/A

California Proposition 65

WARNING

This product can expose you to chemicals including those listed below, which is [are] known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Chemical Name	California Proposition 65
Crystalline silica (impurity) 14808-60-7	Carcinogen

Canadian Classification

This Safety Data Sheet has been prepared in compliance with the Hazardous Products Regulations.

Brazil Regulation This SDS was prepared in accordance with Brazil law NBR 14725.

Federal Police Not determined

Army Not determined

ANVISA Not determined

16. Other Information

Supersedes date 17/Aug/2020

Revision date 13/Oct/2020

Version 10

This SDS has been revised in the following section(s) 15, 16 No changes with regard to classification have been made.

HMIS classification

Health	3*
Flammability	1
Physical hazard	0
PPE	X

N/A - Not Applicable, N/D - Not Determined.

*A mark of M-I L.L.C., a Schlumberger Company

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SDS no. 12153
Version 1
Revision date 18/Jun/2014
Supersedes date 16/Mar/2011

Safety Data Sheet
WATER BASED MUD (GENERIC)

1. Identification

1.1 Product identifier

Product name WATER BASED MUD (GENERIC)

Product code 12153

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Drilling fluid system.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.

P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals) , Mike McDowell

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Australia +61 2801 44558, Asia Pacific +65 3158 1074, China +86 10 5100 3039, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, New Zealand +64 9929 1483, USA 001 281 561 1600

2. Hazards identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Acute oral toxicity	Category 4
Acute inhalation toxicity - dust/mist	Category 4
Skin corrosion/irritation	Category 2
Serious eye damage/eye irritation	Category 2
Carcinogenicity	Category 1A

Environmental hazards Not classified

Physical Hazards Not classified

2.2 Label elements

Signal word
DANGER

Hazard statements
H302 - Harmful if swallowed
H315 - Causes skin irritation
H319 - Causes serious eye irritation
H332 - Harmful if inhaled
H350 - May cause cancer

Precautionary statements
P201 - Obtain special instructions before use
P281 - Use personal protective equipment as required
P308 + P313 - IF exposed or concerned: Get medical advice/ attention

Supplementary precautionary statements
P202 - Do not handle until all safety precautions have been read and understood
P261 - Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray
P264 - Wash face, hands and any exposed skin thoroughly after handling
P270 - Do not eat, drink or smoke when using this product
P271 - Use only outdoors or in a well-ventilated area
P280 - Wear protective gloves/ protective clothing/ eye protection/ face protection
P301 + P312 - IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell
P302 + P352 - IF ON SKIN: Wash with plenty of soap and water
P304 + P340 - IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P312 - Call a POISON CENTER or doctor/physician if you feel unwell
P321 - Specific treatment (see supplemental first aid instructions on this label)
P330 - Rinse mouth
P332 + P313 - If skin irritation occurs: Get medical advice/ attention
P337 + P313 - If eye irritation persists: Get medical advice/attention
P362 - Take off contaminated clothing and wash before reuse
P501 - Dispose of contents/ container to an approved waste disposal plant

Unknown acute toxicity 5.5% of the mixture consists of ingredient(s) of unknown toxicity.

3. Composition/information on Ingredients

3.1 Substances

Not Applicable

3.2 Mixtures

Component	CAS-No	Weight % - range

Barite	7727-43-7	10 - 30
Bentonite	1302-78-9	5 - 10
Sodium chloride	7647-14-5	5 - 10
Silica, crystalline, quartz	14808-60-7	1 - 5
Sodium hydroxide	1310-73-2	0.1 - 1
Calcium hydroxide	1305-62-0	0.1 - 1

Comments
The product contains other ingredients which do not contribute to the overall classification.

4. First aid measures

4.1 First-Aid Measures

Inhalation Move to fresh air. If breathing is difficult, (trained personnel should) give oxygen. If not breathing, give artificial respiration. Get medical attention immediately if symptoms occur.

Ingestion Drink 1 or 2 glasses of water. Get medical attention if symptoms occur.

Skin contact Wash off with soap and water. Remove contaminated clothing and shoes. Get medical attention if irritation persists.

Eye contact Rinse with plenty of water. Get medical attention if any discomfort continues.

4.2 Most important symptoms and effects, both acute and delayed

Main symptoms

Inhalation Please see Section 11. Toxicological Information for further information.

Ingestion Please see Section 11. Toxicological Information for further information.

Skin contact Please see Section 11. Toxicological Information for further information.

Eye contact Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician Treat symptomatically

5. Fire-fighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Fog, Alcohol Foam, CO_2, Dry Chemical.

Extinguishing media which shall not be used for safety reasons
None known.

5.2 Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
None known.

Hazardous combustion products
Carbon oxides (COx), Silicon oxide, Sodium oxides.

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

6. Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Evacuate personnel to safe areas. Use personal protective equipment. If spilled, take caution, as material can cause surfaces to become very slippery.

6.2 Environmental precautions

Do not allow spilled material to enter sewers, storm drains or surface waters.

Environmental exposure controls
No information available.

6.3 Methods and materials for containment and cleaning up

Methods for cleaning up
Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Sweep up and shovel into suitable containers for disposal.

6.4 Reference to other sections

No information available.

7. Handling and storage

7.1 Precautions for safe handling

Handling
Avoid breathing vapors or mists. Avoid contact with skin, eyes and clothing. Wear personal protective equipment.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Ensure adequate ventilation.

Storage precautions Keep container/package tightly closed and in a well-ventilated place. Follow safe warehousing practices regarding palletizing, banding, shrink-wrapping and/or stacking.

8. Exposure controls/personal protection

8.1 Control parameters

Component Information

Component	ACGIH TLV	OSHA PEL
Barite	10 mg/m³	15 mg/m³ (total); 5 mg/m³ (resp)
Bentonite	Not Determined	Not Determined
Sodium chloride	Not Determined	Not Determined
Silica, crystalline, quartz	0.025 mg/m³	see Table Z-3
Sodium hydroxide	2 mg/m³ (ceiling)	2 mg/m³
Calcium hydroxide	5 mg/m³	5 mg/m³ (resp); 15 mg/m³ (total)

Silica, crystalline, quartz

OSHA - Final PELs - Table Z-3 Mineral Dusts
(30)/(%SiO2 + 2) mg/m³ TWA, total dust; (250)/(%SiO2 + 5) mppcf TWA, respirable fraction; (10)/(%SiO2 + 2) mg/m³ TWA, respirable fraction

8.2 Exposure controls

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering measures to reduce exposure
Ensure adequate ventilation, especially in confined areas.

Personal protective equipment

Eye protection	Tightly fitting safety goggles.
Hand protection	Gloves- Neoprene, Nitrile Unless Specified.
Respiratory protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent. If exposed to airborne mist/aerosol of this product, use at least a NIOSH-approved N95 half-mask disposable or re-usable particulate respirator. In work environments containing oil mist/aerosol, use at least a NIOSH-approved P95 half-mask disposable or reuseable particulate respirator. If exposed to vapors from this product use a NIOSH/MSHA-approved respirator with an Organic Vapor cartridge.
Skin and body protection	Wear suitable protective clothing.

9. Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state	Liquid
Appearance	Opaque
Color	Tan - Gray
Odor	Characteristic
Odor threshold	Not applicable

Property	Values	Remarks
pH		
pH @ dilution		
Melting/freezing point		
Boiling point/range	No information available	
Flash point	> 93.3 °C / > 200 °F	PMCC
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not Applicable	
Flammability Limits in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	No information available	
Bulk density	No information available	
Water solubility	Soluble	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	

Decomposition temperature	No information available
Kinematic viscosity	No information available
Dynamic viscosity	10 - 220 cPs @ 78°F / 25.5°C
Log Pow	No information available
Explosive properties	No information available
Oxidizing properties	No information available

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	No information available
Density	No information available

10. Stability and reactivity

10.1 Not chemically reactive.

No specific reactivity hazards associated with this product.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

Hazardous Reactions
None known.

10.4 Conditions to avoid

Avoid extreme temperatures.

10.5 Incompatible materials

Oxidizing agents.

10.6 Hazardous decomposition products

Carbon oxides (COx). Silicon oxide. Sodium oxides.

11. Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Inhalation	Inhalation of vapors in high concentration may cause irritation of respiratory system. Breathing dried dust or spray mist may irritate respiratory tract.
Eye contact	Causes eye irritation.
Skin contact	May cause skin irritation and/or dermatitis. Repeated exposure may cause skin dryness or cracking.
Ingestion	Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Barite	No data available	No data available	No data available
Bentonite	> 5000 mg/kg (Rat)	No data available	No data available
Sodium chloride	= 3 g/kg (Rat)	> 10 g/kg (Rabbit)	> 42 g/m³ (Rat) 1 h
Silica, crystalline, quartz	= 500 mg/kg (Rat)	No data available	No data available
Sodium hydroxide	No data available	= 1350 mg/kg (Rabbit)	No data available
Calcium hydroxide	= 7340 mg/kg (Rat)	No data available	No data available

Component	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Barite	No data available	No data available	No data available	No data available
Bentonite	No data available	No data available	No data available	No data available
Sodium chloride	No data available	No data available	No data available	No data available
Silica, crystalline, quartz	Group 1; Monograph 100C [in preparation] Group 1; Monograph 68 [1997] Monograph 100C [in preparation] (listed under Crystalline silica inhaled in the form of quartz or cristobalite from occupational sources); Monograph 68 [1997]	A2 Suspected Human Carcinogen	Present	Known Human Carcinogen
Sodium hydroxide	No data available	No data available	No data available	No data available
Calcium hydroxide	No data available	No data available	No data available	No data available

Sensitization This product does not contain any components suspected to be sensitizing.

Mutagenic effects No evidence of mutagenic properties.

Carcinogenicity Contains a known or suspected carcinogen.

Reproductive toxicity No evidence of toxicity to reproduction.

Developmental toxicity Not known to cause birth defects or have a deleterious effect on a developing fetus.

Routes of exposure Skin contact. Inhalation. Eyes.

Routes of entry Inhalation.

Specific target organ toxicity (single exposure) Not classified

Specific target organ toxicity (repeated exposure) Not classified.

Aspiration hazard Not Applicable.

12. Ecological information

12.1 Toxicity

Toxicity to algae
See component information below.

Toxicity to fish
See component information below.

Toxicity to daphnia and other aquatic invertebrates
See component information below.

Component	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Barite 7727-43-7 (10 - 30)	No information available	No information available	No information available
Bentonite 1302-78-9 (5 - 10)	19000 mg/L LC50 (Oncorhynchus mykiss) = 96 h 8.0 - 19.0 g/L LC50 (Salmo gairdneri) = 96 h	No information available	No information available
Sodium chloride 7647-14-5 (5 - 10)	5560 - 6080 mg/L LC50 (Lepomis macrochirus) = 96 h 12946 mg/L LC50 (Lepomis macrochirus) = 96 h 4747 - 7824 mg/L LC50 (Oncorhynchus mykiss) = 96 h 7050 mg/L LC50 (Pimephales promelas) = 96 h 6420 - 6700 mg/L LC50 (Pimephales promelas) = 96 h 6020 - 7070 mg/L LC50 (Pimephales promelas) = 96 h	No information available	340.7 - 469.2 mg/L EC50 (Daphnia magna) = 48 h 1000 mg/L EC50 (Daphnia magna) = 48 h
Silica, crystalline, quartz 14808-60-7 (1 - 5)	No information available	No information available	No information available
Sodium hydroxide 1310-73-2 (0.1 - 1)	45.4 mg/L LC50 (Oncorhynchus mykiss) = 96 h	No information available	No information available
Calcium hydroxide 1305-62-0 (0.1 - 1)	160 mg/L LC50 (Gambusia affinis) = 96 h	No information available	No information available

12.2 Persistence and degradability

No product level data available.

12.3 Bioaccumulative potential

No product level data available.

12.4 Mobility in soil

No information available.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal considerations

13.1 Waste treatment methods

Disposal Method Disposal should be made in accordance with federal, state and local regulations.

Contaminated packaging Do not burn, or use a cutting torch on, the empty drum. Empty containers may contain flammable or explosive vapors. Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1 UN Number

UN No. (DOT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG)	Not regulated
UN No. (ICAO)	Not regulated

14.2 Proper shipping name

Not regulated for transportation by DOT, TDG, IMDG and ICAO/IATA.

14.3 Hazard class(es)

DOT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG Hazard class	Not regulated
ICAO Hazard class/division	Not regulated

14.4 Packing group

DOT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG Packing group	Not regulated
ICAO Packing group	Not regulated

14.5 Environmental hazard

No

14.6 Special precautions

Not Applicable

15. Regulatory information

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
European Union (EINECS and ELINCS)	Does not Comply
Philippines (PICCS)	Does not Comply
Japan (ENCS)	Does not Comply
China (IECSC)	Does not Comply

Australia (AICS)	Does not Comply
Korean (KECL)	Does not Comply
New Zealand (NZIoC)	Does not Comply

U.S. Federal and State Regulations

Component	SARA 302 / TPQs	SARA 313	CERCLA RQ
Barite	N/A	N/A	N/A
Bentonite	N/A	N/A	N/A
Sodium chloride	N/A	N/A	N/A
Silica, crystalline, quartz	N/A	N/A	N/A
Sodium hydroxide	N/A	N/A	1000 lb final RQ 454 kg final RQ
Calcium hydroxide	N/A	N/A	N/A

State Comments
Proposition 65: This product contains chemical(s) considered by the State of California's Safe Drinking Water and Toxic Enforcement Act of 1986 to cause cancer and/or reproductive toxicity. See table under U.S. Federal and State Regulations for the specific chemicals.

Silica, crystalline, quartz
carcinogen

This product has been classified in accordance with the hazard criteria of the CPR and the SDS contains all the information required by the CPR.

16. Other information

Supersedes date 16/Mar/2011

Revision date 18/Jun/2014

Version 1

HMIS classification

Health	1*
Flammability	1
Physical hazard	0
PPE	J

N/A - Not Applicable, N/D - Not Determined.

Disclaimer
The information contained herein is considered in good faith as reliable of the date issued and is based upon on measurements, tests or data derived from supplier's own study or furnished by others. In providing this SDS information, Supplier makes no express or implied warranties as to the information or product; merchantability or fitness of purpose; any express or implied warranty; or non-infringement of intellectual property rights; and supplier assumes no responsibility for any direct, special or consequential damages, results obtained, or the activities of others. To the maximum extent permitted by law, supplier's warranty obligations and buyer's sole remedies are as stated in separate agreement between the parties.

Safety Data Sheets: 4421 Kendex OCTG; Best O Life 72733; Jet-Lube API- Modified – Casing;

Waste Stream: Casing Protectors

EPA Waste Profile Sheet Number: 201440506-012

Material Safety Data Sheet

Prepared according to 29 CFR 1910.1200

1. Chemical Product and Company Identification

American Refining Group, Inc.
77 North Kendall Avenue
Bradford, PA 16701 USA
Tel: (814) 368.1200
www.amref.com

Product Name	Kendex® OCTG
Product Code	4421
CAS Number	Not applicable for mixtures
Synonyms	Piping Dope, Grease
Generic Chemical Name	Petroleum distillate
Product Type	Mixture
Transportation Emergency Phone No.	Chemtrec: 1-800-424-9300 (24 HRS)
ARG Emergency Phone No.	814-368-1297 (24 HRS)
MSDS E-Mail	msds@amref.com

2. Hazards Identification

Appearance	Orange grease
Odor	Petroleum Oil
Signal Word	None
	May cause eye irritation
	May cause skin irritation
OSHA Regulatory Status	This material is NOT considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200)
Primary Routes of Exposure	Inhalation, skin adsorption
Precautions	
Inhalation	Avoid breathing dust/fume/gas/mist/vapors/spray. Keep container tightly closed. Use only with adequate ventilation.
Eyes	Avoid contact with eyes. Wash thoroughly after handling.
Skin	Avoid contact with skin and clothing. Wash thoroughly after handling.
Chronic Effects	See Section 11 for complete health hazard information
Environmental Effects	See Section 12 for complete ecological information

3. Composition / Information on Ingredients

This product does not contain hazardous ingredients

4. First Aid Measures

4. First Aid Measures

Eyes	Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.
Skin	In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.
Inhalation	Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.
Ingestion	If conscious, rinse out mouth with water. Get medical attention immediately.
Note to Physicians	No specific treatment. Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

5. Fire Fighting Measures

Flammable Properties
This product poses no unusual fire-fighting problems.
Extinguishing Media
Use dry chemical, CO_2, water spray (FOG) or foam
Specific Hazards Arising from Chemical
Elevated temperatures can lead to the formation of irritating fumes and vapors. Decomposition products may include the following materials: Oxides of sulfur, oxides of carbon, oxides of calcium
Protective Equipment and Precautions for Firefighters
Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

6. Accidental Release Measures

Personal Precautions
No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
Environmental Precautions
Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution.
Methods for Containment
Stop leak if without risk.
Methods for Cleanup
Move containers from spill area. Approach release from upwind. Absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

7. Handling and Storage

Handling Procedures

Eating, drinking, and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. Do not get in eyes or on skin or clothing. Do not ingest. Avoid breathing vapor or mist. Use only with adequate ventilation. Use non-sparking tools.

Shipping and Storing Procedures

Maximum storage temperature is 93℃. Store in accordance with local regulations. Store in a segregated and approved area. Keep in the original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials. Do not store in unlabeled containers. Store and use away from heat, sparks, open flame or any other ignition source. Take precautionary measures against electrostatic discharges. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. Empty containers that retain product residue may be hazardous. Do not reuse container.

8. Exposure Controls / Personal Protection

Component Exposure Limits: None

Engineering Controls	None normally required. Use additional ventilation if needed to control vapor concentrations particularly if a mist is generated or fumes from hot material are present.
Eye/Face Protection	Chemical goggles or face shield.
Skin Protection	Use neoprene type gloves and apron
Respiratory Protection	None required if area is adequately ventilated. Use appropriate respiratory protection if used in confined areas. If used in an application where a mist may be generated, observe a TWA/PEL of 5 mg/m^3 (OSHA, ACGIH) for a mineral oil mist. Use a respirator with dual organic vapor/mist arid particulates cartridge if vapor concentration exceeds permissible exposure limit.
General Hygiene	Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing.

9. Physical and Chemical Properties

Appearance	Orange	**Vapor Pressure** (mm Hg at 20℃)	<.0003
Odor	Petroleum oil	**Water Soluble**	No
Physical State	Grease like	**Specific Gravity** (g/cc)	.948
Flash Point (℉)	>356	**Density** (lbs/gal)	7.89
Boiling Point (℉)	700-860	**pH**	Not available

10. Chemical Stability & Reactivity Information

Stability	Stable under normal conditions
Polymerization	No polymerization

10. Chemical Stability & Reactivity Information

Incompatibility	Strong acids and oxidizing materials
Conditions to Avoid	High temperatures
Hazardous Decomposition Products	Oxides of carbon (carbon monoxide, carbon dioxide), oxides of hydrogen (water), oxides of sulfur (sulfur dioxide), and oxides of calcium are all formed from burning.

11. Toxicological Information

Acute Exposure

Respiratory Irritation	Not expected to cause respiratory tract irritation.
Eye Irritation	May cause eye irritation.
Skin Irritation	May cause skin irritation.
Sensitization	Not expected to cause skin or respiratory sensitization.

Chronic Exposure

Target Organ Effects	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Carcinogenicity	No data available to indicate product or components present at greater than .1% are carcinogens.
Mutagenicity	No data available to indicate product or any components present at greater than .1% are mutagenic or genotoxic.
Reproductive Toxicity	No data available to indicate product or any components present at greater than .1% are a reproductive toxin.
Teratogenicity	No data available to indicate product or any components contained at greater than .1% may cause birth defects.

12. Ecological Information

Component Analysis- Ecotoxicity – Aquatic Life

Duration/Test/Species	Concentration/Conditions
96 Hr LC50 Pimephales promelas	N/A mg/L

Degradability	Not determined
Bioaccumulation	Not determined
Soil Mobility	Not determined

13. Disposal Considerations

Disposal Instructions

Not a hazardous waste if disposed of as is, by the definitions of the U.S. EPA. Dispose of properly complying with appropriate laws and regulations.

14. Transportation Information

Emergency Response Guide No. 128 *North American Emergency Response Guide Book*

Not regulated for transport unless shipped hot, at temperatures greater than 212°F but below the flash point and in containers of 450 liters (119 gallons) or more. For these conditions, please see below.

	UN Number	Shipping Name (technical name)	Hazard Class	Packing Group	Labels/Placard*
U.S. DOT Bulk	3257	Elevated temperature liquid, N.O.S. (65 Petroleum oil)	9	III	Bulk container must be labeled on two opposing sides
U.S. DOT Non-Bulk	Not Regulated				

*NOTE: If loading >625F, this classification will change

15. Regulatory Information

SARA Extremely Hazardous Substances (Sections 302 & 304) This product does not contain greater than 1% of any "extremely hazardous substances" listed pursuant to Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) Section 302 or Section 304 as identified in 40 CFR Part 355, Appendix A and B.

SARA Section 313 This product does not contain greater than 1.0% of the substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

SARA Section 311 & 312 Classifications

Acute Hazard	No
Chronic Hazard	No
Fire Hazard	No
Reactivity Hazard	No

CERCLA This product does not contain any "hazardous substances" listed under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) in 40 CFR Part 302, Table 302.4.

Global Chemical Inventories

Inventory	Component
	All components
US TSCA	Present
EU	Present

Inventory	Component
Japan	Present
Australia	Present
New Zealand	Not available
Canada	Present
Switzerland	Not available
Korea	Present
Philippines	Not available
China	Present
Taiwan	Not available

16. Other Information

US NFPA Ratings

Health	Fire	Instability
1	1	0

HMIS Ratings

Health	Fire	Physical Hazards
1	1	0

Preparation/Revision Date 5/14/2012
Revision Reason MSDS out of date
Prepared By: Jenna Prechtl, Product Compliance Coordinator

The information provided on this MSDS is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of MSDS

SAFETY DATA SHEET

72733

Version	Revision Date:	SDS Number:	Date of last issue: 10/31/2017
10.0	11/20/2017	115248-00016	Date of first issue: 05/12/2015

SECTION 1. IDENTIFICATION

Product name : 72733

SDS-Identcode : 463G

Manufacturer or supplier's details

Company name of supplier : Bestolife Corporation

Address : 2777 N. Stemmons Frwy Ste 1800
Dallas TX 75207,

Telephone : 855-243-9164/972-865-8961

Telefax : 214-631-3047

E-mail address : www.bestolife.com

Recommended use of the chemical and restrictions on use

Recommended use : Industrial use
Thread Compound (Pipe Dope) and Jacking grease for use in Offshore industries
Mining, (without offshore industries)

Restrictions on use : Do not use on oxygen lines or in oxygen enriched atmospheres.

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with the Hazardous Products Regulations

Carcinogenicity : Category 2

Reproductive toxicity : Category 1A

Effects on or via lactation

Specific target organ systemic toxicity - repeated exposure : Category 1 (Kidney, Central nervous system, Blood)

GHS label elements

Hazard pictograms :

Signal Word : Danger

Hazard Statements : H351 Suspected of causing cancer.
H360FD May damage fertility. May damage the unborn child.
H362 May cause harm to breast-fed children.
H372 Causes damage to organs (Kidney, Central nervous system, Blood) through prolonged or repeated exposure.

Precautionary Statements :

Prevention:

P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P260 Do not breathe dust/ fume/ gas/ mist/ vapors/ spray.
P263 Avoid contact during pregnancy and while nursing.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response:

P308 + P313 IF exposed or concerned: Get medical advice/ attention.

Storage:

P405 Store locked up.

Disposal:

P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards

None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

Hazardous ingredients

Chemical name	CAS-No.	Concentration (% w/w)
Distillates (petroleum), hydrotreated heavy naphthenic	64742-52-5	>= 30 - < 50
Lead	7439-92-1	>= 30 - < 50
Graphite	7782-42-5	>= 10 - < 20
Copper metal powder	7440-50-8	>= 1 - < 5
Talc	14807-96-6	>= 1 - < 5
Quartz	14808-60-7	>= 1 - < 5
12-Hydroxy lithium stearate	7620-77-1	>= 1 - < 5
Distillates (petroleum), hydrotreated light naphthenic	64742-53-6	>= 1 - < 5
Barium bis(di C8-C10, branched, C9 rich, alkylnaphthalenesulphonate)	25619-56-1	>= 1 - < 5

SECTION 4. FIRST AID MEASURES

General advice	:	In the case of accident or if you feel unwell, seek medical advice immediately. When symptoms persist or in all cases of doubt seek medical advice.
If inhaled	:	If inhaled, remove to fresh air. Get medical attention.
In case of skin contact	:	In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
In case of eye contact	:	Flush eyes with water as a precaution. Get medical attention if irritation develops and persists.
If swallowed	:	If swallowed, DO NOT induce vomiting. Get medical attention. Rinse mouth thoroughly with water.
Most important symptoms and effects, both acute and delayed	:	Suspected of causing cancer. May damage fertility. May damage the unborn child. May cause harm to breast-fed children. Causes damage to organs through prolonged or repeated exposure.
Protection of first-aiders	:	First Aid responders should pay attention to self-protection, and use the recommended personal protective equipment when the potential for exposure exists.
Notes to physician	:	Treat symptomatically and supportively.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media	:	Water spray Alcohol-resistant foam Carbon dioxide (CO2) Dry chemical
Unsuitable extinguishing media	:	None known.
Specific hazards during fire fighting	:	Exposure to combustion products may be a hazard to health.
Hazardous combustion products	:	Carbon oxides Lead compounds Metal oxides Silicon oxides Sulfur oxides
Specific extinguishing methods	:	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Use water spray to cool unopened containers.
Remove undamaged containers from fire area if it is safe to do so.
Evacuate area.

Special protective equipment for fire-fighters : In the event of fire, wear self-contained breathing apparatus.
Use personal protective equipment.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures : Use personal protective equipment.
Follow safe handling advice and personal protective equipment recommendations.

Environmental precautions : Discharge into the environment must be avoided.
Prevent further leakage or spillage if safe to do so.
Retain and dispose of contaminated wash water.
Local authorities should be advised if significant spillages cannot be contained.

Methods and materials for containment and cleaning up : Sweep up or vacuum up spillage and collect in suitable container for disposal.
Local or national regulations may apply to releases and disposal of this material, as well as those materials and items employed in the cleanup of releases. You will need to determine which regulations are applicable.
Sections 13 and 15 of this SDS provide information regarding certain local or national requirements.

SECTION 7. HANDLING AND STORAGE

Technical measures : See Engineering measures under EXPOSURE CONTROLS/PERSONAL PROTECTION section.

Advice on safe handling : Do not get on skin or clothing.
Do not swallow.
Avoid contact with eyes.
Handle in accordance with good industrial hygiene and safety practice, based on the results of the workplace exposure assessment
Keep container tightly closed.
Take care to prevent spills, waste and minimize release to the environment.

Conditions for safe storage : Keep in properly labeled containers.
Store locked up.
Keep tightly closed.
Store in accordance with the particular national regulations.

Materials to avoid : Do not store with the following product types:
Strong oxidizing agents
Organic peroxides
Explosives

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Ingredients with workplace control parameters

Ingredients	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
Distillates (petroleum), hydrotreated heavy naphthenic	64742-52-5	TWA (Mist)	5 mg/m³	CA AB OEL
		STEL (Mist)	10 mg/m³	CA AB OEL
		TWAEV (Mist)	5 mg/m³	CA QC OEL
		STEV (Mist)	10 mg/m³	CA QC OEL
		TWA (Mist)	1 mg/m³	CA BC OEL
		TWA (Inhalable fraction)	5 mg/m³	ACGIH
Lead	7439-92-1	TWA	0.05 mg/m³	CA AB OEL
		TWA	0.05 mg/m³	CA BC OEL
		TWA	0.05 mg/m³ (Lead)	CA ON OEL
		TWAEV	0.05 mg/m³ (Lead)	CA QC OEL
		TWA	0.05 mg/m³ (Lead)	ACGIH
Graphite	7782-42-5	TWA (Respirable)	2 mg/m³	CA BC OEL
		TWA (Respirable)	2 mg/m³	CA AB OEL
		TWAEV (Respirable fibres)	5 mg/m³	CA QC OEL
		TWAEV (Total fibres)	10 mg/m³	CA QC OEL
		TWAEV (respirable dust)	2 mg/m³	CA QC OEL
		TWA (Respirable fraction)	2 mg/m³	ACGIH
Copper metal powder	7440-50-8	TWA (Fumes)	0.2 mg/m³	CA AB OEL
		TWA (Dust and mist)	1 mg/m³ (Copper)	CA AB OEL
		TWAEV (dusts and mists)	1 mg/m³ (Copper)	CA QC OEL
		TWAEV (Fumes)	0.2 mg/m³ (Copper)	CA QC OEL
		TWA (Dust and mists)	1 mg/m³ (Copper)	CA BC OEL

		TWA (Fumes)	0.2 mg/m³ (Copper)	CA BC OEL
		TWA (Dust and mist)	1 mg/m³ (Copper)	ACGIH
		TWA (Fumes)	0.2 mg/m³ (Copper)	ACGIH
Talc	14807-96-6	TWAEV (respirable dust)	3 mg/m³	CA QC OEL
		TWA (Respirable particulates)	2 mg/m³	CA AB OEL
		TWA (Respirable)	2 mg/m³	CA BC OEL
		TWA	2 fibres per cubic centimeter	CA ON OEL
		TWA (Respirable fraction)	2 mg/m³	CA ON OEL
		TWA (Respirable fraction)	2 mg/m³	ACGIH
Quartz	14808-60-7	TWA (Respirable fraction)	0.1 mg/m³	CA ON OEL
		TWA (Respirable particulates)	0.025 mg/m³	CA AB OEL
		TWAEV (respirable dust)	0.1 mg/m³	CA QC OEL
		TWA (Respirable)	0.025 mg/m³ (Silica)	CA BC OEL
		TWA (Respirable fraction)	0.025 mg/m³ (Silica)	ACGIH
12-Hydroxy lithium stearate	7620-77-1	TWA	10 mg/m³	CA AB OEL
		TWA	10 mg/m³	CA BC OEL
		TWA	10 mg/m³	ACGIH
Distillates (petroleum), hydrotreated light naphthenic	64742-53-6	TWA (Mist)	5 mg/m³	CA AB OEL
		STEL (Mist)	10 mg/m³	CA AB OEL
		TWAEV (Mist)	5 mg/m³	CA QC OEL
		STEV (Mist)	10 mg/m³	CA QC OEL
		TWA (Mist)	1 mg/m³	CA BC OEL
		TWA (Inhalable fraction)	5 mg/m³	ACGIH
Barium bis(di C8-C10, branched, C9 rich, alkylnaphthalenesulphonate)	25619-56-1	TWA	0.5 mg/m³ (Barium)	CA AB OEL
		TWAEV	0.5 mg/m³ (Barium)	CA QC OEL

		TWA	0.5 mg/m³ (Barium)	CA BC OEL
		TWA	0.5 mg/m³ (Barium)	ACGIH

These substance(s) are inextricably bound in the product and therefore do not contribute to a dust inhalation hazard.

Quartz

Biological occupational exposure limits

Ingredients	CAS-No.	Control parameters	Biological specimen	Sam-pling time	Permissible concentra-tion	Basis
Lead	7439-92-1	Lead (Lead)	In blood	Not criti-cal	30 micrograms per 100 milliliters	ACGIH BEI

Engineering measures : Minimize workplace exposure concentrations.
Dust formation may be relevant in the processing of this product. In addition to substance-specific OELs, general limitations of concentrations of particulates in the air at workplaces have to be considered in workplace risk assessment. Relevant limits include: OSHA PEL for Particulates Not Otherwise Regulated of 15 mg/m3 - total dust, 5 mg/m3 - respirable fraction; and ACGIH TWA for Particles (insoluble or poorly soluble) Not Otherwise Specified of 3 mg/m3 - respirable particles, 10 mg/m3 - inhalable particles.

Personal protective equipment

Respiratory protection : Use respiratory protection unless adequate local exhaust ventilation is provided or exposure assessment demonstrates that exposures are within recommended exposure guidelines.

Filter type : Combined particulates and organic vapor type

Hand protection

Material : Chemical-resistant gloves

Remarks : Choose gloves to protect hands against chemicals depending on the concentration specific to place of work. Breakthrough time is not determined for the product. Change gloves often! For special applications, we recommend clarifying the resistance to chemicals of the aforementioned protective gloves with the glove manufacturer. Wash hands before breaks and at the end of workday.

Eye protection : Wear the following personal protective equipment:
Safety glasses

Skin and body protection : Select appropriate protective clothing based on chemical

resistance data and an assessment of the local exposure potential.
Skin contact must be avoided by using impervious protective clothing (gloves, aprons, boots, etc).

Hygiene measures : Ensure that eye flushing systems and safety showers are located close to the working place.
When using do not eat, drink or smoke.
Wash contaminated clothing before re-use.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Viscous semi-solid
Color	:	black, copper
Odor	:	Petroleum
Odor Threshold	:	No data available
pH	:	Not applicable (not an aqueous solution)
Melting point/freezing point	:	No data available
Initial boiling point and boiling range	:	No data available
Flash point	:	>= 162.8 °C Method: ASTM D 92, Cleveland open cup Distillates (petroleum), hydrotreated heavy naphthenic
Evaporation rate	:	Not applicable
Flammability (solid, gas)	:	Not classified as a flammability hazard
Upper explosion limit / Upper flammability limit	:	No data available
Lower explosion limit / Lower flammability limit	:	No data available
Vapor pressure	:	Not applicable
Relative vapor density	:	Not applicable
Relative density	:	1.9
Solubility(ies)		
Water solubility	:	negligible
Partition coefficient: n-octanol/water	:	Not applicable
Autoignition temperature	:	No data available

Decomposition temperature	:	No data available
Viscosity		
Viscosity, kinematic	:	Not applicable
Flow time	:	No data available
Explosive properties	:	Not explosive
Oxidizing properties	:	The substance or mixture is not classified as oxidizing.
Molecular weight	:	No data available
Particle size	:	No data available

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	Not classified as a reactivity hazard.
Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	Can react with strong oxidizing agents.
Conditions to avoid	:	None known.
Incompatible materials	:	Oxidizing agents
Hazardous decomposition products	:	No hazardous decomposition products are known.

SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Skin contact
Ingestion
Eye contact

Acute toxicity

Not classified based on available information.

Product:

Acute oral toxicity	:	Acute toxicity estimate: > 5,000 mg/kg Method: Calculation method
Acute inhalation toxicity	:	Acute toxicity estimate: > 10 mg/l Exposure time: 4 h Test atmosphere: dust/mist Method: Calculation method

Ingredients:

Distillates (petroleum), hydrotreated heavy naphthenic:

Acute oral toxicity : LD50 (Rat): > 5,000 mg/kg
Method: OECD Test Guideline 401
Remarks: Based on data from similar materials

Acute inhalation toxicity : LC50 (Rat): > 5.53 mg/l
Exposure time: 4 h
Test atmosphere: dust/mist
Method: OECD Test Guideline 403
Assessment: The substance or mixture has no acute inhalation toxicity
Remarks: Based on data from similar materials

Acute dermal toxicity : LD50 (Rabbit): > 5,000 mg/kg
Method: OECD Test Guideline 402
Remarks: Based on data from similar materials

Lead:

Acute oral toxicity : LD50 (Rat): > 2,000 mg/kg
Remarks: Based on data from similar materials

Acute dermal toxicity : LD50 (Rat): > 2,000 mg/kg
Remarks: Based on data from similar materials

Graphite:

Acute oral toxicity : LD50 (Rat): > 2,000 mg/kg
Method: OECD Test Guideline 401
Assessment: The substance or mixture has no acute oral toxicity

Acute inhalation toxicity : LC50 (Rat): > 2 mg/l
Exposure time: 4 h
Test atmosphere: dust/mist
Method: OECD Test Guideline 403
Assessment: The substance or mixture has no acute inhalation toxicity

Copper metal powder:

Acute oral toxicity : LD50 (Rat): > 2,500 mg/kg
Method: OECD Test Guideline 423
Assessment: The substance or mixture has no acute oral toxicity

Acute inhalation toxicity : LC50 (Rat): > 5.11 mg/l
Exposure time: 4 h
Test atmosphere: dust/mist
Method: OECD Test Guideline 436
Assessment: The substance or mixture has no acute inhalation toxicity

Acute dermal toxicity : LD50 (Rat): > 2,000 mg/kg
Method: OECD Test Guideline 402
Assessment: The substance or mixture has no acute dermal toxicity

Talc:

Acute oral toxicity : LD50 (Rat): > 5,000 mg/kg
Remarks: Based on data from similar materials

Quartz:

Acute oral toxicity : LD50 (Rat): > 5,000 mg/kg

12-Hydroxy lithium stearate:

Acute oral toxicity : LD50 (Rat): > 2,000 mg/kg
Assessment: The substance or mixture has no acute oral toxicity

Distillates (petroleum), hydrotreated light naphthenic:

Acute oral toxicity : LD50 (Rat): > 5,000 mg/kg
Method: OECD Test Guideline 401

Acute inhalation toxicity : LC50 (Rat): > 5.53 mg/l
Exposure time: 4 h
Test atmosphere: dust/mist
Method: OECD Test Guideline 403
Assessment: The substance or mixture has no acute inhalation toxicity

Acute dermal toxicity : LD50 (Rabbit): > 2,000 mg/kg
Assessment: The substance or mixture has no acute dermal toxicity

Barium bis(di C8-C10, branched, C9 rich, alkylnaphthalenesulphonate):

Acute oral toxicity : LD50 (Rat): 1,750 mg/kg
Remarks: Based on data from similar materials

Acute inhalation toxicity : Acute toxicity estimate: 1.5 mg/l
Exposure time: 4 h
Test atmosphere: dust/mist
Method: Expert judgment
Remarks: Based on harmonised classification in EU regulation 1272/2008, Annex VI

Acute dermal toxicity : LD50 (Rat): > 10,000 mg/kg
Remarks: Based on data from similar materials

Skin corrosion/irritation

Not classified based on available information.

Ingredients:

Distillates (petroleum), hydrotreated heavy naphthenic:

Species: Rabbit
Result: No skin irritation
Remarks: Based on data from similar materials

Lead:

Species: Rabbit
Method: OECD Test Guideline 404
Result: No skin irritation
Remarks: Based on data from similar materials

Graphite:

Species: Rabbit
Method: OECD Test Guideline 404
Result: No skin irritation

Copper metal powder:

Species: Rabbit
Method: OECD Test Guideline 404
Result: No skin irritation

Talc:

Species: Rabbit
Result: No skin irritation

12-Hydroxy lithium stearate:

Species: Rabbit
Result: No skin irritation
Remarks: Based on data from similar materials

Distillates (petroleum), hydrotreated light naphthenic:

Species: Rabbit
Result: No skin irritation

Barium bis(di C8-C10, branched, C9 rich, alkylnaphthalenesulphonate):

Species: Rabbit
Result: Skin irritation
Remarks: Based on data from similar materials

Serious eye damage/eye irritation

Not classified based on available information.

Ingredients:

Distillates (petroleum), hydrotreated heavy naphthenic:

Species: Rabbit
Result: No eye irritation
Remarks: Based on data from similar materials

Lead:

Species: Rabbit
Result: No eye irritation
Method: OECD Test Guideline 405

Remarks: Based on data from similar materials

Graphite:

Species: Rabbit
Result: No eye irritation

Copper metal powder:

Species: Rabbit
Result: No eye irritation
Method: OECD Test Guideline 405

Talc:

Species: Rabbit
Result: No eye irritation

12-Hydroxy lithium stearate:

Species: Rabbit
Result: No eye irritation
Remarks: Based on data from similar materials

Distillates (petroleum), hydrotreated light naphthenic:

Species: Rabbit
Result: No eye irritation

Barium bis(di C8-C10, branched, C9 rich, alkylnaphthalenesulphonate):

Species: Rabbit
Result: No eye irritation
Remarks: Based on data from similar materials

Respiratory or skin sensitization

Skin sensitization

Not classified based on available information.

Respiratory sensitization

Not classified based on available information.

Ingredients:

Distillates (petroleum), hydrotreated heavy naphthenic:

Test Type: Buehler Test
Routes of exposure: Skin contact
Species: Guinea pig
Result: negative
Remarks: Based on data from similar materials

Lead:

Test Type: Maximization Test
Routes of exposure: Skin contact
Species: Guinea pig

Method: OECD Test Guideline 406
Result: negative
Remarks: Based on data from similar materials

Graphite:

Test Type: Local lymph node assay (LLNA)
Routes of exposure: Skin contact
Species: Mouse
Result: negative

Copper metal powder:

Test Type: Maximization Test
Routes of exposure: Skin contact
Species: Guinea pig
Method: OECD Test Guideline 406
Result: negative

Talc:

Routes of exposure: Skin contact
Species: Humans
Result: negative

12-Hydroxy lithium stearate:

Test Type: Local lymph node assay (LLNA)
Routes of exposure: Skin contact
Species: Mouse
Method: OECD Test Guideline 429
Result: negative

Distillates (petroleum), hydrotreated light naphthenic:

Test Type: Buehler Test
Routes of exposure: Skin contact
Species: Guinea pig
Method: OECD Test Guideline 406
Result: negative

Barium bis(di C8-C10, branched, C9 rich, alkylnaphthalenesulphonate):

Test Type: Buehler Test
Routes of exposure: Skin contact
Species: Guinea pig
Result: negative
Remarks: Based on data from similar materials

Germ cell mutagenicity

Not classified based on available information.

Ingredients:

Distillates (petroleum), hydrotreated heavy naphthenic:

Genotoxicity in vitro : Test Type: Bacterial reverse mutation assay (AMES)

Method: OECD Test Guideline 471
Result: negative

Genotoxicity in vivo : Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay)
Species: Mouse
Application Route: Intraperitoneal injection
Method: OECD Test Guideline 474
Result: negative
Remarks: Based on data from similar materials

Lead:

Genotoxicity in vitro : Test Type: In vitro sister chromatid exchange assay in mammalian cells
Result: negative
Remarks: Based on data from similar materials

Genotoxicity in vivo : Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay)
Species: Rat
Application Route: Ingestion
Result: positive
Remarks: Based on data from similar materials

Graphite:

Genotoxicity in vitro : Test Type: Bacterial reverse mutation assay (AMES)
Result: negative

Copper metal powder:

Genotoxicity in vitro : Test Type: Bacterial reverse mutation assay (AMES)
Method: OECD Test Guideline 471
Result: negative

Genotoxicity in vivo : Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay)
Species: Mouse
Application Route: Ingestion
Method: Directive 67/548/EEC, Annex V, B.12.
Result: negative
Remarks: Based on data from similar materials

Talc:

Genotoxicity in vitro : Test Type: DNA damage and repair, unscheduled DNA synthesis in mammalian cells (in vitro)
Result: negative

Genotoxicity in vivo : Test Type: Chromosome aberration test in vitro
Species: Rat
Application Route: Ingestion
Result: negative

Distillates (petroleum), hydrotreated light naphthenic:

Genotoxicity in vitro : Test Type: Bacterial reverse mutation assay (AMES)
Method: OECD Test Guideline 476
Result: negative

Genotoxicity in vivo : Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay)
Species: Mouse
Application Route: Intraperitoneal injection
Method: OECD Test Guideline 474
Result: negative

Barium bis(di C8-C10, branched, C9 rich, alkylnaphthalenesulphonate):

Genotoxicity in vitro : Test Type: Chromosome aberration test in vitro
Method: OECD Test Guideline 473
Result: negative
Remarks: Based on data from similar materials

Carcinogenicity

Suspected of causing cancer.

Product:

Carcinogenicity - Assessment : Petroleum distillates have been classified as not carcinogenic based on DMSO extract content < 3% (Regulation (EC) 1272/2008, Annex VI, Part 3, Note L).

Ingredients:

Distillates (petroleum), hydrotreated heavy naphthenic:

Species: Mouse
Application Route: Skin contact
Exposure time: 78 weeks
Method: OECD Test Guideline 451
Result: negative

Lead:

Species: Rat
Application Route: Ingestion
Exposure time: 2 Years
Result: positive
Remarks: Based on data from similar materials

Carcinogenicity - Assessment : Limited evidence of carcinogenicity in animal studies

Talc:

Species: Mouse
Application Route: inhalation (dust/mist/fume)
Exposure time: 2 Years
Result: negative

Quartz:

Species: Humans
Application Route: inhalation (dust/mist/fume)
Result: positive
Remarks: IARC: (International Agency for Research on Cancer)
These substance(s) are inextricably bound in the product and therefore do not contribute to a dust inhalation hazard.

Carcinogenicity - Assessment : Positive evidence from human epidemiological studies (inhalation)

Distillates (petroleum), hydrotreated light naphthenic:

Species: Mouse
Application Route: Skin contact
Exposure time: 78 weeks
Result: negative

Reproductive toxicity

May damage fertility. May damage the unborn child.
May cause harm to breast-fed children.

Ingredients:

Lead:

Effects on fertility : Test Type: Two-generation reproduction toxicity study
Species: Mouse
Application Route: Ingestion
Result: positive
Remarks: Based on data from similar materials

Effects on fetal development : Test Type: Embryo-fetal development
Species: Rat
Application Route: Ingestion
Result: positive
Remarks: Based on data from similar materials

Reproductive toxicity - Assessment : Positive evidence of adverse effects on sexual function and fertility from human epidemiological studies., Positive evidence of adverse effects on development from human epidemiological studies., Studies indicating a hazard to babies during the lactation period

Graphite:

Effects on fertility : Test Type: Combined repeated dose toxicity study with the reproduction/developmental toxicity screening test
Species: Rat
Application Route: Ingestion
Method: OECD Test Guideline 422
Result: negative

Effects on fetal development : Test Type: Combined repeated dose toxicity study with the reproduction/developmental toxicity screening test
Species: Rat

Application Route: Ingestion
Method: OECD Test Guideline 422
Result: negative

Copper metal powder:

Effects on fertility : Test Type: Two-generation reproduction toxicity study
Species: Rat
Application Route: Ingestion
Result: negative
Remarks: Based on data from similar materials

Effects on fetal development : Test Type: Embryo-fetal development
Species: Rabbit
Application Route: Ingestion
Result: negative

Talc:

Effects on fetal development : Test Type: Embryo-fetal development
Species: Rat
Application Route: Ingestion
Result: negative

Distillates (petroleum), hydrotreated light naphthenic:

Effects on fertility : Test Type: Reproduction/Developmental toxicity screening test
Species: Rat
Application Route: Ingestion
Result: negative

Effects on fetal development : Test Type: Embryo-fetal development
Species: Rat
Application Route: Skin contact
Result: negative

Barium bis(di C8-C10, branched, C9 rich, alkylnaphthalenesulphonate):

Effects on fertility : Test Type: Combined repeated dose toxicity study with the reproduction/developmental toxicity screening test
Species: Rat
Application Route: Ingestion
Method: OECD Test Guideline 422
Result: negative
Remarks: Based on data from similar materials

Effects on fetal development : Test Type: Combined repeated dose toxicity study with the reproduction/developmental toxicity screening test
Species: Rat
Application Route: Ingestion
Method: OECD Test Guideline 422
Result: negative
Remarks: Based on data from similar materials

STOT-single exposure

Not classified based on available information.

STOT-repeated exposure

Causes damage to organs (Kidney, Central nervous system, Blood) through prolonged or repeated exposure.

Ingredients:

Lead:

Target Organs: Kidney, Central nervous system, Blood
Assessment: Causes damage to organs through prolonged or repeated exposure.

Quartz:

Routes of exposure: inhalation (dust/mist/fume)
Target Organs: Lungs
Assessment: Shown to produce significant health effects in animals at concentrations of 0.02 mg/l/6h/d or less.

12-Hydroxy lithium stearate:

Routes of exposure: Ingestion
Assessment: No significant health effects observed in animals at concentrations of 100 mg/kg bw or less.

Repeated dose toxicity

Ingredients:

Distillates (petroleum), hydrotreated heavy naphthenic:

Species: Rat
NOAEL: > 0.98 mg/l
Application Route: inhalation (dust/mist/fume)
Exposure time: 28 Days
Remarks: Based on data from similar materials

Lead:

Species: Rat
NOAEL: 0.0015 mg/kg
LOAEL: 0.005 mg/kg
Application Route: Ingestion
Exposure time: 6 - 12 Months
Remarks: Based on data from similar materials

Graphite:

Species: Rat
NOAEL: 12 mg/m3
Application Route: inhalation (dust/mist/fume)
Exposure time: 28 Days
Method: OECD Test Guideline 412

Copper metal powder:

Species: Rat
NOAEL: >= 2 mg/m³
Application Route: inhalation (dust/mist/fume)
Exposure time: 28 Days

Quartz:

Species: Humans
LOAEL: 0.053 mg/m³
Application Route: inhalation (dust/mist/fume)
Remarks: These substance(s) are inextricably bound in the product and therefore do not contribute to a dust inhalation hazard.

12-Hydroxy lithium stearate:

Species: Rat
NOAEL: > 88 mg/kg
Application Route: Ingestion
Exposure time: 90 Days

Distillates (petroleum), hydrotreated light naphthenic:

Species: Rabbit
NOAEL: 1,000 mg/kg
Application Route: Skin contact
Exposure time: 4 Weeks
Method: OECD Test Guideline 410

Barium bis(di C8-C10, branched, C9 rich, alkylnaphthalenesulphonate):

Species: Rat
NOAEL: 55 mg/kg
LOAEL: 165 mg/kg
Application Route: Ingestion
Exposure time: 29 Days
Method: OECD Test Guideline 422
Remarks: Based on data from similar materials

Aspiration toxicity

Not classified based on available information.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Ingredients:

Distillates (petroleum), hydrotreated heavy naphthenic:

Toxicity to fish	:	LC50 (Pimephales promelas (fathead minnow)): > 100 mg/l Exposure time: 96 h Method: OECD Test Guideline 203 Remarks: Based on data from similar materials
Toxicity to daphnia and other	:	EC50 (Daphnia magna (Water flea)): > 10,000 mg/l

aquatic invertebrates		Exposure time: 48 h Remarks: Based on data from similar materials
Toxicity to algae	:	EC50 (Pseudokirchneriella subcapitata (green algae)): > 100 mg/l Exposure time: 72 h Method: OECD Test Guideline 201 Remarks: Based on data from similar materials
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	NOEC (Daphnia magna (Water flea)): 10 mg/l Exposure time: 21 d Remarks: Based on data from similar materials
Toxicity to microorganisms	:	NOEC: > 1.93 mg/l Exposure time: 10 min Remarks: Based on data from similar materials

Lead:

Toxicity to fish	:	LC50 (Oncorhynchus mykiss (rainbow trout)): 0.107 mg/l Exposure time: 96 h
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Ceriodaphnia dubia (water flea)): 0.029 mg/l Exposure time: 48 h
Toxicity to algae	:	ErC50 (Pseudokirchneriella subcapitata (green algae)): 0.025 mg/l Exposure time: 72 h EC10 (Pseudokirchneriella subcapitata (green algae)): 6.1 µg/l Exposure time: 72 h
M-Factor (Acute aquatic toxicity)	:	10
Toxicity to fish (Chronic toxicity)	:	EC10 (Pimephales promelas (fathead minnow)): 20 µg/l Exposure time: 30 d
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	EC10 (Ceriodaphnia dubia (water flea)): 1.7 µg/l Exposure time: 7 d
M-Factor (Chronic aquatic toxicity)	:	10

Graphite:

Toxicity to fish	:	LC50 (Danio rerio (zebra fish)): > 100 mg/l Exposure time: 96 h Method: OECD Test Guideline 203
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia magna (Water flea)): > 100 mg/l Exposure time: 48 h Method: OECD Test Guideline 202

Toxicity to algae	:	EC50 (Pseudokirchneriella subcapitata (green algae)): > 100 mg/l Exposure time: 72 h Method: OECD Test Guideline 201
Toxicity to microorganisms	:	EC50: > 1,012.5 mg/l Exposure time: 3 h Method: OECD Test Guideline 209

Copper metal powder:

Toxicity to fish	:	LC50: > 10 - 100 µg/l Exposure time: 96 h
M-Factor (Acute aquatic toxicity)	:	10
Toxicity to fish (Chronic toxicity)	:	NOEC: > 1 - 10 µg/l
M-Factor (Chronic aquatic toxicity)	:	10

Talc:

Toxicity to fish	:	LC50 (Brachydanio rerio (zebrafish)): > 100,000 mg/l Exposure time: 24 h

Quartz:

Ecotoxicology Assessment

Acute aquatic toxicity	:	No toxicity at the limit of solubility.
Chronic aquatic toxicity	:	No toxicity at the limit of solubility.

12-Hydroxy lithium stearate:

Toxicity to fish	:	LL50 (Oncorhynchus mykiss (rainbow trout)): > 100 mg/l Exposure time: 96 h Method: OECD Test Guideline 203
Toxicity to daphnia and other aquatic invertebrates	:	EL50 (Daphnia magna (Water flea)): > 100 mg/l Exposure time: 48 h Method: OECD Test Guideline 202
Toxicity to algae	:	NOELR (Pseudokirchneriella subcapitata (green algae)): > 100 mg/l Exposure time: 72 h Method: OECD Test Guideline 201

Distillates (petroleum), hydrotreated light naphthenic:

Toxicity to fish	:	LL50 (Pimephales promelas (fathead minnow)): > 100 mg/l Exposure time: 96 h Test substance: Water Accommodated Fraction

Toxicity to daphnia and other aquatic invertebrates	:	EL50 (Daphnia magna (Water flea)): > 10,000 mg/l Exposure time: 48 h Test substance: Water Accommodated Fraction
Toxicity to algae	:	NOELR (Pseudokirchneriella subcapitata (green algae)): >= 100 mg/l Exposure time: 72 h Test substance: Water Accommodated Fraction
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	NOEC (Daphnia magna (Water flea)): 10 mg/l Exposure time: 21 d
Toxicity to microorganisms	:	NOEC (Photobacterium phosphoreum): > 2.17 mg/l Exposure time: 4 d

Barium bis(di C8-C10, branched, C9 rich, alkylnaphthalenesulphonate):

Toxicity to fish	:	LL50 (Cyprinus carpio (Carp)): > 100 mg/l Exposure time: 96 h Test substance: Water Accommodated Fraction Method: OECD Test Guideline 203 Remarks: Based on data from similar materials
Toxicity to daphnia and other aquatic invertebrates	:	EL50 (Daphnia magna (Water flea)): > 100 mg/l Exposure time: 48 h Test substance: Water Accommodated Fraction Method: OECD Test Guideline 202 Remarks: Based on data from similar materials
Toxicity to algae	:	EL50 (Pseudokirchneriella subcapitata (green algae)): > 100 mg/l Exposure time: 72 h Test substance: Water Accommodated Fraction Method: OECD Test Guideline 201 Remarks: Based on data from similar materials
Toxicity to microorganisms	:	EC50: > 100 mg/l Exposure time: 3 h Method: OECD Test Guideline 209 Remarks: Based on data from similar materials

Persistence and degradability

Ingredients:

Distillates (petroleum), hydrotreated heavy naphthenic:

Biodegradability	:	Result: Not readily biodegradable. Biodegradation: 2 - 4 % Exposure time: 28 d Method: OECD Test Guideline 301B

12-Hydroxy lithium stearate:

Biodegradability : Result: Readily biodegradable.
Biodegradation: 78 %
Exposure time: 28 d
Method: OECD Test Guideline 301C

Distillates (petroleum), hydrotreated light naphthenic:

Biodegradability : Result: Not readily biodegradable.
Biodegradation: 2 - 8 %
Exposure time: 28 d
Method: OECD Test Guideline 301B

Barium bis(di C8-C10, branched, C9 rich, alkylnaphthalenesulphonate):

Biodegradability : Result: Not readily biodegradable.
Biodegradation: 14 %
Exposure time: 28 d
Method: OECD Test Guideline 301B
Remarks: Based on data from similar materials

Bioaccumulative potential

No data available

Mobility in soil

No data available

Other adverse effects

No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues : Dispose of in accordance with local regulations.

Contaminated packaging : Empty containers should be taken to an approved waste handling site for recycling or disposal.
Empty containers retain residue and can be dangerous.
Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury and/or death.
If not otherwise specified: Dispose of as unused product.

SECTION 14. TRANSPORT INFORMATION

International Regulations

UNRTDG

UN number : UN 3077
Proper shipping name : ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
(Lead, Copper metal powder)
Class : 9

Packing group	:	III
Labels	:	9

IATA-DGR

UN/ID No.	:	UN 3077
Proper shipping name	:	Environmentally hazardous substance, solid, n.o.s. (Lead, Copper metal powder)
Class	:	9
Packing group	:	III
Labels	:	Miscellaneous
Packing instruction (cargo aircraft)	:	956
Packing instruction (passenger aircraft)	:	956
Environmentally hazardous	:	yes

IMDG-Code

UN number	:	UN 3077
Proper shipping name	:	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Lead, Copper metal powder)
Class	:	9
Packing group	:	III
Labels	:	9
EmS Code	:	F-A, S-F
Marine pollutant	:	yes

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable for product as supplied.

Domestic regulation

TDG

UN number	:	UN 3077
Proper shipping name	:	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Lead, Copper metal powder)
Class	:	9
Packing group	:	III
Labels	:	9
ERG Code	:	171
Marine pollutant	:	yes(Lead, Copper metal powder)

SECTION 15. REGULATORY INFORMATION

The ingredients of this product are reported in the following inventories:

DSL	:	All components of this product are on the Canadian DSL
TSCA	:	All chemical substances in this product are either listed on the TSCA Inventory or are in compliance with a TSCA Inventory exemption.
AICS	:	All ingredients listed or exempt.

SECTION 16. OTHER INFORMATION

Full text of other abbreviations

ACGIH	:	USA. ACGIH Threshold Limit Values (TLV)
ACGIH BEI	:	ACGIH - Biological Exposure Indices (BEI)
CA AB OEL	:	Canada. Alberta, Occupational Health and Safety Code (table 2: OEL)
CA BC OEL	:	Canada. British Columbia OEL
CA ON OEL	:	Ontario Table of Occupational Exposure Limits made under the Occupational Health and Safety Act.
CA QC OEL	:	Québec. Regulation respecting occupational health and safety, Schedule 1, Part 1: Permissible exposure values for airborne contaminants
ACGIH / TWA	:	8-hour, time-weighted average
CA AB OEL / TWA	:	8-hour Occupational exposure limit
CA AB OEL / STEL	:	15-minute occupational exposure limit
CA BC OEL / TWA	:	8-hour time weighted average
CA ON OEL / TWA	:	Time-Weighted Average Limit (TWA)
CA QC OEL / TWAEV	:	Time-weighted average exposure value
CA QC OEL / STEV	:	Short-term exposure value

AICS - Australian Inventory of Chemical Substances; ANTT - National Agency for Transport by Land of Brazil; ASTM - American Society for the Testing of Materials; bw - Body weight; CMR - Carcinogen, Mutagen or Reproductive Toxicant; CPR - Controlled Products Regulations; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; Nch - Chilean Norm; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NOM - Official Mexican Norm; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TDG - Transportation of Dangerous Goods; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative; WHMIS - Workplace Hazardous Materials Information System

Sources of key data used to compile the Material Safety	:	Internal technical data, data from raw material SDSs, OECD eChem Portal search results and European Chemicals Agen-

Data Sheet cy, http://echa.europa.eu/

Revision Date : 11/20/2017

Items where changes have been made to the previous version are highlighted in the body of this document by two vertical lines.

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and shall not be considered a warranty or quality specification of any type. The information provided relates only to the specific material identified at the top of this SDS and may not be valid when the SDS material is used in combination with any other materials or in any process, unless specified in the text. Material users should review the information and recommendations in the specific context of their intended manner of handling, use, processing and storage, including an assessment of the appropriateness of the SDS material in the user's end product, if applicable.

CA / Z8

API-MODIFIED
HIGH-PRESSURE THREAD COMPOUND

DESCRIPTION

JET-LUBE® API-MODIFIED is a high-pressure thread compound that conforms to or exceeds the requirements of API RP 5A3 and former API BUL 5A2. It also contains rust and oxidation inhibitors blended in **JET-LUBE's** unique grease compounded from custom-refined, low-sulfur oil to ensure brushability over a wide temperature range, tenacious adherence to all surfaces, resistance to water washout, and prevention of rust/corrosion.

API-MODIFIED will seal and withstand pressures to 10,000 psi and will not harden or dry.

The lubricating characteristics of **API-MODIFIED** reduces friction in the makeup of casing and tubing, preventing galling and wear. Maximum thread engagement is ensured, providing optimum leak resistance.

Inhibitors in **API-MODIFIED** provide maximum protection against rust and corrosion of threaded surfaces. Its conductivity reduces the possibility of electrolytic corrosion by preventing the formation of galvanic cells in the presence of salt water and other corrosive fluids.

Not recommended for rotary shouldered connections.

- Meets or exceeds API RP 5A3
- Additives for rust & corrosion protection
- Excellent lubrication qualities to prevent galling & wear
- Sticks to wet or oily threads
- Brushable over a wide temperature range
- Leak prevention to 10,000 psi
- Available in Arctic Grade
- California Proposition 65: Carcinogen & reproductive toxin

APPLICATIONS

JET-LUBE API-MODIFIED is specially formulated for use on casing, tubing, line pipe, flow lines, subsurface production tools, tank batteries, and will lubricate, seal and protect threaded connections of oilfield tubular goods on makeup, in service, and in storage.

PRODUCT CHARACTERISTICS

Thickener	Soap
Fluid Type	Petroleum
Color/Appearance	Black/Brown
Dropping Point (ASTM D-2265)	>280°F (138°C)
Specific Gravity	1.97
Density (lbs./gal.)	16.4
Flash Point (ASTM D-92)	>430°F (221°C)
NLGI Grade	1
Penetration @77°F	310 - 340
Friction Factor	1.0
Copper Strip Corrosion (ASTM D-4048)	1A
4-Ball (ASTM D-2596)	1000 Weld Point, kgf >130 Load Wear Index

Shelf Life: Minimum 2 years from manufacture date.

PACKAGING

Code No.	Container Size	Shipping Wt.
22123	10 lb.	11 lbs.
22112	25 lb.	27 lbs.
22114	50 lb.	54 lbs.
22119	25 kg.	27 kg.

LIMITED WARRANTY

Jet-Lube, Inc. makes the Limited Express Warranty that at the date of delivery, this product shall be free from defects in Jet-Lube, Inc. materials and workmanship.

This Limited Express Warranty is expressly in lieu of any other express or implied warranties, including any implied warranty of merchantability or fitness for a particular purpose, and of any other obligation on the part of Jet-Lube, Inc.

The sole remedy for breach of the Limited Express Warranty shall be the refund of the purchase price. All other liability is negated and disclaimed, and Jet-Lube, Inc. shall not be liable for incidental or consequential damages.

CORPORATE LOCATIONS

Houston, Texas–World Headquarters

Maidenhead, England

Edmonton, Canada

JET-LUBE, INC.
4849 HOMESTEAD RD.,
SUITE 232
HOUSTON, TX 77028

WATS: 800-538-5823
PHONE: 713-670-5700
FAX: 713-678-4604
sales@jetlube.com
www.jetlube.com

OILFIELD OILFIELD OILFIELD OILFIELD OILFIELD

Safety Data Sheets: Hydrochloric Acid

Waste Stream: Acid Solutions

EPA Waste Profile Sheet Number: 20140506-015

ASHTA Chemicals Inc.
P.O. Box 858, Ashtabula, Ohio 44005
(440) 997-5221
ashtachemicals.com

SAFETY DATA SHEET

Hydrochloric Acid, 31 – 36%

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

Product Name: Hydrochloric Acid, 31 – 36.7%
Identified Uses: Acid etching, steel pickling, oil and gas, ore and mineral, food processing, pharmaceutical, organic chemical synthesis

Company Information:
ASHTA Chemicals Inc.
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Phone: (440) 997-5221
Fax: (440) 998-0286
24-hour Emergency Phone: CHEMTREC: (800) 424-9300

SECTION 2 HAZARDS IDENTIFICATION

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Corrosive to metals - Category 1 Serious eye damage - Category 1 Skin corrosion - Category 1B

Specific target organ toxicity - single exposure - Category 3

GHS label elements, including precautionary statements:

Signal Word: **Danger**
Pictograms(s):

Hazard Statements	
H290	May be corrosive to metals.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H335	May cause respiratory irritation.

Precautionary Statements	
P234	Keep only in original container.
P261	Avoid breathing dust/fume/mist/vapors/spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water. Shower.

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P304 + P340 + P310	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or doctor/physician.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/physician.
P363	Wash contaminated clothingbefore reuse.
P390	Absorb spillage to prevent material damage.
P403 + P233	Store in a well-ventilated place. Keep container with a resistant inner liner.
P405	Store locked up.
P406	Store in corrosive resistant stainless steel container with a resistant inner liner.
P501	Dispose of contents/container in accordance with local/state/national regulations.

SECTION 3 COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms:

CHEMICAL NAME:	Hydrochloric acid
TRADE NAME:	Hydrochloric acid, 31 – 36%
SYNONYMS:	Muriatic acid, Chlorohydric acid, Hydrogen Chloride
C.A.S:	7647-01-0
EC:	231-595-7
WHMIS:	D2A, E
CHEMICAL FORMULA:	HCl (in aqueous solution)
CHEMICAL FAMILY:	Inorganic Acid

SECTION 4 FIRST AID MEASURES

Description of first aid measures:
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled:
If breathed in, move person into fresh air. If not breathing, give artificial respiration. If breathing is difficult, give humidified air. Give oxygen, but only by a certified physician. Consult a physician.

In case of skin contact:
Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash off with soap and plenty of water. Consult a physician.

In case of eye contact:
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Remove contact lenses if present and easy to do. Continue rinsing eyes during transport to medical facility.

If swallowed:
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth thoroughly with water. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Consult a physician.

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SECTION 5 FIRE FIGHTING MEASURES

Flash Point (Method):	Non-combustible.
Extinguishing Media:	Use extinguishing agents compatible with acid and appropriate for the burning material. Use water spray to keep fire-exposed containers cool.
Auto Ignition Temp:	Non-combustible.
Special Fire Fighting Procedures:	Wear self-contained breathing apparatus and full protective clothing. In case of fire and/or explosion do not breathe fumes. Use standard fire fighting procedures and consider the hazards of other involved materials.
Unusual Fire/Explosion Hazards:	Releases flammable hydrogen gas when reacting with metals.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Environmental Precautions:
Use closed systems when possible. Provide local exhaust ventilation where vapor or mist may be generated. Avoid discharge into drains, water courses or onto the ground.

Containment and Cleaning:
Follow preplanned emergency procedures. Only properly equipped, trained, functional personnel should attempt to contain a leak. All other personnel should be evacuated from the danger area. Using full protective equipment, apply appropriate emergency device or other securement technology to stop the leak if possible.

Small Spill:	Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: neutralize the residue with a dilute solution of sodium carbonate.
Large Spill:	Corrosive liquid. Stop leak if without risk. Do not touch spilled material. Use water spray curtain to knock down vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of sodium carbonate. Be careful that vapor is not present at a concentration level above TLV.

SECTION 7 HANDLING AND STORAGE

Precautions to be taken for handling and storage:
Wear appropriate personal protective equipment. Do not get in eyes, on skin, on clothing. Do not breathe mist or vapor. Observe good industrial hygiene practices. Do not empty into drains. Use caution when combining with water; DO NOT add water to acid, ALWAYS add acid to water while stirring to prevent release of heat, steam and fumes. Store in a well-ventilated place. Store away from incompatible materials. Store closed containers in a clean, cool, open or well-ventilated area. Keep out of sun.

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SECTION 8 EXPOSURE CONTROL/PERSONAL PROTECTION

Principal Component: Hydrochloric Acid
Occupational Exposure Limits:
Regulatory Limits:

Component	OSHA Final PEL TWA	OSHA Final PEL STEL	OSHA Final PEL Ceiling
Hydrochloric Acid Mixture	---	---	5 ppm 7.59 mg/m^3

ACGIH TLV = 5 ppm (7.59 mg/m^3) TWA

NIOSH IDLH = 50 ppm (as HCl, 2010)

Exposure Controls:

Eye Protection: Tightly fitting safety goggles. Face shield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Respiratory Protection: Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multipurpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Other Protection: Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Ventilation Recommended: Exhaust ventilation is required to meet PEL limits.

Glove Type Recommended: Wear neoprene, nitrile, butyl rubber or PVC gloves to prevent exposure.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties:

Appearance	Colorless to light yellow liquid
Odor	Pungent (irritating/strong)
Odor threshold	0.3ppm (can cause olfactory fatigue)
pH	<1 (in aqueous solution)
Melting point/freezing point	-30°C (-22°F)
Initial boiling point	>100°C (>212°F)
Flash point	Not applicable

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Auto-ignition temp	Not applicable
Evaporation rate	No data available
Decomposition temperature	No data available
Flammability (solid, gas)	Not combustible
Upper/lower flammability or explosive limits	Not combustible
Water solubility	100%
Molecular weight	36.46
Relative density (specific gravity)	1.16 (32% HCl solution) 1.19 (36.5% HCl solution)
Bulk density	8.75 lbs/gal (32% HCl solution) 9.83 lbs/gal (36.5% HCl solution)
Vapor density (air = 1)	1.267 at 20 °C
Vapor pressure	84 mm Hg @ 20°C
Partition coefficient: n-octanol/water	No data available

SECTION 10 STABILITY AND REACTIVITY

Stability: Hydrochloric acid is stable under normal conditions and pressures.

Conditions to avoid: Incompatible materials, metals, excess heat, bases.

Incompatibility: Bases, amines, metals, permanganates (e.g., potassium permanganate), fluorine, metal acetylides, hexalithium disilicide.

Hazardous decomposition products: Hydrogen chloride, chlorine, hydrogen gas.

Polymerization: Hazardous polymerization WILL NOT occur.

SECTION 11 TOXICOGICAL INFORMATION

Information on likely routes of exposure:

Inhalation: Vapors and mist will irritate throat and respiratory system and cause coughing.

Skin contact: Causes skin burns.

Eye contact: Causes eye burns.

Ingestion: Harmful if swallowed. Causes digestive tract burns. Ingestion may produce burns to the lips, oral cavity, upper airway, esophagus and possibly the digestive tract.

Symptoms related to the physical, chemical and toxicological characteristics:

Contact with this material will cause burns to the skin, eyes and mucous membranes. Permanent eye damage including blindness could result.

Information on toxicological effects:

Acute toxicity: Harmful if swallowed.

Skin corrosion/irritation: Causes severe skin burns and eye damage.

Irritation: Causes serious eye damage.

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Respiratory sensitization:	Not available.
Skin sensitization:	No data available.
Germ cell mutagenicity:	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Carcinogenicity:	This product is not considered to be a carcinogen by IARC, ACGIH, NTP or OSHA.
Reproductive toxicity:	This product is not expected to cause reproductive or developmental effects.
Specific target organ toxicity - single exposure:	May cause respiratory irritation.
Specific target organ toxicity - repeated exposure:	No data available.
Aspiration hazard:	Not available.
Chronic effects:	Prolonged inhalation may be harmful.

Components Species Test Results:
Hydrochloric acid (CAS# 7647-01-0)

Rat - Inhalation LC_{50}:	3124 ppm, (1 hour)
Rabbit - Dermal LD_{50}:	5010 mg/kg

SECTION 12 ECOLOGICAL INFORMATION

Ecotoxicity:	Because of the low pH of this product, it would be expected to produce significant ecotoxicity upon exposure to aquatic organisms and aquatic systems.
Aquatic Toxicity:	This material is toxic to fish and aquatic organisms. Most aquatic species do not tolerate pH lower than 5.5 for any extended period.
Fish Toxicity:	Fish LC_{50} Mosquito fish: 282 mg/l, 96 hours Fish LC_{50} Bluegill: 3.6 mg/l, 48 hours
Persistence and Degradability:	Not biodegradable. Hydrochloric acid will likely be neutralized to chloride by alkalinity present in natural environment.
Bioaccumulative Potential:	No data available.
Mobility in Soil:	Hydrochloric acid will be neutralized by naturally occurring alkalinity. The acid will permeate soil, dissolving some soil material and will then neutralize.
Other Adverse Effects:	No other adverse environmental effects (e.g., ozone depletion, photochemical ozone creation.

SECTION 13 DISPOSAL CONSIDERATIONS

Collect and reclaim or dispose in sealed containers at a properly licensed waste disposal site. This material, if not neutralized, must be disposed of as hazardous waste. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national or international regulations.

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SECTION 14 TRANSPORT INFORMATION

Shipping:

Usual Shipping Containers:	Tank cars, bulk tankers.
Usual Shelf Life:	Indefinite (life of containers).
Storage/Transport Temperatures:	Ambient.

Suitable Storage:

Materials/Coatings:	Teflon, Tygon, Rubber, PVC and Polypropylene Materials.

D.O.T. Information:

Labeling:	Corrosive
D.O.T. Identification Number:	UN 1789
D.O.T. Shipping Name:	Hydrochloric Acid
Hazard Class:	8
Packing Group:	II
Hazard Guide:	157
Placard:	UN 1789

SECTION 15 REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:
Hydrochloric Acid CAS#: 7647-01-0

SARA 311/312 Hazards
Acute health hazard, reactive hazard.

Massachusetts Right to Know Components
Hydrochloric Acid CAS#: 7647-01-0
Pennsylvania Right to Know Components
Hydrochloric Acid CAS#: 7647-01-0
New Jersey Right to Know Components
Hydrochloric Acid CAS#: 7647-01-0

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects or any other reproductive harm.

OSHA PSM/RMP Threshold for Accidental Release:
CAS# 7647-01-0 is regulated under OSHA PSM ***only*** if anhydrous HCl.

CAS# 7647-01-0 is regulated under EPA RMP ***only*** if $\geq$ 37% HCl.

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Toxic Substances Control Act (TSCA):
Hydrochloric Acid CAS#: 7647-01-0

Comprehensive Environmental Response Compensation Liability Act: (CERCLA)
Hydrochloric Acid CAS#: 7647-01-0

SECTION 16 OTHER INFORMATION

NFPA Rating:
Health hazard: 3
Fire Hazard: 0
Reactivity Hazard: 1

This information is drawn from recognized sources believed to be reliable. ASHTA Chemicals, Inc. makes no guarantees or assumes any liability in connection with this information. The user should be aware of changing technology, research, regulations and analytical procedures that may require changes herein. The above data is supplied upon the condition that persons will evaluate this information and then determine its suitability for their use. Only U.S.A. regulations apply to the above.

Version 1.0	For the new GHS SDS Standard	Revision Date: 12/31/2014
Version 1.1	Graphics updated	Revision Date: 3/9/2015
Version 1.2	Title updated	Revision Date: 6/2/2015
Version 1.3	Section 9 changes	Revision Date: 7/30/2015
Version 1.4	Section 1, 15 changes	Revision Date: 4/15/2016
Version 1.5	Changed P501 text (Section 2)	Revision Date: 6/15/2016
Version 1.6	Updated Section 2.0	Revision Date 4/20/2017
Removed Version, Updated Format		Revision Date 5/16/2018
Updated Format		Revision Date: 11/03/2020

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Safety Data Sheets: WD-40 Aerosol CAN

Waste Stream: Aerosol Cans

EPA Waste Profile Sheet Number: 20140506-016

Safety Data Sheet

1 - Identification

Trade Name: WD-40 Aerosol **Product Use:** Lubricant, Penetrant, Drives Out Moisture, Removes and Protects Surfaces From Corrosion **Restrictions on Use:** None identified **SDS Date Of Preparation:** November 21, 2019	**Canadian Office:** WD-40 Products [Canada] Ltd. P.O. Box 220 Toronto, Ontario M9C 4V3 **Information Phone #:** (416) 622-9881 **Emergency Phone # 24 hr:** Canutec: (613) 996-6666 - Designated for use only in the event of chemical emergencies involving a spill, leak, fire exposure or accident involving chemicals

2 – Hazards Identification

WHMIS 2015/GHS Classification:
Flammable Aerosol Category 1
Gas Under Pressure: Compressed Gas
Aspiration Toxicity Category 1
Specific Target Organ Toxicity Single Exposure Category 3 (nervous system effects)

Note: This product is a consumer product and is labeled in accordance with the Consumer Chemicals and Containers Regulations (CCCR) which take precedence over WHMIS 2015 labeling. The actual container label will not include the label elements below. The labeling below applies to industrial/professional products.

Label Elements:

DANGER!
Extremely flammable aerosol.
Contains gas under pressure; may explode if heated.
May be fatal if swallowed and enters airways.
May cause drowsiness or dizziness.

Prevention
Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
Do not spray on an open flame or other ignition source.
Do not pierce or burn, even after use.
Avoid breathing mist or vapors.
Use only outdoors or in a well-ventilated area.
Response
IF SWALLOWED: Immediately call a POISON CENTER or physician. Do NOT induce vomiting.
IF INHALED: Remove person to fresh air and keep comfortable for breathing.
Call a POISON CENTER or doctor if you fell unwell.
Storage
Store locked up.
Protect from sunlight. Do not expose to temperatures exceeding 50°C/122°F. Store in a well-ventilated place.
Disposal

Dispose of contents and container in accordance with local and national regulations.

3 - Composition/Information on Ingredients

Ingredient	CAS #	Weight Percent	WHMIS 2015/ GHS Classification
Aliphatic Hydrocarbon	64742-47-8	50-70%	Flammable Liquid Category 3 Aspiration Toxicity Category 1 Specific Target Organ Toxicity Single Exposure Category 3 (nervous system effects)
Petroleum Base Oil	64742-56-9 64742-65-0 64742-53-6 64742-54-7 64742-71-8	30-35%	Not Hazardous
Carbon Dioxide	124-38-9	2-3%	Simple Asphyxiant

4 – First Aid Measures

Ingestion (Swallowed): Aspiration Hazard. DO NOT induce vomiting. Call physician, poison control center or the WD-40 Safety Hotline at 1-888-324-7596 immediately.
Eye Contact: Flush thoroughly with water. Remove contact lenses if present after the first 5 minutes and continue flushing for several more minutes. Get medical attention if irritation persists.
Skin Contact: Wash with soap and water. If irritation develops and persists, get medical attention.
Inhalation (Breathing): If irritation is experienced, move to fresh air. Get medical attention if irritation or other symptoms develop and persist.
Signs and Symptoms of Exposure: Harmful or fatal is swallowed. If swallowed, may be aspirated and cause lung damage. May cause eye irritation. Inhalation of mists or vapors may cause nasal and respiratory tract irritation and central nervous system effects such as headache, dizziness and nausea. Skin contact may cause drying of the skin.
Indication of Immediate Medical Attention/Special Treatment Needed: Immediate medical attention is needed for ingestion.

5 – Fire Fighting Measures

Suitable (and unsuitable) Extinguishing Media: Use water fog, dry chemical, carbon dioxide or foam. Do not use water jet or flooding amounts of water. Burning product will float on the surface and spread fire.
Specific Hazards Arising from the Chemical: Contents under pressure. Keep away from ignition sources and open flames. Exposure of containers to extreme heat and flames can cause them to rupture often with violent force. Vapors are heavier than air and may travel along surfaces to remote ignition sources and flash back. Combustion will produce oxides of carbon and hydrocarbons.
Special Protective Equipment and Precautions for Fire-Fighters: Firefighters should always wear positive pressure self-contained breathing apparatus and full protective clothing. Cool fire-exposed containers with water. Use shielding to protect against bursting containers.

6 – Accidental Release Measures

Personal Precautions, Protective Equipment and Emergency Procedures: Wear appropriate protective clothing (see Section 8). Eliminate all sources of ignition and ventilate area.
Methods and Materials for Containment/Cleanup: Leaking cans should be placed in a plastic bag or open pail until the pressure has dissipated. Contain and collect liquid with an inert absorbent and place in a container for disposal. Clean spill area thoroughly. Report spills to authorities as required.

7 – Handling and Storage

Precautions for Safe Handling: Avoid contact with eyes. Avoid prolonged contact with skin. Avoid breathing vapors or aerosols. Use only with adequate ventilation. Keep away from heat, sparks, pilot lights, hot surfaces and open flames. Unplug electrical tools, motors and appliances before spraying or bringing the can near any source of electricity. Electricity can burn a hole in the can and cause contents to burst into flames. To avoid serious burn injury, do not let the can touch battery terminals, electrical connections on motors or appliances

or any other source of electricity. Wash thoroughly with soap and water after handling. Keep containers closed when not in use. Keep out of the reach of children. Do not puncture, crush or incinerate containers, even when empty.
Conditions for Safe Storage: Store in a cool, well-ventilated area, away from incompatible materials Do not store above 120°F or in direct sunlight. U.F.C (NFPA 30B) Level 3 Aerosol. Store away from oxidizers.

8 – Exposure Controls/Personal Protection

Chemical	Occupational Exposure limits
Aliphatic Hydrocarbon	1200 mg/m3 TWA (manufacturer recommended)
Petroleum Base Oil	5 mg/m3 TWA (Inhalable) ACGIH TLV (as mineral oil) 5 mg/m3 TWA, 10 mg/m3 STEL Canada- Québec (as oil mist, mineral) 5 mg/m3 TWA, 10 mg/m3 STEL Canada- Ontario (as oil mist, mineral) 1 mg/m3 TWA British Columbia (as Oil mist-mineral, severely refined)
Carbon Dioxide	5000 ppm TWA, 30,000 ppm STEL ACGIH TLV 5000 ppm TWA, 30,000 ppm STEL Canada-Ontario 5000 ppm TWA, 30,000 ppm STEL Canada-Québec 5000 ppm TWA, 15,000 ppm STEL British Columbia

The Following Controls are Recommended for Normal Consumer Use of this Product
Appropriate Engineering Controls: Use in a well-ventilated area.
Personal Protection:
Eye Protection: Avoid eye contact. Always spray away from your face.
Skin Protection: Avoid prolonged skin contact. Chemical resistant gloves recommended for operations where skin contact is likely.
Respiratory Protection: None needed for normal use with adequate ventilation.

For Bulk Processing or Workplace Use the Following Controls are Recommended
Appropriate Engineering Controls: Use adequate general and local exhaust ventilation to maintain exposure levels below that occupational exposure limits.
Personal Protection:
Eye Protection: Safety goggles recommended where eye contact is possible.
Skin Protection: Wear chemical resistant gloves.
Respiratory Protection: None required if ventilation is adequate. If the occupational exposure limits are exceeded, wear a NIOSH approved respirator. Respirator selection and use should be based on contaminant type, form and concentration. Follow applicable regulations and good Industrial Hygiene practice.
Work/Hygiene Practices: Wash with soap and water after handling.

9 – Physical and Chemical Properties

Appearance:	Light amber liquid	Flammable Limits: (Solvent Portion)	LEL: 0.6% UEL: 8%
Odor:	Mild petroleum odor	Vapor Pressure:	95-115 PSI @ 70°F
Odor Threshold:	Not established	Vapor Density:	Greater than 1 (air=1)
pH:	Not Applicable	Relative Density:	0.8 – 0.82 @ 60°F
Melting/Freezing Point:	Not established	Solubilities:	Insoluble in water
Boiling Point/Range:	361 - 369°F (183 - 187°C)	Partition Coefficient; n-octanol/water:	Not established
Flash Point:	122°F (49°C) Tag Open Cup (liquid)	Autoignition Temperature:	Not established
Evaporation Rate:	Not established	Decomposition Temperature:	Not established
Flammability (solid, gas):	Flammable Aerosol	Viscosity:	2.79-2.96 cSt @ 100°F
VOC:	65%	Pour Point:	-63°C (-81.4°F) ASTM D-97

10 – Stability and Reactivity

Reactivity: Not reactive under normal conditions
Chemical Stability: Stable
Possibility of Hazardous Reactions: May react with strong oxidizers generating heat.
Conditions to Avoid: Avoid heat, sparks, flames and other sources of ignition. Do not puncture or incinerate containers.
Incompatible Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Carbon monoxide and carbon dioxide.

11 – Toxicological Information

Symptoms of Overexposure:
Inhalation: High concentrations may cause nasal and respiratory irritation and central nervous system effects such as headache, dizziness and nausea. Intentional abuse may be harmful or fatal.
Skin Contact: Prolonged and/or repeated contact may produce mild irritation and defatting with possible dermatitis.
Eye Contact: Contact may be irritating to eyes. May cause redness and tearing.
Ingestion: This product has low oral toxicity. Swallowing may cause gastrointestinal irritation, nausea, vomiting and diarrhea. This product is an aspiration hazard. If swallowed, can enter the lungs and may cause chemical pneumonitis, severe lung damage and death.
Chronic Effects: None expected.
Carcinogen Status: None of the components are listed as a carcinogen or suspect carcinogen by IARC, NTP, ACGIH or OSHA.
Reproductive Toxicity: None of the components is considered a reproductive hazard.

Numerical Measures of Toxicity:
Acute Toxicity Estimates: Oral > 5,000 mg/kg; Dermal >2,000 mg/kg based on an assessment of the ingredients. This product is not classified as toxic by established criteria. It is an aspiration hazard.

12 – Ecological Information

Ecotoxicity: No specific aquatic toxicity data is currently available; however components of this product are not expected to be harmful to aquatic organisms
Persistence and Degradability: Components are readily biodegradable.
Bioaccumulative Potential: Bioaccumulation is not expected based on an assessment of the ingredients.
Mobility in Soil: No data available
Other Adverse Effects: None known

13 - Disposal Considerations

Aerosol containers should not be punctured, compacted in home trash compactors or incinerated. Empty containers may be disposed of through normal waste management options. Dispose of all waste product, absorbents, and other materials in accordance with applicable Federal, state and local regulations.

14 – Transportation Information

DOT Surface Shipping Description: UN1950, Aerosols, 2.1 Ltd. Qty
(Note: Shipping Papers are not required for Limited Quantities unless transported by air or vessel – each package must be marked with the Limited Quantity Mark)
Canadian TDG Classification: Limited Quantity
IMDG Shipping Description: Un1950, Aerosols, 2.1, LTD QTY
ICAO Shipping Description: UN1950, Aerosols, flammable, 2.1

NOTE: WD-40 Company does not test aerosol cans to assure that they meet the pressure and other requirements for transport by air. We do not recommend that our aerosol products be transported by air.

15 – Regulatory Information

National Pollutant Release Inventory (NPRI): This product contains the following chemicals that are listed on the NPRI Substance List: Aliphatic Hydrocarbon (64742-47-8) 50-70%

Canadian Environmental Protection Act: All of the ingredients are listed on the Canadian Domestic Substances List or exempt from notification.

16 – Other Information

HMIS Hazard Rating:
Health – 1 (slight hazard), Fire Hazard – 4 (severe hazard), Physical Hazard – 0 (minimal hazard)

Revision Date: November 21, 2019 Supersedes: November 15, 2016

Prepared by: Industrial Health & Safety Consultants, Inc. Shelton, CT, USA

Reviewed by: I. Kowalski Regulatory Affairs Dept.

1014100/No.0084104

Safety Data Sheets: AFFF Ansulite 1

Waste Stream: AFFF

EPA Waste Profile Sheet Number: 20140506-017

Safety Data Sheet

This safety data sheet complies with the requirements of: 2012 OSHA Hazard Communication Standard (29CFR 1910.1200)

Product name ANSULITE 1% AFFF (AFC1B)

1. Identification

1.1. Product Identifier

Product name ANSULITE 1% AFFF (AFC1B)

1.2. Other means of identification

Product code 443102
Synonyms None
Chemical Family No information available

1.3. Recommended use of the chemical and restrictions on use

Recommended use Fire extinguishing agent.
Uses advised against Consumer use.

1.4. Details of the Supplier of the Safety Data Sheet

Company Name Tyco Fire Protection Products
One Stanton Street
Marinette, WI 54143-2542
Telephone: 715-735-7411
Contact point Product Stewardship at 1-715-735-7411
E-mail address psra@tycofp.com

1.5. Emergency Telephone Number

Emergency telephone CHEMTREC 001-800-424-9300 or 001-703-527-3887

2. Hazards Identification

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Serious eye damage/eye irritation - Category 1
Skin Sensitization - Category 1B

2.2. Label Elements

Signal Word
DANGER

Hazard Statements
Causes serious eye damage
May cause an allergic skin reaction

Precautionary Statements

Prevention
Wear protective gloves/protective clothing/eye protection/face protection. Avoid breathing dust/fume/gas/mist/vapors/spray. Contaminated work clothing should not be allowed out of the workplace.

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/physician.
IF ON SKIN: Wash with plenty of soap and water. If skin irritation or rash occurs: Get medical advice/attention. Wash contaminated clothing before reuse.

Disposal
Dispose of contents/container to an approved waste disposal plant.

2.3. Hazards Not Otherwise Classified (HNOC)
Not Applicable.

2.4. Other Information
May be harmful if swallowed.

3. Composition/information on Ingredients

3.1. Mixture
The following component(s) in this product are considered hazardous under applicable OSHA(USA)

Chemical name	CAS No.	weight-%
2-(2-Butoxyethoxy)ethanol	112-34-5	10 - 30
Sodium Decyl Sulfate	142-87-0	1 - 5
Polyfluorinated alkyl betaine	Proprietary	1 - 5
Sodium Octyl Sulfate	142-31-4	1 - 5
Polyfluorinated alkyl polyamide	Proprietary	1 - 5

4. First aid measures

4.1. Description of first aid measures
General Advice If symptoms persist, call a physician.

Eye Contact Rinse thoroughly with plenty of water for at least 15 minutes, lifting lower and upper eyelids. Consult a physician.

Skin contact Wash skin with soap and water. Get medical attention if irritation develops and persists.

Inhalation Remove to fresh air. If breathing is difficult, give oxygen. (Get medical attention immediately if symptoms occur.).

Ingestion Rinse mouth. Do not induce vomiting without medical advice. If swallowed, call a poison control center or physician immediately.

4.2. Most Important Symptoms and Effects, Both Acute and Delayed
Symptoms No information available.

4.3. Indication of Any Immediate Medical Attention and Special Treatment Needed
Note to physicians Treat symptomatically.

5. Fire-fighting measures

5.1. Suitable Extinguishing Media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

5.2. Unsuitable Extinguishing Media
None.

5.3. Specific Hazards Arising from the Chemical
None known.

Hazardous Combustion Products	Carbon oxides, Fluorinated oxides, Nitrogen oxides (NOx), Oxides of sulfur

5.4. Explosion Data

Sensitivity to Mechanical Impact	None.
Sensitivity to Static Discharge	None.

5.5. Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Personal Precautions	Ensure adequate ventilation, especially in confined areas.
For emergency responders	Use personal protection recommended in Section 8.

6.2. Environmental Precautions

Environmental Precautions	Prevent further leakage or spillage if safe to do so. Prevent entry into waterways, sewers, basements or confined areas. See Section 12 for additional Ecological Information.

6.3. Methods and material for containment and cleaning up

Methods for Containment	Prevent further leakage or spillage if safe to do so.
Methods for Cleaning Up	Pick up and transfer to properly labeled containers.

7. Handling and Storage

7.1. Precautions for Safe Handling

Advice on safe handling	Avoid contact with skin and eyes. Handle in accordance with good industrial hygiene and safety practice.

7.2. Conditions for safe storage, including any incompatibilities

Storage Conditions	Keep containers tightly closed in a dry, cool and well-ventilated place.
Incompatible Materials	Strong oxidizing agents. Strong acids. Strong bases.

8. Exposure Controls/Personal Protection

8.1. Control Parameters

Exposure guidelines

Chemical name	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL
2-(2-Butoxyethoxy)ethanol 112-34-5	TWA: 10 ppm inhalable fraction and vapor	-	-	-

ACGIH (American Conference of Governmental Industrial Hygienists) OSHA (Occupational Safety and Health Administration of the US Department of Labor) NIOSH IDLH Immediately Dangerous to Life or Health

8.2. Appropriate Engineering Controls

Engineering controls	Ensure adequate ventilation, especially in confined areas.

8.3. Individual protection measures, such as personal protective equipment

Eye/Face Protection	Avoid contact with eyes. Tight sealing safety goggles.
Skin and Body Protection	Wear protective gloves and protective clothing.
Respiratory Protection	If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.
Ventilation	Use local exhaust or general dilution ventilation to control exposure with applicable limits

8.4. General hygiene considerations

Do not eat, drink or smoke when using this product. Handle in accordance with good industrial hygiene and safety practice.

9. Physical and Chemical Properties

9.1. Information on basic physical and chemical properties

Physical State	Liquid		
Odor	Characteristic	**Color**	Light yellow
Odor Threshold	No data available		

Property	Values	Remarks • Method
pH	8.5	
Melting point/freezing point	No data available	
Boiling point / boiling range	No data available	
Flash Point	No data available	
Evaporation Rate	No data available	
Flammability (solid, gas)	No data available	
Flammability limit in air		
Upper flammability limit:	No data available	
Lower flammability limit:	No data available	
Vapor Pressure	No data available	

Vapor Density	No data available
Specific gravity	No data available
Water Solubility	No data available
Solubility in Other Solvents	No data available
Partition coefficient	No data available
Autoignition Temperature	No data available
Decomposition Temperature	No data available
Kinematic viscosity	No data available
VOC content (%)	25.4782
Density	1.02

10. Stability and Reactivity

10.1. Chemical Stability

Stable under recommended storage conditions.

10.2. Reactivity

No data available

10.3. Possibility of hazardous reactions

None under normal processing.

Hazardous Polymerization Hazardous polymerization does not occur.

10.4. Conditions to Avoid

Extremes of temperature and direct sunlight.

10.5. Incompatible Materials

Strong oxidizing agents. Strong acids. Strong bases.

10.6. Hazardous decomposition products

Carbon oxides. Nitrogen oxides (NOx). Oxides of sulfur. Fluorinated oxides.

11. Toxicological Information

11.1. Information on Likely Routes of Exposure

Product information

Inhalation No data available.

Eye Contact Severely irritating to eyes.

Skin contact May cause irritation.

Ingestion May be harmful if swallowed.

Component Information

Acute Toxicity

Chemical name	Oral LD50	Dermal LD50	Inhalation LC50
2-(2-Butoxyethoxy)ethanol 112-34-5	= 5660 mg/kg (Rat)	= 2700 mg/kg (Rabbit)	-
Sodium Decyl Sulfate 142-87-0	= 1950 mg/kg (Rat)	-	-
Sodium Octyl Sulfate 142-31-4	= 3200 mg/kg (Rat)	-	-
Polyfluorinated alkyl polyamide	>2000 mg/kg	>2000 mg/kg	>5.11 mg/l

11.2. Information on Toxicological Effects

Symptoms No information available.

11.3. Delayed and immediate effects as well as chronic effects from short and long-term exposure

Skin Corrosion/Irritation Irritating to skin.

Serious eye damage/eye irritation Severely irritating to eyes.

Component Information					
Polyfluorinated alkyl polyamide					
Method	species	Exposure Route	Effective dose	Exposure time	Results
OECD Test No. 405: Acute Eye Irritation/Corrosion	Rabbit	eye			Class 4 on a 1 to 8 scale according to a modified Kay and Calandra classification system. Mild eye irritation

Sensitization May cause sensitization by skin contact.

Component Information			
Polyfluorinated alkyl polyamide			
Method	species	Exposure Route	Results
OECD Test No. 429: Skin Sensitisation: Local Lymph Node Assay	mouse	dermal	sensitizing

Component Information		
Polyfluorinated alkyl polyamide		
Method	species	Results
OECD Test No. 473: In vitro Mammalian Chromosome Aberration Test	in vitro	Non-clastogenic to human lymphocytes in vitro.

Carcinogenicity No information available.
Reproductive Toxicity No information available.
STOT - Single Exposure No information available.
STOT - Repeated Exposure No information available.
Chronic Toxicity Avoid repeated exposure.
Aspiration Hazard No information available.

11.4. Numerical Measures of Toxicity - Product information

The following values are calculated based on chapter 3.1 of the GHS document

ATEmix (oral) 4874 mg/kg
ATEmix (dermal) 10216 mg/kg
ATEmix (inhalation-dust/mist) 321.4 mg/l

12. Ecological Information

12.1. Ecotoxicity

Chemical name	Algae/aquatic plants	Fish	Crustacea
2-(2-Butoxyethoxy)ethanol 112-34-5	EC50 (96h) > 100 mg/L Desmodesmus subspicatus	LC50 (96h) static = 1300 mg/L Lepomis macrochirus	EC50 (48h) > 100 mg/L Daphnia magna EC50 (24h) = 2850 mg/L Daphnia magna
1,2-Propanediol 57-55-6	EC50 (96h) = 19000 mg/L Pseudokirchneriella subcapitata	LC50 (96h) static = 51600 mg/L Oncorhynchus mykiss LC50 (96h) static = 51400 mg/L Pimephales promelas LC50 (96h) = 710 mg/L Pimephales promelas LC50 (96h) static 41 - 47 mL/L Oncorhynchus mykiss	EC50 (48h) Static > 1000 mg/L Daphnia magna EC50 (24h) > 10000 mg/L Daphnia magna
t-Butanol 75-65-0	EC50 (72h) > 1000 mg/L Desmodesmus subspicatus	LC50 (96h) flow-through 6130 - 6700 mg/L Pimephales promelas	EC50 (48h) = 933 mg/L Daphnia magna EC50 (48h) Static 4607 - 6577 mg/L Daphnia magna
1-Octanol 111-87-5	EC50 (48h) static = 14 mg/L Desmodesmus subspicatus	LC50 (96h) static = 17.68 mg/L Oncorhynchus mykiss LC50 (96h) flow-through 11.4 - 12.9 mg/L Pimephales promelas	EC50 (24h) 15 - 26 mg/L Daphnia magna
Formaldehyde 50-00-0	-	LC50 (96h) static 100 - 136 mg/L Oncorhynchus mykiss LC50 (96h) flow-through 0.032 - 0.226 mL/L Oncorhynchus mykiss LC50 (96h) flow-through 22.6 - 25.7 mg/L Pimephales promelas LC50 (96h) static 23.2 - 29.7 mg/L Pimephales promelas LC50 (96h) static = 41 mg/L Brachydanio rerio LC50 (96h) static = 1510 µg/L Lepomis macrochirus	LC50 (48h) = 2 mg/L Daphnia magna EC50 (48h) Static 11.3 - 18 mg/L Daphnia magna
4,4'-bis-(sulfostyryl)-biphenyl disodium salt 27344-41-8	EC50 (72h) = 10 mg/L Desmodesmus subspicatus EC50 (96h) 10.0 - 11.0 mg/L Desmodesmus subspicatus	LC50 (96h) static = 76 mg/L Brachydanio rerio	EC50 (48h) = 1000 mg/L Daphnia magna

Concentrate	
Method	Biological Test Method: Acute Lethality Test Using Daphnia ssp. (EPS 1/RM/11)
Species	Daphnia magna
Endpoint type	LC50
Effective dose	564 mg/L
Exposure time	48h

Method	Biological Test Method: Acute Lethality Test Using Daphnia ssp. (EPS 1/RM/11)
Species	Daphnia magna
Endpoint type	EC50
Effective dose	556 mg/L
Exposure time	48h

Method	Biological Test Method: Acute Lethality Test Using Rainbow Trout (EPS 1/RM/9)
Species	Oncorhynchus mykiss (rainbow trout)
Endpoint type	LC50
Effective dose	2,140 mg/L
Exposure time	96h

1% Solution	
Method	Biological Test Method: Acute Lethality Test Using Daphnia ssp. (EPS 1/RM/11)
Species	Daphnia magna
Endpoint type	LC50
Effective dose	93,350 mg/L
Exposure time	48h

Method	Biological Test Method: Acute Lethality Test Using Rainbow Trout (EPS 1/RM/9)
Species	Oncorhynchus mykiss (rainbow trout)
Endpoint type	LC50
Effective dose	153,000 mg/L
Exposure time	96h

Method	Biological Test Method: Acute Lethality Using Threespine Stickleback (Gasterosteus aculeatus) (EPS 1/RM/10)
Species	Gasterosteus aculeatus
Endpoint type	LC50
Effective dose	74,830 mg/L
Exposure time	96h

Method	Biological Test Method: Acute Lethality Test Using Daphnia ssp. (EPS 1/RM/11)
Species	Daphnia magna
Endpoint type	EC50
Effective dose	60,440 mg/L
Exposure time	48h

Polyfluorinated alkyl polyamide					
Method	Species	Endpoint type	Effective dose	Exposure time	Results
OECD Test No. 203: Fish, Acute Toxicity Test	Oncorhynchus mykiss (rainbow trout)	LC50	>14 mg/l	96h	NOEC: 14 mg/L No toxic effects at saturation.
OECD Test No. 201: Freshwater Alga and Cyanobacteria, Growth Inhibition Test	Algae	ErC50	>15 mg/l	72h	Growth rate >15, Yield 13. NOEC: 4.0 mg/L, LOEC: 8.5 mg/L
OECD Test No. 202: Daphnia sp., Acute Immobilization Test	Daphnia magna	EC50	>20 mg/l	48h	NOEC: 20 mg/L No toxic effects at saturation.

12.2. Persistence and Degradability

.

Chemical Oxygen Demand (mg/L)

Concentrate	580,000
1% Solution	6,100

Concentrate Biological Oxygen Demand (mg/L)

Biological Oxygen Demand (5 Day)	180000
%BOD/COD	31.03
Biological Oxygen Demand (10 Day)	380000
%BOD/COD	65.51
Biological Oxygen Demand (15 Day)	440000
%BOD/COD	75.86
Biological Oxygen Demand (20 Day)	450000
%BOD/COD	77.59

1% Solution Biological Oxygen Demand (mg/L)

Biological Oxygen Demand (5 Day)	2300
%BOD/COD	37.70
Biological Oxygen Demand (10 Day)	4400
%BOD/COD	72.13
Biological Oxygen Demand (15 Day)	4800
%BOD/COD	78.69
Biological Oxygen Demand (20 Day)	5000
%BOD/COD	81.97

12.3. Bioaccumulation
No information available.

12.4. Other Adverse Effects
No information available

13. Disposal Considerations

13.1. Waste Treatment Methods

Disposal of wastes Disposal should be in accordance with applicable regional, national and local laws and regulations.

Contaminated Packaging Do not reuse container.

14. Transport Information

DOT NOT REGULATED

TDG NOT REGULATED

MEX NOT REGULATED

ICAO (air) NOT REGULATED

IATA NOT REGULATED

IMDG NOT REGULATED

15. Regulatory Information

15.1. International Inventories

TSCA	Complies
DSL/NDSL	Does not comply
ENCS	Does not comply
IECSC	Does not comply
KECL	Does not comply
PICCS	Does not comply
AICS	Does not comply

Legend:

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
ENCS - Japan Existing and New Chemical Substances
IECSC - China Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
AICS - Australian Inventory of Chemical Substances

15.2. US Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

Chemical name	SARA 313 - Threshold Values %
2-(2-Butoxyethoxy)ethanol - 112-34-5	1.0

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic health hazard	No
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

CWA (Clean Water Act)

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

CERCLA

This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material

15.3. US State Regulations

California Proposition 65

This product contains the following Proposition 65 chemicals

Chemical name	California Proposition 65
Formaldehyde - 50-00-0	Carcinogen
Perfluorooctanoic acid - 335-67-1	Developmental Toxicity

U.S. State Right-to-Know Regulations

Chemical name	New Jersey	Massachusetts	Pennsylvania
2-(2-Butoxyethoxy)ethanol 112-34-5	X	-	X
1-Octanol 111-87-5	-	-	X
Formaldehyde 50-00-0	X	X	X

16. Other information, including date of preparation of the last revision

NFPA	**Health Hazards** 2	**Flammability** 0	**Instability** 0	**Physical and chemical properties** -
HMIS	**Health Hazards** 2	**Flammability** 0	**Physical Hazards** 0	**Personal Protection** X

Revision date 13-Jan-2019
Revision note SDS sections updated, 12.

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

End of Safety Data Sheet

Safety Data Sheets: BBI- Lead Acid Batteries**;** Sonardyne 641-0127 Compatt 6 Battery Pack Lithium

Waste Stream: Batteries

EPA Waste Profile Sheet Number: 20140506-018

Safety Data Sheet

Issue Date 01-Jan-2013 **Revision Date:** 09-Aug-2013 **Version** 1

1. IDENTIFICATION

Product Identifier

Product Name Lead Acid Batteries

Other means of identification

SDS # BB-001
UN/ID No UN2794
Product Code UN2794

Recommended use of the chemical and restrictions on use

Recommended Use Batteries, wet, filled with acid.

Details of the supplier of the safety data sheet

Manufacturer Address
Battery Builders Inc.
31 W238 91st St
Naperville, IL 60564
PO Box 5005
Naperville, IL 60567

Emergency Telephone Number

Company Phone Number Phone: 630-851-5800
Fax: 630-851-1040

Emergency Telephone (24 hr) INFOTRAC 1-352-323-3500 (International)
1-800-535-5053 (North America)

2. HAZARDS IDENTIFICATION

Classification

This product is a battery. The classification below is based on the battery acid contained in the battery, which would only be released during an incident.

Acute toxicity - Oral	Category 4
Acute toxicity - Inhalation (Dusts/Mists)	Category 4
Skin corrosion/irritation	Category 1 Sub-category C
Carcinogenicity	Category 1A
Reproductive toxicity	Category 1A
Specific target organ toxicity (repeated exposure)	Category 2

Signal Word
Danger

Hazard Statements
Harmful if swallowed
Harmful if inhaled
Causes severe skin burns and eye damage
May cause cancer
May damage fertility or the unborn child
May cause damage to organs through prolonged or repeated exposure

Appearance Industrial/commercial lead acid battery **Physical State** Sulfuric acid: Liquid Lead: Solid **Odor** Odorless

Precautionary Statements - Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Use only outdoors or in a well-ventilated area
Do not breathe dust/fume/gas/mist/vapors/spray

Precautionary Statements - Response
If exposed or concerned: Get medical advice/attention
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Immediately call a POISON CENTER or doctor/physician
IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
Wash contaminated clothing before reuse
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Call a poison center or doctor/physician if you feel unwell
Rinse mouth
Do not induce vomiting

Precautionary Statements - Storage
Store locked up

Precautionary Statements - Disposal
Dispose of contents/container to an approved waste disposal plant

Other Hazards
Very toxic to aquatic life with long lasting effects
Very toxic to aquatic life

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula $PbO2 + Pb + 2H2SO4 = 2PbSO4 + 2H2O$

Chemical Name	CAS No	Weight-%
Water	7732-18-5	19.2
Lead	7439-92-1	25.5
Lead Sulfate	7446-14-2	18.2
Lead Oxide	1309-60-0	18
Sulfuric acid	7664-93-9	5.2
Antimony	7440-36-0	<1

4. FIRST-AID MEASURES

First Aid Measures

General Advice If exposed or concerned: Get medical advice/attention. If the battery is compromised, the most probably routes of entry would include eyes, skin, mouth, and inhalation. Lead compounds: Hazardous exposure can occur only when product is heated above melting point, oxidized or otherwise processed or damaged to create dust, vapor or fume.

Eye Contact In case of exposure to electrolyte and lead compounds: Flush immediately with large amounts of clean water or saline for at least 15 minutes. Call a physician immediately.

Skin Contact In case of exposure to electrolyte, flush with large amounts of water for at least 15 minutes. In case of contact with lead compounds: wash immediately with soap and water. Remove contaminated clothing and shoes.

Inhalation In case of exposure to electrolyte, remove to fresh air. If breathing is difficult, give oxygen. In case of exposure to lead compounds, remove from exposure, gargle, wash nose and lips. Call a physician.

Ingestion Rinse mouth. In case of exposure to electrolyte, give large quantities of water. Do not induce vomiting. Call a physician. In case of ingestion of lead compounds: consult physician immediately.

Most important symptoms and effects

Symptoms Prolonged contact may even cause severe skin irritation or mild burn. Ingestion may cause severe burns to mouth, throat or stomach. Inhalation of sulfuric acid vapors or mists may cause severe respiratory irritation. In severe cases, burns, corneal damage, and blindness may occur.

Indication of any immediate medical attention and special treatment needed

Notes to Physician Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media
Carbon dioxide (CO2). Dry chemical.

Unsuitable Extinguishing Media Not determined.

Specific Hazards Arising from the Chemical
Highly flammable hydrogen gas is generated during charging and operation of batteries. To avoid risk of fire or explosion, keep sparks or other sources of ignition away from batteries. D not allow metallic materials to simultaneously contact negative and positive terminals of cells and batteries.

Protective equipment and precautions for firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. If batteries are on charge, shut off power. Water applied to electrolyte generates heat and causes it to spatter. Wear acid-resistant clothing.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal Precautions	Wear acid-resistant clothing, boots, gloves, and face shield.
Environmental Precautions	Do not allow discharge of unneutralized acid to sewer.

Methods and material for containment and cleaning up

Methods for Containment	Prevent further leakage or spillage if safe to do so.
Methods for Clean-Up	Stop flow of material, contain/absorb small spills with dry sand, earth and vermiculite. Do not use combustible materials. If possible, carefully neutralize spilled electrolyte with soda ash, sodium bicarbonate, lime, etc.

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on Safe Handling	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protection recommended in Section 8. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Do not breathe dust/fume/gas/mist/vapors/spray. Use only in well-ventilated areas. Handle carefully and avoid tipping, which may allow electrolyte leakage. Single batteries pose no risk of electric shock, but there may be increased risk of electric shock from strings of connected batteries exceeding three 12-volt units.

Conditions for safe storage, including any incompatibilities

Storage Conditions	Store locked up. Store batteries under roof in cool, dry, well-ventilated areas that are separated from incompatible materials and from activities that may create flames, spark or heat. Store on smooth, impervious surfaces that are provided with measures for liquid containment in the event of electrolyte spills. Keep away from metallic objects that could bridge the terminals on a battery and create a dangerous short-circuit.
Incompatible Materials	Electrolyte: Contact with combustibles and organic material may cause fire and explosion. Also reacts violently with strong reducing agents, metals, sulfur trioxide gas, strong oxidizers, and water. Lead compounds: Avoid contact with strong acids, bases, halides, halogenates, potassium nitrate, permanganate, peroxides, nascent hydrogen, and reducing agents.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Lead 7439-92-1	TWA: 0.05 mg/m^3 TWA: 0.05 mg/m^3 Pb	TWA: 50 µg/m^3 TWA: 50 µg/m^3 Pb	IDLH: 100 mg/m^3 IDLH: 100 mg/m^3 Pb TWA: 0.050 mg/m^3 TWA: 0.050 mg/m^3 Pb
Lead Sulfate 7446-14-2	TWA: 0.05 mg/m^3 Pb	TWA: 50 µg/m^3 Pb	IDLH: 100 mg/m^3 Pb TWA: 0.050 mg/m^3 Pb
Lead Oxide 1309-60-0	TWA: 0.05 mg/m^3 Pb	TWA: 50 µg/m^3 Pb	IDLH: 100 mg/m^3 Pb TWA: 0.050 mg/m^3 Pb
Sulfuric acid 7664-93-9	TWA: 0.2 mg/m^3 thoracic fraction	TWA: 1 mg/m^3 (vacated) TWA: 1 mg/m^3	IDLH: 15 mg/m^3 TWA: 1 mg/m^3
Antimony 7440-36-0	TWA: 0.5 mg/m^3 TWA: 0.5 mg/m^3 Sb	TWA: 0.5 mg/m^3 TWA: 0.5 mg/m^3 Sb (vacated) TWA: 0.5 mg/m^3 (vacated) TWA: 0.5 mg/m^3 Sb	IDLH: 50 mg/m^3 IDLH: 50 mg/m^3 Sb TWA: 0.5 mg/m^3 TWA: 0.5 mg/m^3 Sb

Appropriate engineering controls

Engineering Controls None under normal use conditions. Use engineering controls (work station design and ventilation) to reduce exposure below OSHA PEL when potential exposure to battery contents exists. Eyewash stations. Showers.

Individual protection measures, such as personal protective equipment

Eye/Face Protection Wear safety glasses when handling sealed batteries as a general precaution. If topping is off of a battery or if potential exposure to battery contents exists, wear splash goggles and/or a full face shield.

Skin and Body Protection Wear acid resistant clothing such as apron or splash suit if handling damaged or leaking batteries. Wear chemical and acid resistant gloves when handling electrolyte.

Respiratory Protection No protective equipment is needed under normal use conditions. When responding to a spill involving damaged batteries or potential exposure to battery contents, use a NIOSH approved respirator with particulate and acid gas cartridges.

General Hygiene Considerations Do not eat, drink or smoke when using this product. Wash contaminated clothing before reuse.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical State	Sulfuric acid: Liquid Lead: Solid		
Appearance	Industrial/commercial lead acid battery	**Odor**	Odorless
Color	Not determined	**Odor Threshold**	Not Applicable

Property	Values	Remarks • Method
pH	<1	
Melting Point/Freezing Point	Not applicable	
Boiling Point/Boiling Range	113-116 °C / 235-240 °F	(as sulfuric acid)
Flash Point	Below room temperature	(as hydrogen gas)
Evaporation Rate	< 1	(butyl acetate = 1)
Flammability (Solid, Gas)	Not determined	
Upper Flammability Limits	74% (as hydrogen gas)	
Lower Flammability Limit	4% (as hydrogen gas)	
Vapor Pressure	10 mmHg	

Property	Values	Remarks • Method
Vapor Density	>1	(Air=1)
Specific Gravity	1.27-1.33	(1=Water)
Water Solubility	Completely soluble	(as sulfuric acid)
Solubility in other solvents	Not determined	
Partition Coefficient	Not determined	
Autoignition Temperature	Not applicable	
Decomposition Temperature	Not determined	
Kinematic Viscosity	Not determined	
Dynamic Viscosity	Not determined	
Explosive Properties	Not determined	
Oxidizing Properties	Not determined	

10. STABILITY AND REACTIVITY

Reactivity
Not reactive under normal conditions.

Chemical Stability
Stable under recommended storage conditions.

Possibility of Hazardous Reactions
None under normal processing.

Conditions to Avoid
Prolonged overcharge at high current. Ignition sources.

Incompatible Materials
Electrolyte: Contact with combustibles and organic material may cause fire and explosion. Also reacts violently with strong reducing agents, metals, sulfur trioxide gas, strong oxidizers, and water. Lead compounds: Avoid contact with strong acids, bases, halides, halogenates, potassium nitrate, permanganate, peroxides, nascent hydrogen, and reducing agents.

Hazardous Decomposition Products
Electrolyte: Sulfur trioxide, carbon monoxide, sulfuric acid mist, sulfur dioxide, hydrogen sulfide. Lead compounds: Temperatures above the melting point are likely to produce toxic metal fume, vapor, or dust; contact with strong acid or base or presence of nascent hydrogen may generate highly toxic arsine gas.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information

Eye Contact Causes severe eye damage.

Skin Contact Causes severe skin burns.

Inhalation Harmful if inhaled.

Ingestion Harmful if swallowed.

Component Information

Chemical Name	Oral LD50	Dermal LD50	Inhalation LC50
Sulfuric acid 7664-93-9	= 2140 mg/kg (Rat)	-	= 510 mg/m^3 (Rat) 2 h = 347 ppm (Rat) 1 h

Information on physical, chemical and toxicological effects

Symptoms Please see section 4 of this SDS for symptoms.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Carcinogenicity IARC has classified "strong inorganic acid mist containing sulfuric acid" as a category 1 carcinogen, substance that is carcinogenic to humans. This classification does not apply to liquid forms of sulfuric acid or sulfuric acid solutions contained within a battery. Inorganic acid mist is not generated under normal use of this product. Misuse of the product, such as overcharging, may result in the generation of sulfuric acid mist.

Chemical Name	ACGIH	IARC	NTP	OSHA
Lead 7439-92-1	A3	Group 2A	Reasonably Anticipated	X
Lead Sulfate 7446-14-2	A3	Group 2A	Reasonably Anticipated	X
Lead Oxide 1309-60-0	A3	Group 2A	Reasonably Anticipated	X
Sulfuric acid 7664-93-9	A2	Group 1	Known	X

Legend

ACGIH (American Conference of Governmental Industrial Hygienists)
A2 - Suspected Human Carcinogen
A3 - Animal Carcinogen
IARC (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans
NTP (National Toxicology Program)
Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen
Known - Known Carcinogen
OSHA (Occupational Safety and Health Administration of the US Department of Labor)
X - Present

Reproductive toxicity May damage fertility or the unborn child.

STOT - repeated exposure May cause damage to organs through prolonged or repeated exposure.

Numerical measures of toxicity
Not determined

12. ECOLOGICAL INFORMATION

Ecotoxicity
Very toxic to aquatic life. Very toxic to aquatic life with long lasting effects.

Chemical Name	Algae/aquatic plants	Fish	Toxicity to microorganisms	Crustacea
Lead 7439-92-1		0.44: 96 h Cyprinus carpio mg/L LC50 semi-static 1.17: 96 h Oncorhynchus mykiss mg/L LC50 flow-through 1.32: 96 h Oncorhynchus mykiss mg/L LC50 static		600: 48 h water flea µg/L EC50
Sulfuric acid 7664-93-9		500: 96 h Brachydanio rerio mg/L LC50 static		29: 24 h Daphnia magna mg/L EC50

Persistence/Degradability
Not determined

Bioaccumulation
Not determined

Mobility
Not determined

Other Adverse Effects
Not determined

13. DISPOSAL CONSIDERATIONS

Waste Treatment Methods

Disposal of Wastes Disposal should be in accordance with applicable regional, national and local laws and regulations. Spent batteries: Send to secondary lead smelter for recycling. Place neutralized slurry into sealed containers and handle as applicable with state and federal regulations. Large water-diluted spills, after neutralization and testing, should be managed in accordance with approved local, state and federal requirements. Consult state environmental agency and/or federal EPA.

Contaminated Packaging Disposal should be in accordance with applicable regional, national and local laws and regulations.

US EPA Waste Number
Spent lead-acid batteries are not regulated as hazardous waste by the EPA when recycled; however, state and international regulations may vary

Chemical Name	RCRA	RCRA - Basis for Listing	RCRA - D Series Wastes	RCRA - U Series Wastes
Lead 7439-92-1		Included in waste streams: F035, F037, F038, F039, K002, K003, K005, K046, K048, K049, K051, K052, K061, K062, K069, K086, K100, K176	5.0 mg/L regulatory level	
Antimony 7440-36-0		Included in waste streams: F039, K021, K161, K177		

Chemical Name	RCRA - Halogenated Organic Compounds	RCRA - P Series Wastes	RCRA - F Series Wastes	RCRA - K Series Wastes
Antimony 7440-36-0				Toxic waste waste number K021 Waste description: Aqueous spent antimony catalyst waste from fluoromethanes production.

California Hazardous Waste Status

Chemical Name	California Hazardous Waste Status
Lead 7439-92-1	Toxic
Lead Sulfate 7446-14-2	Toxic
Lead Oxide 1309-60-0	Toxic
Sulfuric acid 7664-93-9	Toxic Corrosive
Antimony 7440-36-0	Toxic

14. TRANSPORT INFORMATION

Note Please see current shipping paper for most up to date shipping information, including exemptions and special circumstances.

DOT

UN/ID No	UN2794
Proper Shipping Name	Batteries, Wet, Filled with Acid
Hazard Class	8
Packing Group	III

IATA

UN/ID No	UN2794
Proper Shipping Name	Batteries, Wet, Filled with Acid
Hazard Class	8
Packing Group	III

IMDG

UN/ID No	UN2794
Proper Shipping Name	Batteries, Wet, Filled with Acid
Hazard Class	8
Packing Group	III

15. REGULATORY INFORMATION

International Inventories

TSCA	All ingredients are listed or exempt from listing on Chemical Substance Inventory
DSL	Listed
EINECS	Listed

Legend:

TSCA *- United States Toxic Substances Control Act Section 8(b) Inventory*

DSL/NDSL *- Canadian Domestic Substances List/Non-Domestic Substances List*

EINECS/ELINCS *- European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances*

ENCS *- Japan Existing and New Chemical Substances*

IECSC *- China Inventory of Existing Chemical Substances*

KECL *- Korean Existing and Evaluated Chemical Substances*

PICCS *- Philippines Inventory of Chemicals and Chemical Substances*

US Federal Regulations

CERCLA

Chemical Name	Hazardous Substances RQs	CERCLA/SARA RQ	Reportable Quantity (RQ)
Lead 7439-92-1	10 lb		RQ 10 lb final RQ RQ 4.54 kg final RQ
Lead Sulfate 7446-14-2	10 lb		RQ 10 lb final RQ RQ 4.54 kg final RQ
Sulfuric acid 7664-93-9	1000 lb	1000 lb	RQ 1000 lb final RQ RQ 454 kg final RQ
Antimony 7440-36-0	5000 lb 10 lb		RQ 5000 lb final RQ RQ 2270 kg final RQ RQ 10 lb final RQ RQ 4.54 kg final RQ

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	No
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

SARA 313

Chemical Name	CAS No	Weight-%	SARA 313 - Threshold Values %
Lead - 7439-92-1	7439-92-1	25.5	0.1
Lead Sulfate - 7446-14-2	7446-14-2	18.2	0.1
Lead Oxide - 1309-60-0	1309-60-0	18	0.1
Sulfuric acid - 7664-93-9	7664-93-9	5.2	1.0
Antimony - 7440-36-0	7440-36-0	<1	1.0

CWA (Clean Water Act)

Component	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Lead 7439-92-1 (25.5)		X	X	
Lead Sulfate 7446-14-2 (18.2)		X		X
Lead Oxide 1309-60-0 (18)		X		
Sulfuric acid 7664-93-9 (5.2)	1000 lb			X
Antimony 7440-36-0 (<1)		X	X	

US State Regulations

California Proposition 65

This product contains the following Proposition 65 chemicals.

Chemical Name	California Proposition 65
Lead - 7439-92-1	Carcinogen Developmental Female Reproductive Male Reproductive
Lead Sulfate - 7446-14-2	Carcinogen Developmental
Lead Oxide - 1309-60-0	Carcinogen Developmental
Sulfuric acid - 7664-93-9	Carcinogen

U.S. State Right-to-Know Regulations

Chemical Name	New Jersey	Massachusetts	Pennsylvania
Lead 7439-92-1	X	X	X
Lead Sulfate 7446-14-2	X	X	X
Lead Oxide 1309-60-0	X	X	X
Sulfuric acid 7664-93-9	X	X	X
Antimony 7440-36-0	X	X	X

16. OTHER INFORMATION

NFPA	**Health Hazards**	**Flammability**	**Instability**	**Special Hazards**
	Not determined	Not determined	Not determined	Not determined
HMIS	**Health Hazards**	**Flammability**	**Physical Hazards**	**Personal Protection**
	Not determined	Not determined	Not determined	Not determined

Issue Date	01-Jan-2013
Revision Date:	09-Aug-2013
Revision Note	New format

Disclaimer

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End of Safety Data Sheet

QC
RN AUG 13 2018

Safety Data Sheet

Primary Li-$SOCl_2$ single cells and multi-cell battery packs

1. IDENTIFICATION

1.1 Product

Lithium-thionyl dichloride primary unit LS/LSH cells and multi-cell battery systems composed of these cells

1.2 Supplier

Headquarters	**Saft S.A.S.**
Address	12 rue Sadi Carnot, 93170 BAGNOLET – France
Phone/Fax	+33 (0)1 49 93 19 18 /+33 (0)1 49 93 19 50
Factory	**Saft Poitiers**
Address	Rue Georges Leclanché, BP 1039, 86060 POITIERS Cedex 9 – France
Phone/Fax	+33 (0)5 49 55 48 48 /+33 (0)5 49 55 48 50
Factory	**Saft Ltd.**
Address	River Drive, Tyne & Wear, SOUTH SHIELDS, NE33 2TR – United Kingdom
Phone/Fax	+1 44 191 456 1451/+1 44 191 456 6383
Factory	**Saft America Inc.**
Address	313 Crescent Street, VALDESE, NC 28690 – USA
Phone/Fax	+1 828 874 4111/+1 828 874 2431
Factory	**Saft Batteries Co., Ltd.**
Address	Zhuhai Free Trade Zone, Lianfeng Road, ZHUHAI 519030, Guangdong Province – China
Phone/Fax	+86 756 881 9318/+86 756 881 9328
Factory	**Tadiran Batteries Ltd.**
Address	34 Y. Rabin Avenue – KIRYAT EKRON 76950 - Israel
Phone/Fax	+972 894 44374/+972 894 13066
Factory	**Tadiran Batteries GmbH**
Address	Industriestrasse 22, D-63654 BÜDINGEN – Germany
Phone/Fax	+49 (0)6 042 954 599/+49 (0)6 042 954 190

1.3 Emergency contact

For chemical emergency ONLY (in case of spill, leak, fire, exposure or accident) call CHEMTREC at:
International: +1-703-527-3887 for English
Within the USA: +1-800-424-9300

2. HAZARD IDENTIFICATION

The Li-$SOCl_2$ batteries described in this Battery Information Sheet are sealed units which are not hazardous under normal operating conditions in accordance with manufacturer's recommendations, as stated in the user's manual or other similar documentation. Under normal use, the battery integrity is maintained and the active components it contains are isolated from the outside.
In particular, the battery should not be submitted to any mechanical (opening, puncture, immersion), thermal (burning, heating to temperatures above the normal temperature range of the product) or electrical abuse (short-circuit, recharge, forced discharge), which will lead to the activation of safety valves and/or the rupture of the battery container.
Any accidental release of the inner components of the cell, or their combustion products could be highly hazardous. Battery content exposition to air humidity/liquid water may be followed by severe battery vent/explosion/fire, depending on the hazard causes and circumstances.

Protection from charging:

Whenever lithium batteries are not the single power source in a circuit, the following measures recommended by Underwriters Laboratories are relevant. The cells should not be connected with an electrical power source that would increase the load through the cells. The electronic circuit shall include one of the following:

A. Two suitable diodes or the equivalent in series with the cells to prevent any reverse (charging) current. The second diode is used to provide protection in the event that one would fail. Quality control, or equivalent procedures, shall be established by the device manufacturer to check that the diode polarity is correct for each unit.

or

B. A blocking diode or the equivalent to prevent any reverse (charging) current and a resistor to limit current in case of diode failure. The resistor should be sized to limit the reverse (charging) current to the maximum value according to the data sheet of the cell.

3. COMPOSITION, INFORMATION OR INGREDIENTS

Each unit cell consists of a hermetically sealed metallic can containing a number of chemicals and materials of construction of which the following are potentially hazardous upon release to air.

Component	CAS Number	EINECS/ELINCS	Content (wt. %)*
Lithium metal	7439-93-2	231-102-5	2-6
Thionyl dichloride	7719-09-7	231-748-8	18-47
Aluminium chloride	7446-70-0	231-208-1	1-5
Gallium chloride	13450-90-3	236-610-0	0-2
Lithium chloride	7447-41-8	231-212-3	1-2
Carbon	1333-86-4	215-609-9	2-5
PTFE	9002-84-0	N/A	0-1
Stainless steel, Nickel and inert material	N/A	N/A	remainder

** Quantities may vary with cell model*

4. FIRST AID MEASURES (not anticipated under normal use)

4.1. Electrolyte contact

EYE CONTACT: Immediately flush with plenty of water for at least 15 minutes and get medical attention.

SKIN CONTACT: Remove contaminated clothing and immediately flush with plenty of water for at least 15 minutes. In severe cases, get medical attention.

INHALATION: Contents of an opened cell may cause respiratory tract and mucus membrane irritation. Remove from exposure, rest and keep warm. Immediately inhale Cortisone spray. In severe cases, track medical surveillance for 48 hours.

INGESTION: Wash out mouth thoroughly with water and give plenty of water to drink. Get medical attention.

FURTHER TREATMENT: All cases of eye contamination, persistent skin irritation and casualties who have swallowed this substance or have breathed its vapours should be seen by a Doctor.

4.2. Lithium metal contact

EYE CONTACT: Immediately flush with large quantities of water for at least 15 minutes, with open eyelids, and get medical attention.

SKIN CONTACT: Remove particles of lithium from skin as quick as possible. Immediately flush with plenty of water for at least 15 minutes and get medical attention.

INHALATION/INGESTION: Contents of an opened cell may cause respiratory tract and mucus membrane irritation. Remove from exposure, rest and keep warm. Immediately inhale Cortisone spray. In severe cases, track medical surveillance for 48 hours.

5. FIRE FIGHTING MEASURES (not anticipated under normal use)

ESTINGUISHING MEDIA:

- During a fire with lithium batteries, using large amounts of cold water or water-based foam has some cooling effect and is effective to prevent fire expansion as long as the extent of the fire has not progressed to the point that the lithium metal they contain is exposed (as marked by appearance of deep red flames). Do not use warm or hot water.
- Lith-X Class D extinguishers are effective on fires involving only a few lithium batteries.
- Do not use CO_2 or Halon-type extinguishers.
- Do not use sand, dry powder or soda ash, graphite powder or fire blankets.
- **Use only class D metal extinguishers on raw lithium metal.**

SPECIAL FIRE FIGHTING PROCEDURES:

- Fire fighters should wear approved/certified positive pressure self-contained breathing apparatus.
- Full protective clothing is necessary to prevent potential body contact with electrolyte solution.
- During water spraying, caution is advised as burning pieces of lithium may be ejected from the fire.
- It is permissible to use any class of extinguishing medium, specified above, on these batteries or their packing material. Cool exterior of batteries if exposed to fire to prevent rupture.
- If the cells or batteries are not located at the center of the fire, copious amounts of water may be supplied using a diffuser type nozzle so that the cells remain cool during the fire containment and extinction. A sprinkler system should be suitable for this purpose, the critical factor being that the lithium cells do not experience temperatures above the melting point of lithium (180°C).
- Small amounts of water should never be used such as the volumes contained within portable fire extinguishers. Standard dry powder extinguishers are ineffective. It should be kept in mind that a hazard of hydrogen formation exists whenever hot lithium metal comes into contact with water.

6. ACCIDENTAL RELEASE MEASURES (not anticipated under normal use)

INDIVIDUAL PRECAUTIONS: Evacuate the employees from area until fumes dissipate. In case of electrolyte leakage from a cell or battery, do not inhale vapors or touch liquid with bare hands. In case of skin or eye contact, inhalation or ingestion, follow the measured described in section 4.

ENVIRONMENTAL PRECAUTION: Avoid sewage, surface water and underground water contamination. Avoid ground and atmosphere contamination.

WAYS OF CLEANING: With protective glasses and gloves, use absorbent material (sand, earth, chalk ($CaCO_3$) or lime (CaO) powder or Vermiculite) to absorb any exuded material. Seal leaking battery (unless hot) and contaminated absorbent material tight in plastic bag, and dispose of as hazardous waste in accordance with local regulations. Electrolyte traces may be wiped off dryly using household paper. Rinse with water afterwards.

7. HANDLING AND STORAGE

IMPORTANT NOTICE: Lithium-thionyle chloride batteries are not rechargeable and should not be tentatively charged or recharged. Manufacturer's recommendations should be followed regarding maximum current and operating temperature range. Applying pressure or deforming the battery may lead to disassembly and cause eye, skin and throat irritation.

STORAGE: Store in a cool, regulated (preferably below 21°C and in any case below 30°C), dry and ventilated area, away from possible sources of heat, open flames, food and drink. Avoid exposure to direct sunlight for long periods. Temperatures above 100°C (or higher for High Temperatures cells and batteries such as the LSH20-150 cell- refer to individual data sheets for maximum temperatures) may cause leakage and rupture, and result in shortened battery service life. Keep proper clearance space between batteries and walls. Since short circuit can cause burn hazard, leakage or explosion hazard, keep batteries in original packaging until use and do not mix them.

HANDLING:

- Do not open the battery system.
- Do not crush or pierce the cells.
- Do not short (+) or (-) terminal with conductors.
- Do not reverse the polarity.
- Do not submit to excessive mechanical stress.
- Do not mix batteries of different types or mix new and old ones together.
- Do not use the unit without its electronic management system.
- Do not expose the unit to water or condensation.
- Do not directly heat, solder or throw into fire. Such unsuitable use can cause leakage or spout vaporized electrolyte fumes and may cause fire or explosion.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION* (not anticipated under normal use)

	Respiratory protection	In all fire situations, use self-contained breathing apparatus
	Hand protection	In case of leakage wear protective gloves
	Eye protection	Safety glasses are mandatory during handling
	Other	In the event of leakage or ruptured cells, wear a rubber apron and protective clothes.

AFNOR pictograms

Occupational exposure standard:

Compound	8 hour TWA	15 min TWA	SK
Sulfur Dioxide	1 ppm	1 ppm	-
Hydrogen chloride	1 ppm	5 ppm	-

9. PHYSICAL AND CHEMICAL PROPERTIES

The lithium-thionyl chloride cell or battery described by this Safety Data Sheet is a sealed unit when offered for sale. It is a manufactured "article" and does not expose the user to hazardous chemicals when used in accordance with manufacturer specifications.

Appearance – Cylindrical shape
Odour – If leaking, gives off a pungent corrosive odour

Flash point – Not applicable	Flammability – Not applicable
Boiling Point – Not applicable	Melting Point – Not applicable
Vapor Pressure – Not applicable	Vapor Density – Not applicable
pH – Not applicable	Specific Gravity – Not applicable
Solubility (in water) – Not applicable	Solubility (other) – Not applicable

10. STABILITY AND REACTIVITY

The battery system is stable when handled and stored according to section 7.

MATERIALS TO AVOID: Oxidizing agents, bases, water. Avoid electrolyte contact with aluminium or zinc.

CONDITIONS TO AVOID: Do not heat above 100°C (or higher (150°C) for High Temperatures cells and batteries such as the LSH20-150 cell- refer to individual data sheets for maximum temperatures) or incinerate. Do not disassemble, crush, pierce, short, charge or recharge. Avoid mechanical or electrical abuse.

HAZARDOUS DECOMPOSITION PRODUCTS: Hydrogen (H_2) as well as lithium oxide (Li_2O) and lithium hydroxide (LiOH) dust are produced in case of reaction of lithium metal with water (hydrolysis).
Chlorine (Cl_2), sulfur dioxide (SO_2) and disulfur dichloride (S_2Cl_2) are produced in case of thermal decomposition of thionyl dichloride above 100°C. Hydrochloric acid (HCl) and sulfur dioxide (SO_2) are produced in case of reaction of thionyl dichloride with water at room temperature.
Hydrochloric acid (HCl) fumes, lithium oxide (Li_2O), lithium hydroxide (LiOH) and aluminium hydroxide ($Al(OH)_3$) dust are produced in case of reaction of lithium tetrachloroaluminate ($LiAlCl_4$) with water.

11. TOXICOLOGICAL INFORMATION

There is no risk, unless the battery ruptures. In the event of accidental exposure to internal contents, corrosive fumes will cause severe skin, eye and mucous membrane irritation. Medical conditions are generally aggravated by exposure to battery internal contents: eczema, skin allergies, lung injuries, asthma and other respiratory disorders may occur.
Overexposure may cause symptoms of non-fibrotic lung injury and ingestion can cause tissue damage to throat and gastro-respiratory tract.

12. ECOLOGICAL INFORMATION

The batteries do not contain mercury, cadmium or other heavy metals.

Eco-toxicity	None known if used/disposed of correctly.
Mammalian affects	None known if used/disposed of correctly.
Bioaccumulation potential	None known if used/disposed of correctly.
Environmental fate	None known if used/disposed of correctly.

13. DISPOSAL CONSIDERATIONS

Batteries do not contain hazardous materials according to EC Directives 91/157/EEC, 93/86/EEC, and 2002/95/EC (RoHS) Directive). Battery recycling is either mandatory or recommended: The European Directive 2006/66/EC has been implemented by most EC member states.
Dispose of in accordance with local laws and regulations. Store material for disposal as indicated in Section 7. A disposal service is offered upon request by Tadiran Batteries.
Do not incinerate, or subject cells to temperatures in excess of 100°C (or 150°C for LSH20-150 cells and the battery packs assembled from them). Such abuse can result in loss of seal, electrolyte leakage and/or violent disassembly with risk of material projections.

For additional information a Technical Notice is available upon request.

See the section on "Sustainability & Environment" on http://www.saftbatteries.com

14. TRANSPORTATION INFORMATION

Note: when manufacturing a new battery pack, one must assure that it has fulfilled the tests according to the UN Model Regulations, Manuel of Tests and Criteria, Part III, subsection 38.3.

14.1 United Nations Class

For the single cell batteries and multi-cell battery packs that are non-restricted to transport (non-assigned to the Miscellaneous Class 9), use lithium batteries inside label.

For the single cell batteries and multi-cell battery packs which are restricted to transport (assigned to Class 9), use Class 9 Miscellaneous Dangerous Goods and UN Identification Number Labels.

In all cases, refer to the product transport certificate issued by the manufacturer.

UN Numbers:	3090	LITHIUM METAL BATTERIES: Shipment of cells and batteries *in bulk*
	3091	LITHIUM METAL BATTERIES CONTAINED IN EQUIPMENT or LITHIUM METAL BATTERIES PACKED WITH EQUIPMENT: Cells and batteries *contained in equipment* or *packed with it*
Shipping name	LITHIUM METAL BATTERIES	
Hazard Classification:	9 Depending on their lithium metal content, some single cells and small multi-cell battery packs may be non-assigned to Class 9. Refer to Transport Certificate.	
Packaging:	Group II	

14.2 International agreements

By Air International:	IATA/ICAO: UN 3090 or UN3091
By Sea International:	IMDG: UN 3090 or UN 3091
European road transportation:	ADR
European rail transportation:	RID

15. REGULATORY INFORMATION

Regulations specifically applicable to the product:

- ACGIH and OSHA: see exposure limits of the internal components of the battery in section 8.
- IATA/ICAO (air transportation): UN 3090 or UN 3091.
- IMDG (sea transportation) : UN 3090 or UN 3091.
- Transportation within the US-DOT, 49 Code of Federal Regulations
- UK regulatory references: Classified under CHIP.
- Battery Directive (2006/66/EC): see section 13

16. OTHER INFORMATION

This information has been compiled from sources considered to be dependable and is, to the best of our knowledge and belief, accurate and reliable as of the date compiled. However, neither exhaustively nor perfect reliability can be granted. Information does not imply implicit or specific warranty of it.

This information relates to the specific products designated and may not be valid for such products used in combination with any other materials or in any process. It is the user's responsibility to satisfy himself as to the suitability and completeness of this information for his particular use.

Saft does not accept liability for any loss or damage that may occur, whether direct, indirect, incidental or consequential, from the use of this SDS. Saft does not offer warranty against patent infringement.

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Data in this document is subject to change without notice and becomes contractual only after written confirmation.

Safety Data Sheets: ACP22005A; AFMR19017A; ASPH17544SP; MISC17477A; PC-191T; Oceanic HW443 R 2015

Waste Stream: Chemical Contaminated Water

EPA Waste Profile Sheet Number: 20140506-020

NALCO Champion
An Ecolab Company

SAFETY DATA SHEET

ACPC22005A

Section: 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	ACPC22005A
Other means of identification	:	Not applicable.
Recommended use	:	ASPHALTENE/PARAFFIN INHIBITOR
Restrictions on use	:	Refer to available product literature or ask your local Sales Representative for restrictions on use and dose limits.
Company	:	Nalco Champion 11177 S. Stadium Drive Sugar Land, Texas 77478 USA TEL: (281) 632-6500
Emergency telephone number	:	(800) 424-9300 (24 Hours) CHEMTREC
Issuing date	:	06/01/2018

Section: 2. HAZARDS IDENTIFICATION

GHS Classification

Flammable liquids	:	Category 3
Acute toxicity (Dermal)	:	Category 4
Skin irritation	:	Category 2
Eye irritation	:	Category 2A
Carcinogenicity	:	Category 2
Reproductive toxicity	:	Category 2
Specific target organ toxicity - single exposure	:	Category 3 (Respiratory system, Central Nervous System)
Aspiration hazard	:	Category 1

GHS Label element

Hazard pictograms :

Signal Word : Danger

Hazard Statements : Flammable liquid and vapour.
May be fatal if swallowed and enters airways.
Harmful in contact with skin.
Causes skin irritation.
Causes serious eye irritation.
May cause respiratory irritation.
May cause drowsiness or dizziness.
Suspected of causing cancer.
Suspected of damaging fertility or the unborn child.

Precautionary Statements	:	**Prevention:** Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray. Wear protective gloves/ protective clothing/ eye protection/ face protection. **Response:** IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. Immediately call a POISON CENTER or doctor/ physician.IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. **Storage:** Store in a well-ventilated place. **Disposal:** Dispose of contents/ container to an approved waste disposal plant.
Other hazards	:	None known.

Section: 3. COMPOSITION/INFORMATION ON INGREDIENTS

Pure substance/mixture : Mixture

Chemical Name	CAS-No.	Concentration: (%)
Xylene	1330-20-7	60 - 100
Ethylbenzene	100-41-4	10 - 30
Toluene	108-88-3	0.1 - 1

Section: 4. FIRST AID MEASURES

In case of eye contact	:	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention.
In case of skin contact	:	Wash off immediately with plenty of water for at least 15 minutes. Use a mild soap if available. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention if irritation develops and persists.
If swallowed	:	Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Aspiration hazard if swallowed - can enter lungs and cause damage. Get medical attention immediately.
If inhaled	:	Remove to fresh air. Treat symptomatically. Get medical attention if symptoms occur.
Protection of first-aiders	:	In event of emergency assess the danger before taking action. Do not put yourself at risk of injury. If in doubt, contact emergency responders. Use personal protective equipment as required.
Notes to physician	:	Treat symptomatically.
Most important symptoms and effects, both acute and	:	See Section 11 for more detailed information on health effects and symptoms.

delayed

Section: 5. FIREFIGHTING MEASURES

Suitable extinguishing media	:	Foam Carbon dioxide Dry powder Other extinguishing agent suitable for Class B fires For large fires, use water spray or fog, thoroughly drenching the burning material.
Unsuitable extinguishing media	:	High volume water jet
Specific hazards during firefighting	:	Fire Hazard Keep away from heat and sources of ignition. Flash back possible over considerable distance. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
Hazardous combustion products	:	Carbon oxides
Special protective equipment for firefighters	:	Use personal protective equipment.
Specific extinguishing methods	:	Use water spray to cool unopened containers. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations. In the event of fire and/or explosion do not breathe fumes.

Section: 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Ensure adequate ventilation. Remove all sources of ignition. Ensure clean-up is conducted by trained personnel only. Refer to protective measures listed in sections 7 and 8.
Environmental precautions	:	Do not allow contact with soil, surface or ground water.
Methods and materials for containment and cleaning up	:	Eliminate all ignition sources if safe to do so. Stop leak if safe to do so. Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13). For large spills, dike spilled material or otherwise contain material to ensure runoff does not reach a waterway. Do not flush into surface water or sanitary sewer system.

Section: 7. HANDLING AND STORAGE

Advice on safe handling	:	Avoid contact with skin and eyes. Open drum carefully as content may be under pressure. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapours). Keep away from fire, sparks and heated surfaces. Do not breathe dust/fume/gas/mist/vapours/spray. Wash hands thoroughly after handling. Use only with adequate ventilation.
Conditions for safe storage	:	Keep away from heat and sources of ignition. Keep in a cool, well-ventilated

place. Keep away from oxidizing agents. Keep out of reach of children. Keep container tightly closed. Store in suitable labelled containers.

Suitable material : The following compatibility data is suggested based on similar product data and/or industry experience: Copper, Brass, PTFE, Aluminum, Mild steel, Stainless Steel 304, Stainless Steel 316L, Hastelloy C-276, Perfluoroelastomer, Compatibility with Plastic Materials can vary; we therefore recommend that compatibility is tested prior to use.

Unsuitable material : The following compatibility data is suggested based on similar product data and/or industry experience: PVC, Polypropylene, Polyethylene, Plexiglass, EPDM, Buna-N, HDPE (high density polyethylene), Natural rubber, Polyurethane, Neoprene, Ethylene propylene, Polytetrafluoroethylene/polypropylene copolymer, Chlorosulfonated polyethylene rubber, Fluoroelastomer

Section: 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Form of exposure	Permissible concentration	Basis
Xylene	1330-20-7	TWA	100 ppm 435 mg/m3	OSHA Z1
		TWA	100 ppm	ACGIH
		STEL	150 ppm	ACGIH
Ethylbenzene	100-41-4	TWA	20 ppm	ACGIH
		TWA	100 ppm 435 mg/m3	NIOSH REL
		STEL	125 ppm 545 mg/m3	NIOSH REL
		TWA	100 ppm 435 mg/m3	OSHA Z1
Toluene	108-88-3	TWA	20 ppm	ACGIH
		TWA	100 ppm 375 mg/m3	NIOSH REL
		STEL	150 ppm 560 mg/m3	NIOSH REL
		TWA	200 ppm	OSHA/Z2
		CEIL	300 ppm	OSHA/Z2
		Peak	500 ppm	OSHA/Z2

Engineering measures : Effective exhaust ventilation system. Maintain air concentrations below occupational exposure standards.

Personal protective equipment

Eye protection : Safety goggles
Face-shield

Hand protection : Wear protective gloves.
Nitrile
Viton

		Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough.
Skin protection	:	Wear suitable protective clothing.
Respiratory protection	:	When workers are facing concentrations above the exposure limit they must use appropriate certified respirators.
Hygiene measures	:	Handle in accordance with good industrial hygiene and safety practice. Remove and wash contaminated clothing before re-use. Wash face, hands and any exposed skin thoroughly after handling.

Section: 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Liquid
Colour	:	Clear Colorless
Odour	:	aromatic, solvent-like
Flash point	:	25 °C, Method: closed cup
pH	:	Not applicable.
Odour Threshold	:	no data available
Melting point/freezing point	:	no data available
Initial boiling point and boiling range	:	135 - 210 °C
Evaporation rate	:	0.7, (BuAc = 1)
Flammability (solid, gas)	:	no data available
Upper explosion limit	:	no data available
Lower explosion limit	:	no data available
Vapour pressure	:	6 - 6.5 mm Hg, (20 °C),
Relative vapour density	:	3.7(Air = 1)
Relative density	:	0.86, (20 °C),
Density	:	7.19 lb/gal
Water solubility	:	insoluble
Solubility in other solvents	:	no data available
Partition coefficient: n-octanol/water	:	log Pow: 3.12 - 3.20
Auto-ignition temperature	:	464 °C
Thermal decomposition	:	no data available
Viscosity, dynamic	:	no data available
Viscosity, kinematic	:	0.9 mm2/s (25 °C), estimated
Molecular weight	:	no data available
VOC	:	no data available

Section: 10. STABILITY AND REACTIVITY

Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	No dangerous reaction known under conditions of normal use.
Conditions to avoid	:	Heat, flames and sparks.
Incompatible materials	:	Strong oxidizing agents
Hazardous decomposition products	:	In case of fire, hazardous decomposition products may be produced such as: Carbon oxides

Section: 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure	:	Inhalation, Eye contact, Skin contact

Potential Health Effects

Eyes	:	Causes serious eye irritation.
Skin	:	Harmful in contact with skin. Causes skin irritation.
Ingestion	:	May be fatal if swallowed and enters airways.
Inhalation	:	May cause respiratory tract irritation. May cause nose, throat, and lung irritation. Inhalation may cause central nervous system effects.
Chronic Exposure	:	Suspected of damaging fertility or the unborn child. Suspected of causing cancer.

Experience with human exposure

Eye contact	:	Redness, Pain, Irritation
Skin contact	:	Redness, Irritation
Ingestion	:	Vomiting
Inhalation	:	Respiratory irritation, Cough, Dizziness, Drowsiness

Toxicity

Product

Acute oral toxicity	:	rat: 4,300 mg/kg Test substance: Product
Acute inhalation toxicity	:	no data available
Acute dermal toxicity	:	Acute toxicity estimate: 1,375 mg/kg
Skin corrosion/irritation	:	no data available
Serious eye damage/eye	:	no data available

irritation

Respiratory or skin sensitization	:	no data available

Carcinogenicity

IARC **Group 2B: Possibly carcinogenic to humans**
Ethylbenzene 100-41-4

OSHA No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

NTP No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

Reproductive effects	:	no data available
Germ cell mutagenicity	:	no data available
Teratogenicity	:	no data available
STOT - single exposure	:	no data available
STOT - repeated exposure	:	no data available
Aspiration toxicity	:	no data available

Components

Acute inhalation toxicity : Ethylbenzene
LC50 rat: 17.4 mg/l
Exposure time: 4 h
Test atmosphere: vapour

Toluene
LC50 rat: 28.1 mg/l
Exposure time: 4 h
Test atmosphere: vapour

Section: 12. ECOLOGICAL INFORMATION

Ecotoxicity

Environmental Effects : This product has no known ecotoxicological effects.

Product

Toxicity to fish : LC50 Sheepshead Minnow: 174 mg/l
Exposure time: 96 hrs
Test substance: Product

NOEC Sheepshead Minnow: 100 mg/l
Exposure time: 96 hrs
Test substance: Product

Toxicity to daphnia and other aquatic invertebrates : LC50 Acartia tonsa: 562 mg/l
Exposure time: 48 hrs
Test substance: Solvent used in the product

NOEC Acartia tonsa: 250 mg/l
Exposure time: 48 hrs
Test substance: Solvent used in the product

Toxicity to algae : EC50 Marine Algae (Skeletonema costatum): 710 mg/l
Exposure time: 72 hrs
Test substance: Solvent used in the product

NOEC Marine Algae (Skeletonema costatum): 100 mg/l
Exposure time: 72 hrs
Test substance: Solvent used in the product

Components

Toxicity to bacteria : Toluene
84 mg/l
EC50 Nitrosomonas Sp.: 84 mg/l
Exposure time: 24 h

Components

Toxicity to fish (Chronic toxicity) : Toluene
NOEC: 1.39 mg/l
Exposure time: 40 d
Species: Oncorhynchus kisutch (coho salmon)

Components

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : Toluene
NOEC: 0.74 mg/l
Exposure time: 7 d
Species: Ceriodaphnia dubia

Persistence and degradability

The organic portion of this preparation is expected to be inherently biodegradable.

Mobility

The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM, provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models.
If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air : 10 - 30%
Water : 10 - 30%
Soil : 50 - 70%

The portion in water is expected to float on the surface.

Bioaccumulative potential

Component substances have a low potential to bioconcentrate.

Other information

no data available

Section: 13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it could meet the criteria of a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261. Before disposal, it should be determined if the waste meets the criteria of a hazardous waste.

Disposal methods	:	Where possible recycling is preferred to disposal or incineration. If recycling is not practicable, dispose of in compliance with local regulations. Dispose of wastes in an approved waste disposal facility.
Disposal considerations	:	Dispose of as unused product. Empty containers should be taken to an approved waste handling site for recycling or disposal. Do not re-use empty containers.

Section: 14. TRANSPORT INFORMATION

The shipper/consignor/sender is responsible to ensure that the packaging, labeling, and markings are in compliance with the selected mode of transport.

The presence of an RQ component (Reportable Quantity for U.S. DOT) in this product causes it to be regulated with an additional description of RQ for road, or as Environmentally hazardous for road and air, ONLY when the net weight in the package exceeds the calculated RQ for the product.

Land transport (DOT)

Proper shipping name	:	XYLENES
Technical name(s)	:	
UN/ID No.	:	UN 1307
Transport hazard class(es)	:	3
Packing group	:	III
Reportable Quantity (per package)	:	125 lbs
RQ Component	:	Xylene

Air transport (IATA)

Proper shipping name	:	XYLENES
Technical name(s)	:	
UN/ID No.	:	UN 1307
Transport hazard class(es)	:	3
Packing group	:	III
Reportable Quantity (per package)	:	125 lbs
RQ Component	:	Xylene

Sea transport (IMDG/IMO)

Proper shipping name	:	XYLENES
Technical name(s)	:	
UN/ID No.	:	UN 1307
Transport hazard class(es)	:	3
Packing group	:	III

Section: 15. REGULATORY INFORMATION

TSCA list : No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

EPCRA - Emergency Planning and Community Right-to-Know Act

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Xylene	1330-20-7	100	125

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 311/312 Hazards : Flammable (gases, aerosols, liquids, or solids)
Acute toxicity (any route of exposure)
Skin corrosion or irritation
Serious eye damage or eye irritation
Carcinogenicity
Reproductive toxicity
Specific target organ toxicity (single or repeated exposure)
Aspiration hazard

SARA 302 : This material does not contain any components with a section 302 EHS TPQ.

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

Xylene	1330-20-7	60 - 100 %
Ethylbenzene	100-41-4	10 - 30 %

California Prop 65

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

Toluene	108-88-3

WARNING! This product contains a chemical known to the State of California to cause cancer.

Ethylbenzene	100-41-4

INTERNATIONAL CHEMICAL CONTROL LAWS :

United States TSCA Inventory

The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

Australia. Industrial Chemical (Notification and Assessment) Act

All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

Canadian Domestic Substances List (DSL)
The substance(s) in this preparation are included in or exempted from the Domestic Substance List (DSL).

Japan. ENCS - Existing and New Chemical Substances Inventory
All substances in this product comply with the Law Regulating the Manufacture and Importation Of Chemical Substances and are listed on the Existing and New Chemical Substances list (ENCS).

Korea. Korean Existing Chemicals Inventory (KECI)
All substances in this product comply with the Chemical Control Act (CCA) and are listed on the Existing Chemicals List (ECL)

Philippines Inventory of Chemicals and Chemical Substances (PICCS)
All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippines Inventory of Chemicals & Chemical Substances (PICCS).

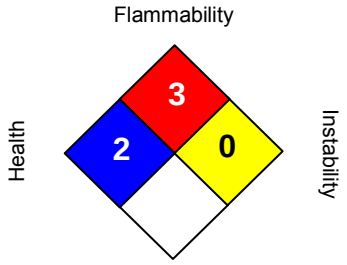
China Inventory of Existing Chemical Substances
All substances in this product comply with the Provisions on the Environmental Administration of New Chemical Substances and are listed on or exempt from the Inventory of Existing Chemical Substances China (IECSC).

New Zealand. Inventory of Chemicals (NZIoC), as published by ERMA New Zealand
All substances in this product comply with the Hazardous Substances and New Organisms (HSNO) Act 1996,and are listed on or are exempt from the New Zealand Inventory of Chemicals.

Taiwan Chemical Substance Inventory
On the inventory, or in compliance with the inventory

Section: 16. OTHER INFORMATION

NFPA:



HMIS III:

HEALTH	2*
FLAMMABILITY	3
PHYSICAL HAZARD	0

0 = not significant, 1 =Slight,
2 = Moderate, 3 = High
4 = Extreme, * = Chronic

Revision Date	:	06/01/2018
Version Number	:	1.2
Prepared By	:	Regulatory Affairs

REVISED INFORMATION: Significant changes to regulatory or health information for this revision is indicated by a bar in the left-hand margin of the SDS.

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.
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NALCO Champion
An Ecolab Company

SAFETY DATA SHEET

AFMR19017A

Section: 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	AFMR19017A
Other means of identification	:	Not applicable.
Recommended use	:	ANTIFOAM
Restrictions on use	:	Refer to available product literature or ask your local Sales Representative for restrictions on use and dose limits.
Company	:	Nalco Champion 11177 S. Stadium Drive Sugar Land, Texas 77478 USA TEL: (281) 632-6500
Emergency telephone number	:	(800) 424-9300 (24 Hours) CHEMTREC
Issuing date	:	03/05/2019

Section: 2. HAZARDS IDENTIFICATION

GHS Classification

Flammable liquids	:	Category 3
Carcinogenicity	:	Category 2
Specific target organ toxicity - single exposure	:	Category 3 (Central Nervous System)

GHS Label element

Hazard pictograms :

Signal Word : Warning

Hazard Statements : Flammable liquid and vapour.
May cause drowsiness or dizziness.
Suspected of causing cancer.

Precautionary Statements : **Prevention:**
Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray. Wear protective gloves/ protective clothing/ eye protection/ face protection.
Response:
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
Storage:
Store in a well-ventilated place.

Disposal:
Dispose of contents/ container to an approved waste disposal plant.

Other hazards : None known.

Section: 3. COMPOSITION/INFORMATION ON INGREDIENTS

Pure substance/mixture : Mixture

Chemical Name	CAS-No.	Concentration: (%)
Kerosene	8008-20-6	60 - 100
Naphthalene	91-20-3	1 - 5
Ethylbenzene	100-41-4	0.1 - 1

Section: 4. FIRST AID MEASURES

In case of eye contact : Rinse with plenty of water. Get medical attention if symptoms occur.

In case of skin contact : Wash off with soap and plenty of water. Get medical attention if symptoms occur.

If swallowed : Rinse mouth. Get medical attention if symptoms occur.

If inhaled : Remove to fresh air. Treat symptomatically. Get medical attention if symptoms occur.

Protection of first-aiders : In event of emergency assess the danger before taking action. Do not put yourself at risk of injury. If in doubt, contact emergency responders. Use personal protective equipment as required.

Notes to physician : Treat symptomatically.

Most important symptoms and effects, both acute and delayed : See Section 11 for more detailed information on health effects and symptoms.

Section: 5. FIREFIGHTING MEASURES

Suitable extinguishing media : Foam
Carbon dioxide
Dry powder
Other extinguishing agent suitable for Class B fires
For large fires, use water spray or fog, thoroughly drenching the burning material.

Unsuitable extinguishing media : High volume water jet

Specific hazards during firefighting : Fire Hazard
Keep away from heat and sources of ignition.
Flash back possible over considerable distance.
Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

Hazardous combustion products	:	Decomposition products may include the following materials: Carbon oxides metal oxides
Special protective equipment for firefighters	:	Use personal protective equipment.
Specific extinguishing methods	:	Use water spray to cool unopened containers. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations. In the event of fire and/or explosion do not breathe fumes.

Section: 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Ensure adequate ventilation. Remove all sources of ignition. Refer to protective measures listed in sections 7 and 8.
Environmental precautions	:	Do not allow contact with soil, surface or ground water.
Methods and materials for containment and cleaning up	:	Eliminate all ignition sources if safe to do so. Stop leak if safe to do so. Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13). For large spills, dike spilled material or otherwise contain material to ensure runoff does not reach a waterway. Do not flush into surface water or sanitary sewer system.

Section: 7. HANDLING AND STORAGE

Advice on safe handling	:	Open drum carefully as content may be under pressure. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapours). Keep away from fire, sparks and heated surfaces. Do not breathe dust/fume/gas/mist/vapours/spray. Wash hands thoroughly after handling. Use only with adequate ventilation.
Conditions for safe storage	:	Keep away from heat and sources of ignition. Keep in a cool, well-ventilated place. Keep away from oxidizing agents. Keep out of reach of children. Keep container tightly closed. Store in suitable labelled containers.
Suitable material	:	The following compatibility data is suggested based on similar product data and/or industry experience: Mild steel, Stainless Steel 304, Stainless Steel 316L, Hastelloy C-276, PVC, Plexiglass, PTFE, Perfluoroelastomer
Unsuitable material	:	The following compatibility data is suggested based on similar product data and/or industry experience: Aluminum, Brass, Copper, Buna-N, Nylon, Natural rubber, Polyethylene, Polypropylene, HDPE (high density polyethylene), Ethylene propylene, EPDM, Neoprene, Polyurethane, Alfax, Hypalon, Fluoroelastomer, Shipping and long term storage compatibility with construction materials can vary; we therefore recommend that compatibility is tested prior to use.

Section: 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Form of exposure	Permissible	Basis

			concentration	
Kerosene	8008-20-6	TWA	100 mg/m3	NIOSH REL
		TWA	500 ppm 2,000 mg/m3	OSHA Z1
		TWA	200 mg/m3 (as total hydrocarbon vapor)	ACGIH
Naphthalene	91-20-3	TWA	10 ppm	ACGIH
		TWA	10 ppm 50 mg/m3	NIOSH REL
		STEL	15 ppm 75 mg/m3	NIOSH REL
		TWA	10 ppm 50 mg/m3	OSHA Z1
Ethylbenzene	100-41-4	TWA	20 ppm	ACGIH
		TWA	100 ppm 435 mg/m3	NIOSH REL
		STEL	125 ppm 545 mg/m3	NIOSH REL
		TWA	100 ppm 435 mg/m3	OSHA Z1

Engineering measures : Effective exhaust ventilation system. Maintain air concentrations below occupational exposure standards.

Personal protective equipment

Eye protection : Safety goggles
Face-shield

Hand protection : Wear the following personal protective equipment:
Standard glove type.
Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough.

Skin protection : Wear suitable protective clothing.

Respiratory protection : When workers are facing concentrations above the exposure limit they must use appropriate certified respirators.

Hygiene measures : Handle in accordance with good industrial hygiene and safety practice. Remove and wash contaminated clothing before re-use. Wash face, hands and any exposed skin thoroughly after handling.

Section: 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : Liquid

Colour : colourless to yellow

Odour : characteristic

Flash point : > 38 °C

pH : Not applicable.

Odour Threshold	:	no data available
Melting point/freezing point	:	no data available
Initial boiling point and boiling range	:	no data available
Evaporation rate	:	no data available
Flammability (solid, gas)	:	no data available
Upper explosion limit	:	5 V%, Based on solvent
Lower explosion limit	:	0.7 V%, Based on solvent
Vapour pressure	:	< 100 Pa, Based on solvent
Relative vapour density	:	no data available
Relative density	:	0.805 - 0.840, (25 °C),
Density	:	0.819 g/cm3
Water solubility	:	insoluble
Solubility in other solvents	:	no data available
Partition coefficient: n-octanol/water	:	no data available
Auto-ignition temperature	:	no data available
Thermal decomposition	:	no data available
Viscosity, dynamic	:	no data available
Viscosity, kinematic	:	60 - 80 mm2/s (40 °C)
Molecular weight	:	no data available
VOC	:	no data available

Section: 10. STABILITY AND REACTIVITY

Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	No dangerous reaction known under conditions of normal use.
Conditions to avoid	:	Heat, flames and sparks.
Incompatible materials	:	Strong oxidizing agents
Hazardous decomposition products	:	Decomposition products may include the following materials: Carbon oxides metal oxides

Section: 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure	:	Inhalation, Eye contact, Skin contact

Potential Health Effects

Eyes	:	Health injuries are not known or expected under normal use.
Skin	:	Health injuries are not known or expected under normal use.
Ingestion	:	Health injuries are not known or expected under normal use.
Inhalation	:	Inhalation may cause central nervous system effects.
Chronic Exposure	:	Suspected of causing cancer.

Experience with human exposure

Eye contact	:	No symptoms known or expected.
Skin contact	:	No symptoms known or expected.
Ingestion	:	No symptoms known or expected.
Inhalation	:	Dizziness, Drowsiness

Toxicity

Product

Acute oral toxicity	:	Acute toxicity estimate: 4,876 mg/kg
Acute inhalation toxicity	:	no data available
Acute dermal toxicity	:	no data available
Skin corrosion/irritation	:	no data available
Serious eye damage/eye irritation	:	no data available
Respiratory or skin sensitization	:	no data available

Carcinogenicity

IARC	**Group 2B: Possibly carcinogenic to humans**	
	Naphthalene	91-20-3
	Ethylbenzene	100-41-4
OSHA	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.	
NTP	**Reasonably anticipated to be a human carcinogen**	
	Naphthalene	91-20-3

Reproductive effects	:	no data available
Germ cell mutagenicity	:	no data available
Teratogenicity	:	no data available
STOT - single exposure	:	no data available
STOT - repeated exposure	:	no data available
Aspiration toxicity	:	no data available

Components

Acute inhalation toxicity : Ethylbenzene
LC50 rat: 17.4 mg/l
Exposure time: 4 h
Test atmosphere: vapour

Components

Acute dermal toxicity : Ethylbenzene
LD50 rabbit: 15,400 mg/kg

Section: 12. ECOLOGICAL INFORMATION

Ecotoxicity

Environmental Effects : Harmful to aquatic life with long lasting effects.

Product

Toxicity to daphnia and other aquatic invertebrates : LC50 Ceriodaphnia dubia: 4,063 mg/l
Exposure time: 48 hrs
Test substance: Product

NOEC Ceriodaphnia dubia: 2,500 mg/l
Exposure time: 48 hrs
Test substance: Product

Components

Toxicity to algae : Kerosene
EC50 : 5 mg/l
Exposure time: 72 h

Persistence and degradability

The organic portion of this preparation is expected to be inherently biodegradable.

Mobility

The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM, provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models.
If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air : <5%
Water : 10 - 30%
Soil : 70 - 90%

The portion in water is expected to float on the surface.

Bioaccumulative potential

Component substances have a potential to bioaccumulate.

Other information

no data available

Section: 13. DISPOSAL CONSIDERATIONS

The information presented only applies to the material as supplied. The classification or waste code may not apply if the material has been used or otherwise contaminated. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated at the time of disposal to determine the proper waste identification and disposal methods in compliance with applicable regulations.

Disposal methods	:	The product should not be allowed to enter drains, water courses or the soil. Where possible recycling is preferred to disposal or incineration. If recycling is not practicable, dispose of in compliance with local regulations. Dispose of wastes in an approved waste disposal facility.
Disposal considerations	:	Dispose of as unused product. Empty containers should be taken to an approved waste handling site for recycling or disposal. Do not re-use empty containers.

Section: 14. TRANSPORT INFORMATION

The shipper/consignor/sender is responsible to ensure that the packaging, labeling, and markings are in compliance with the selected mode of transport.

The presence of an RQ component (Reportable Quantity for U.S. DOT) in this product causes it to be regulated with an additional description of RQ for road, or as Environmentally hazardous for road and air, ONLY when the net weight in the package exceeds the calculated RQ for the product.

Land transport (DOT)

Proper shipping name	:	KEROSENE
Technical name(s)	:	
UN/ID No.	:	UN 1223
Transport hazard class(es)	:	3
Packing group	:	III
Reportable Quantity (per package)	:	4,444 lbs
RQ Component	:	Naphthalene

Air transport (IATA)

Proper shipping name	:	KEROSENE
Technical name(s)	:	
UN/ID No.	:	UN 1223
Transport hazard class(es)	:	3
Packing group	:	III
Reportable Quantity (per package)	:	4,444 lbs
RQ Component	:	Naphthalene

Sea transport (IMDG/IMO)

Proper shipping name	:	KEROSENE

Technical name(s)	:	
UN/ID No.	:	UN 1223
Transport hazard class(es)	:	3
Packing group	:	III
*Marine pollutant	:	Naphthalene

* Note: This product is regulated as a Marine Pollutant when shipped by Rail or Highway (in bulk quantities), and when shipped by water in all quantities.

Section: 15. REGULATORY INFORMATION

TSCA list : No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

EPCRA - Emergency Planning and Community Right-to-Know Act

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Naphthalene	91-20-3	100	4444

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 311/312 Hazards : Flammable (gases, aerosols, liquids, or solids)
Carcinogenicity
Specific target organ toxicity (single or repeated exposure)

SARA 302 : This material does not contain any components with a section 302 EHS TPQ.

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

Naphthalene	91-20-3	1 - 5 %
Ethylbenzene	100-41-4	0.1 - 1 %

California Prop. 65

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

Naphthalene	91-20-3
Ethylbenzene	100-41-4

INTERNATIONAL CHEMICAL CONTROL LAWS :

United States TSCA Inventory

The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

Australia. Industrial Chemical (Notification and Assessment) Act

All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

Canadian Domestic Substances List (DSL)
The substance(s) in this preparation are included in or exempted from the Domestic Substance List (DSL).

Japan. ENCS - Existing and New Chemical Substances Inventory
All substances in this product comply with the Law Regulating the Manufacture and Importation Of Chemical Substances and are listed on the Existing and New Chemical Substances list (ENCS).

Korea. Korean Existing Chemicals Inventory (KECI)
All substances in this product comply with the Chemical Control Act (CCA) and are listed on the Existing Chemicals List (ECL)

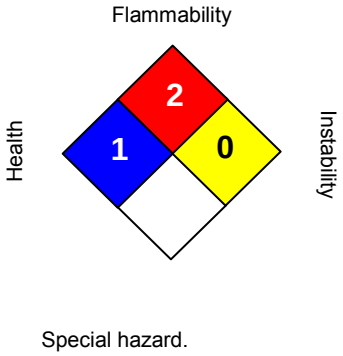
Philippines Inventory of Chemicals and Chemical Substances (PICCS)
All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippines Inventory of Chemicals & Chemical Substances (PICCS).

China Inventory of Existing Chemical Substances
All substances in this product comply with the Provisions on the Environmental Administration of New Chemical Substances and are listed on or exempt from the Inventory of Existing Chemical Substances China (IECSC).

Taiwan Chemical Substance Inventory
On the inventory, or in compliance with the inventory

Section: 16. OTHER INFORMATION

NFPA:



HMIS III:

HEALTH	1*
FLAMMABILITY	2
PHYSICAL HAZARD	0

0 = not significant, 1 =Slight,
2 = Moderate, 3 = High
4 = Extreme, * = Chronic

Revision Date	:	03/05/2019
Version Number	:	1.5
Prepared By	:	Regulatory Affairs

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Certified SURFLO PLUS

SAFETY DATA SHEET

ASPH17544SP

Section: 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	ASPH17544SP
Other means of identification	:	Not applicable.
Recommended use	:	ASPHALTENE INHIBITOR
Restrictions on use	:	Refer to available product literature or ask your local Sales Representative for restrictions on use and dose limits.
Company	:	Nalco Champion 11177 S. Stadium Drive Sugar Land, Texas 77478 USA TEL: (281) 632-6500
Emergency telephone number	:	(800) 424-9300 (24 Hours) CHEMTREC
Issuing date	:	11/14/2017

Section: 2. HAZARDS IDENTIFICATION

GHS Classification

Flammable liquids	:	Category 2
Skin irritation	:	Category 2
Serious eye damage	:	Category 1
Skin sensitization	:	Category 1
Carcinogenicity	:	Category 2
Reproductive toxicity	:	Category 2
Specific target organ toxicity - single exposure	:	Category 3 (Respiratory system, Central Nervous System)
Specific target organ toxicity - repeated exposure	:	Category 2
Aspiration hazard	:	Category 1

GHS Label element

Hazard pictograms :

Signal Word : Danger

Hazard Statements : Highly flammable liquid and vapour.
May be fatal if swallowed and enters airways.
Causes skin irritation.
May cause an allergic skin reaction.
Causes serious eye damage.
May cause respiratory irritation.
May cause drowsiness or dizziness.
Suspected of causing cancer.

Suspected of damaging fertility or the unborn child.
May cause damage to organs through prolonged or repeated exposure.

Precautionary Statements : **Prevention:**
Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Do not breathe dust/fume/gas/mist/vapours/spray. Wear protective gloves/ protective clothing/ eye protection/ face protection.
Response:
IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. Immediately call a POISON CENTER or doctor/ physician.IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/ physician.

Storage:
Store in a well-ventilated place.
Disposal:
Dispose of contents/ container to an approved waste disposal plant.

Other hazards : None known.

Section: 3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS-No.	Concentration: (%)
Xylene	1330-20-7	30 - 60
Kerosene	8008-20-6	10 - 30
Ethylbenzene	100-41-4	5 - 10
Fatty acid-amine condensate	Proprietary	5 - 10
Fatty acid-amine condensate	Proprietary	5 - 10
Fatty amine	Proprietary	1 - 5
Isopropanol	67-63-0	1 - 5
Toluene	108-88-3	0.1 - 1
Diethylenetriamine	111-40-0	0.1 - 1

Section: 4. FIRST AID MEASURES

In case of eye contact : Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention immediately.

In case of skin contact : Wash off immediately with plenty of water for at least 15 minutes. Use a mild soap if available. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

If swallowed : Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Aspiration hazard if swallowed - can enter lungs and cause damage. Get medical attention immediately.

If inhaled : Remove to fresh air. Treat symptomatically. Get medical attention if symptoms occur.

Protection of first-aiders	:	In event of emergency assess the danger before taking action. Do not put yourself at risk of injury. If in doubt, contact emergency responders. Use personal protective equipment as required.
Notes to physician	:	Treat symptomatically.
Most important symptoms and effects, both acute and delayed	:	See Section 11 for more detailed information on health effects and symptoms.

Section: 5. FIREFIGHTING MEASURES

Suitable extinguishing media	:	Foam Carbon dioxide Dry powder Other extinguishing agent suitable for Class B fires For large fires, use water spray or fog, thoroughly drenching the burning material.
Unsuitable extinguishing media	:	None known.
Specific hazards during firefighting	:	Fire Hazard Keep away from heat and sources of ignition. Flash back possible over considerable distance. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
Hazardous combustion products	:	Decomposition products may include the following materials: Carbon oxides nitrogen oxides (NOx)
Special protective equipment for firefighters	:	Use personal protective equipment.
Specific extinguishing methods	:	Use water spray to cool unopened containers. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations. In the event of fire and/or explosion do not breathe fumes.

Section: 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Ensure adequate ventilation. Remove all sources of ignition. Keep people away from and upwind of spill/leak. Avoid inhalation, ingestion and contact with skin and eyes. When workers are facing concentrations above the exposure limit they must use appropriate certified respirators. Ensure clean-up is conducted by trained personnel only. Refer to protective measures listed in sections 7 and 8.
Environmental precautions	:	Do not allow contact with soil, surface or ground water.
Methods and materials for containment and cleaning up	:	Eliminate all ignition sources if safe to do so. Stop leak if safe to do so. Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13). For large spills, dike spilled material or otherwise contain material to ensure runoff does not reach a waterway. Flush away traces with water.

Section: 7. HANDLING AND STORAGE

Advice on safe handling : Avoid contact with skin and eyes. Open drum carefully as content may be under pressure. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapours). Keep away from fire, sparks and heated surfaces. Do not breathe dust/fume/gas/mist/vapours/spray. Do not get in eyes, on skin, or on clothing. Wash hands thoroughly after handling. Use only with adequate ventilation.

Conditions for safe storage : Keep away from heat and sources of ignition. Keep in a cool, well-ventilated place. Keep away from oxidizing agents. Keep out of reach of children. Keep container tightly closed. Store in suitable labelled containers.

Suitable material : Keep in properly labelled containers.

Unsuitable material : not determined

Section: 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Form of exposure	Permissible concentration	Basis
Xylene	1330-20-7	TWA	100 ppm 435 mg/m3	OSHA Z1
		TWA	100 ppm	ACGIH
		STEL	150 ppm	ACGIH
Kerosene	8008-20-6	TWA	100 mg/m3	NIOSH REL
		TWA	500 ppm 2,000 mg/m3	OSHA Z1
		TWA	200 mg/m3 (as total hydrocarbon vapor)	ACGIH
Ethylbenzene	100-41-4	TWA	20 ppm	ACGIH
		TWA	100 ppm 435 mg/m3	NIOSH REL
		STEL	125 ppm 545 mg/m3	NIOSH REL
		TWA	100 ppm 435 mg/m3	OSHA Z1
Isopropanol	67-63-0	TWA	200 ppm	ACGIH
		STEL	400 ppm	ACGIH
		TWA	400 ppm 980 mg/m3	NIOSH REL
		STEL	500 ppm 1,225 mg/m3	NIOSH REL
		TWA	400 ppm 980 mg/m3	OSHA Z1
Toluene	108-88-3	TWA	20 ppm	ACGIH
		TWA	100 ppm 375 mg/m3	NIOSH REL
		STEL	150 ppm 560 mg/m3	NIOSH REL

		TWA	200 ppm	OSHA/Z2
		CEIL	300 ppm	OSHA/Z2
		Peak	500 ppm	OSHA/Z2
Diethylenetriamine	111-40-0	TWA	1 ppm	ACGIH
		TWA	1 ppm 4 mg/m3	NIOSH REL

Engineering measures : Effective exhaust ventilation system. Maintain air concentrations below occupational exposure standards.

Personal protective equipment

Eye protection : Safety goggles
Face-shield

Hand protection : Wear the following personal protective equipment:
Standard glove type.
Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough.

Skin protection : Wear suitable protective clothing.

Respiratory protection : When workers are facing concentrations above the exposure limit they must use appropriate certified respirators.

Hygiene measures : Handle in accordance with good industrial hygiene and safety practice. Remove and wash contaminated clothing before re-use. Wash face, hands and any exposed skin thoroughly after handling. Provide suitable facilities for quick drenching or flushing of the eyes and body in case of contact or splash hazard.

Section: 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : liquid

Colour : clear, amber

Odour : aromatic

Flash point : -3.3 °C, Method: ASTM D7094

pH : Not applicable

Odour Threshold : no data available

Melting point/freezing point : no data available

Initial boiling point and boiling range : 81.8 °C, Method: ASTM D 86

Evaporation rate : no data available

Flammability (solid, gas) : no data available

Upper explosion limit : no data available

Lower explosion limit : no data available

Vapour pressure : 22.8 hPa, (37.8 °C), ASTM D-5191,

Relative vapour density : no data available

Relative density	:	0.9023, (15.56 °C), ASTM D4052
Density	:	0.8982 g/cm3
Water solubility	:	partly soluble
Solubility in other solvents	:	no data available
Partition coefficient: n-octanol/water	:	no data available
Auto-ignition temperature	:	no data available
Thermal decomposition	:	no data available
Viscosity, dynamic	:	no data available
Viscosity, kinematic	:	7.24 mm2/s (40 °C)
Molecular weight	:	no data available
VOC	:	no data available

Section: 10. STABILITY AND REACTIVITY

Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	No dangerous reaction known under conditions of normal use.
Conditions to avoid	:	Heat, flames and sparks.
Incompatible materials	:	Strong oxidizing agents
Hazardous decomposition products	:	Decomposition products may include the following materials: Carbon oxides nitrogen oxides (NOx)

Section: 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure	:	Inhalation, Eye contact, Skin contact

Potential Health Effects

Eyes	:	Causes serious eye damage.
Skin	:	Causes skin irritation. May cause allergic skin reaction.
Ingestion	:	May be fatal if swallowed and enters airways.
Inhalation	:	May cause respiratory tract irritation. May cause nose, throat, and lung irritation. Inhalation may cause central nervous system effects.
Chronic Exposure	:	Suspected of damaging fertility or the unborn child. May cause damage to organs through prolonged or repeated exposure. Suspected of causing cancer.

Experience with human exposure

Eye contact	:	Redness, Pain, Corrosion
Skin contact	:	Redness, Irritation, Allergic reactions
Ingestion	:	Vomiting
Inhalation	:	Respiratory irritation, Cough, Dizziness, Drowsiness

Toxicity

Product

Acute oral toxicity	:	Acute toxicity estimate: > 5,000 mg/kg
Acute inhalation toxicity	:	Acute toxicity estimate: 199.47 mg/l Exposure time: 4 h Test atmosphere: vapour
Acute dermal toxicity	:	Acute toxicity estimate: 3,019 mg/kg
Skin corrosion/irritation	:	no data available
Serious eye damage/eye irritation	:	no data available
Respiratory or skin sensitization	:	no data available
Carcinogenicity		
IARC		**Group 2B: Possibly carcinogenic to humans** Ethylbenzene 100-41-4
OSHA		No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.
NTP		No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
Reproductive effects	:	no data available
Germ cell mutagenicity	:	no data available
Teratogenicity	:	no data available
STOT - single exposure	:	no data available
STOT - repeated exposure	:	no data available
Aspiration toxicity	:	no data available

Section: 12. ECOLOGICAL INFORMATION

Ecotoxicity

Environmental Effects	:	This product has no known ecotoxicological effects.

Components

Toxicity to fish	:	Isopropanol LC50 Pimephales promelas (fathead minnow): 9,640 mg/l

Exposure time: 96 h

Toluene
LC50 Oncorhynchus kisutch (coho salmon): 5.5 mg/l
Exposure time: 96 h

Diethylenetriamine
LC50 Poecilia reticulata (guppy): 430 mg/l
Exposure time: 96 h

Components

Toxicity to daphnia and other aquatic invertebrates : Kerosene
EC50 : 9 mg/l
Exposure time: 48 h

Ethylbenzene
EC50 Daphnia: 1.81 mg/l
Exposure time: 48 h

Fatty amine
EC50 : 0.011 mg/l
Exposure time: 48 h

Isopropanol
LC50 Daphnia magna (Water flea): > 10,000 mg/l

Toluene
LC50 Ceriodaphnia dubia (water flea): 3.78 mg/l
Exposure time: 48 h

Diethylenetriamine
Daphnia magna (Water flea): 16 mg/l
Exposure time: 48 h

Components

Toxicity to algae : Kerosene
EC50 : 5 mg/l
Exposure time: 72 h

Toluene
EC50 Chlorella vulgaris (Fresh water algae): 134 mg/l
Exposure time: 72 h

Diethylenetriamine
EC50 Pseudokirchneriella subcapitata (green algae): 187 mg/l
Exposure time: 72 h

Components

Toxicity to bacteria : Isopropanol
1,050 mg/l

Toluene
84 mg/l

EC50 Nitrosomonas Sp.: 84 mg/l
Exposure time: 24 h

Diethylenetriamine
32.7 mg/l

Components

Toxicity to fish (Chronic toxicity) : Toluene
NOEC: 1.39 mg/l
Exposure time: 40 d
Species: Oncorhynchus kisutch (coho salmon)

Components

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : Toluene
NOEC: 0.74 mg/l
Exposure time: 7 d
Species: Ceriodaphnia dubia

Persistence and degradability

no data available

Mobility

no data available

Bioaccumulative potential

no data available

Other information

no data available

Section: 13. DISPOSAL CONSIDERATIONS

The information presented only applies to the material as supplied. The classification or waste code may not apply if the material has been used or otherwise contaminated. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated at the time of disposal to determine the proper waste identification and disposal methods in compliance with applicable regulations.

Disposal methods : Where possible recycling is preferred to disposal or incineration. If recycling is not practicable, dispose of in compliance with local regulations. Dispose of wastes in an approved waste disposal facility.

Disposal considerations : Dispose of as unused product. Empty containers should be taken to an approved waste handling site for recycling or disposal. Do not re-use empty containers.

Section: 14. TRANSPORT INFORMATION

The shipper/consignor/sender is responsible to ensure that the packaging, labeling, and markings are in compliance with the selected mode of transport.

The presence of an RQ component (Reportable Quantity for U.S. DOT) in this product causes it to be regulated with an additional description of RQ for road, or as Environmentally hazardous for road and air, ONLY when the net weight in the package exceeds the calculated RQ for the product.

Land transport (DOT)

Proper shipping name	:	FLAMMABLE LIQUID, N.O.S.
Technical name(s)	:	Xylene, Ethylbenzene
UN/ID No.	:	UN 1993
Transport hazard class(es)	:	3
Packing group	:	II
Reportable Quantity (per package)	:	278 lbs
RQ Component	:	Xylene

Air transport (IATA)

Proper shipping name	:	FLAMMABLE LIQUID, N.O.S.
Technical name(s)	:	Xylene, Ethylbenzene
UN/ID No.	:	UN 1993
Transport hazard class(es)	:	3
Packing group	:	II
Reportable Quantity (per package)	:	278 lbs
RQ Component	:	Xylene

Sea transport (IMDG/IMO)

Proper shipping name	:	FLAMMABLE LIQUID, N.O.S.
Technical name(s)	:	Xylene, Ethylbenzene
UN/ID No.	:	UN 1993
Transport hazard class(es)	:	3
Packing group	:	II

Section: 15. REGULATORY INFORMATION

TSCA list : No substances are subject to a Significant New Use Rule.
No substances are subject to TSCA 12(b) export notification requirements.

EPCRA - Emergency Planning and Community Right-to-Know Act

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Xylene	1330-20-7	100	278

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 311/312 Hazards : Fire Hazard
Acute Health Hazard
Chronic Health Hazard

SARA 302 : No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

Xylene	1330-20-7	30 - 60 %
Ethylbenzene	100-41-4	5 - 10 %

California Prop 65

WARNING! This product contains a chemical known to the State of California to cause cancer.

Ethylbenzene	100-41-4

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

Toluene	108-88-3

INTERNATIONAL CHEMICAL CONTROL LAWS :

United States TSCA Inventory

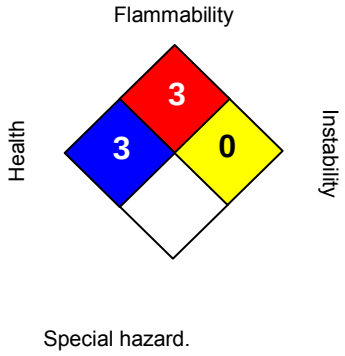
On TSCA Inventory

Australia. Industrial Chemical (Notification and Assessment) Act

On the inventory, or in compliance with the inventory

Section: 16. OTHER INFORMATION

NFPA:



HMIS III:

HEALTH	3*
FLAMMABILITY	3
PHYSICAL HAZARD	0

0 = not significant, 1 =Slight,
2 = Moderate, 3 = High
4 = Extreme, * = Chronic

Revision Date : 11/14/2017
Version Number : 1.0
Prepared By : Regulatory Affairs

REVISED INFORMATION: Significant changes to regulatory or health information for this revision is indicated by a bar in the left-hand margin of the SDS.

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use,

processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.
For additional copies of an SDS visit www.nalco.com and request access.

NALCO Champion
An Ecolab Company

SAFETY DATA SHEET

MISC17477A

Section: 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	MISC17477A
Other means of identification	:	Not applicable.
Recommended use	:	GAS TREATING CHEMICAL, DEHYDRATION
Restrictions on use	:	Refer to available product literature or ask your local Sales Representative for restrictions on use and dose limits.
Company	:	Nalco Champion 11177 S. Stadium Drive Sugar Land, Texas 77478 USA TEL: (281) 632-6500
Emergency telephone number	:	(800) 424-9300 (24 Hours) CHEMTREC
Issuing date	:	06/07/2019

Section: 2. HAZARDS IDENTIFICATION

GHS Classification

Not a hazardous substance or mixture.

GHS Label element

Precautionary Statements : **Prevention:**
Wash hands thoroughly after handling.
Response:
Get medical advice/ attention if you feel unwell.
Storage:
Store in accordance with local regulations.

Other hazards : None known.

Section: 3. COMPOSITION/INFORMATION ON INGREDIENTS

No hazardous ingredients

Section: 4. FIRST AID MEASURES

In case of eye contact	:	Rinse with plenty of water. Get medical attention if symptoms occur.
In case of skin contact	:	Wash off with soap and plenty of water. Get medical attention if symptoms occur.
If swallowed	:	Rinse mouth. Get medical attention if symptoms occur.
If inhaled	:	Get medical attention if symptoms occur.
Protection of first-aiders	:	In event of emergency assess the danger before taking action. Do not put yourself at risk of injury. If in doubt, contact emergency responders. Use personal protective equipment as required.
Notes to physician	:	Treat symptomatically.
Most important symptoms	:	See Section 11 for more detailed information on health effects and symptoms.

and effects, both acute and delayed

Section: 5. FIREFIGHTING MEASURES

Suitable extinguishing media	:	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Unsuitable extinguishing media	:	None known.
Specific hazards during firefighting	:	Not flammable or combustible.
Hazardous combustion products	:	Decomposition products may include the following materials: Carbon oxides
Special protective equipment for firefighters	:	Use personal protective equipment.
Specific extinguishing methods	:	Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

Section: 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Refer to protective measures listed in sections 7 and 8.
Environmental precautions	:	No special environmental precautions required.
Methods and materials for containment and cleaning up	:	Stop leak if safe to do so. Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13). For large spills, dike spilled material or otherwise contain material to ensure runoff does not reach a waterway. Flush away traces with water.

Section: 7. HANDLING AND STORAGE

Advice on safe handling	:	For personal protection see section 8. Wash hands after handling.
Conditions for safe storage	:	Keep out of reach of children. Keep container tightly closed. Store in suitable labelled containers.
Suitable material	:	The following compatibility data is suggested based on similar product data and/or industry experience: Compatibility with Plastic Materials can vary; we therefore recommend that compatibility is tested prior to use.
Unsuitable material	:	not determined

Section: 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Contains no substances with occupational exposure limit values.

Engineering measures	:	Good general ventilation should be sufficient to control worker exposure to

airborne contaminants.

Personal protective equipment

Eye protection	:	Safety glasses
Hand protection	:	Wear the following personal protective equipment: Impervious gloves, resistant to chemicals. Nitrile rubber butyl-rubber Neoprene gloves Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough.
Skin protection	:	Wear suitable protective clothing.
Respiratory protection	:	No personal respiratory protective equipment normally required.
Hygiene measures	:	Wash hands before breaks and immediately after handling the product.

Section: 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Liquid
Colour	:	Clear
Odour	:	Slight
Flash point	:	165.0 °C
pH	:	6.5 - 7.5,(50 %), (20 °C)
Odour Threshold	:	no data available
Melting point/freezing point	:	no data available
Initial boiling point and boiling range	:	287.0 °C
Evaporation rate	:	no data available
Flammability (solid, gas)	:	no data available
Upper explosion limit	:	no data available
Lower explosion limit	:	no data available
Vapour pressure	:	1.0 mm Hg, (20.0 °C),
Relative vapour density	:	no data available
Relative density	:	1.12, (20.0 °C),
Density	:	9.3 lb/gal
Water solubility	:	completely soluble
Solubility in other solvents	:	no data available
Partition coefficient: n-octanol/water	:	no data available
Auto-ignition temperature	:	no data available
Thermal decomposition	:	no data available
Viscosity, dynamic	:	48 mPa.s (20 °C)
Viscosity, kinematic	:	no data available

Molecular weight	:	no data available
VOC	:	99.9 %, Calculation method

Section: 10. STABILITY AND REACTIVITY

Reactivity	:	No dangerous reaction known under conditions of normal use.
Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	No dangerous reaction known under conditions of normal use.
Conditions to avoid	:	None known.
Incompatible materials	:	Contact with strong oxidizers (e.g. chlorine, peroxides, chromates, nitric acid, perchlorate, concentrated oxygen, permanganate) may generate heat, fires, explosions and/or toxic vapors.
Hazardous decomposition products	:	In case of fire, hazardous decomposition products may be produced such as: Carbon oxides

Section: 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure	:	Inhalation, Eye contact, Skin contact

Potential Health Effects

Eyes	:	Health injuries are not known or expected under normal use.
Skin	:	Health injuries are not known or expected under normal use.
Ingestion	:	Health injuries are not known or expected under normal use.
Inhalation	:	Health injuries are not known or expected under normal use.
Chronic Exposure	:	Health injuries are not known or expected under normal use.

Experience with human exposure

Eye contact	:	No symptoms known or expected.
Skin contact	:	No symptoms known or expected.
Ingestion	:	No symptoms known or expected.
Inhalation	:	No symptoms known or expected.

Toxicity

Product

Acute oral toxicity	:	no data available
Acute inhalation toxicity	:	no data available
Acute dermal toxicity	:	no data available
Skin corrosion/irritation	:	no data available
Serious eye damage/eye irritation	:	no data available
Respiratory or skin sensitization	:	no data available
Carcinogenicity	:	no data available
Reproductive effects	:	no data available
Germ cell mutagenicity	:	no data available
Teratogenicity	:	no data available
STOT - single exposure	:	no data available
STOT - repeated exposure	:	no data available
Aspiration toxicity	:	no data available

Section: 12. ECOLOGICAL INFORMATION

Ecotoxicity

Environmental Effects : This product has no known ecotoxicological effects.

Persistence and degradability

The organic portion of this preparation is expected to be readily biodegradable.

Mobility

The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM, provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models.
If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	:	<5%
Water	:	30 - 50%
Soil	:	50 - 70%

The portion in water is expected to float on the surface.

Bioaccumulative potential

This preparation or material is not expected to bioaccumulate.

Other information

no data available

Section: 13. DISPOSAL CONSIDERATIONS

The information presented only applies to the material as supplied. The classification or waste code may not apply if the material has been used or otherwise contaminated. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated at the time of disposal to determine the proper waste identification and disposal methods in compliance with applicable regulations.

Disposal methods : Where possible recycling is preferred to disposal or incineration. If recycling is not practicable, dispose of in compliance with local regulations. Dispose of wastes in an approved waste disposal facility.

Disposal considerations : Dispose of as unused product. Empty containers should be taken to an approved waste handling site for recycling or disposal. Do not re-use empty containers.

Section: 14. TRANSPORT INFORMATION

The shipper/consignor/sender is responsible to ensure that the packaging, labeling, and markings are in compliance with the selected mode of transport.

Land transport (DOT)

Proper shipping name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

Air transport (IATA)

Proper shipping name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

Sea transport (IMDG/IMO)

Proper shipping name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

Section: 15. REGULATORY INFORMATION

TSCA list : No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

EPCRA - Emergency Planning and Community Right-to-Know Act

CERCLA Reportable Quantity

This product does not contain a RQ substance, or this product contains a substance with a RQ, however the calculated RQ exceeds the reasonably attainable upper limit.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 311/312 Hazards : No SARA Hazards

SARA 302 : This material does not contain any components with a section 302 EHS TPQ.

SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

California Prop. 65
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

INTERNATIONAL CHEMICAL CONTROL LAWS :

United States TSCA Inventory
On the inventory, or in compliance with the inventory

Australia. Industrial Chemical (Notification and Assessment) Act
On the inventory, or in compliance with the inventory

New Zealand. Inventory of Chemicals (NZIoC), as published by ERMA New Zealand
not determined

Japan. ENCS - Existing and New Chemical Substances Inventory
On the inventory, or in compliance with the inventory

Korea. Korean Existing Chemicals Inventory (KECI)
On the inventory, or in compliance with the inventory

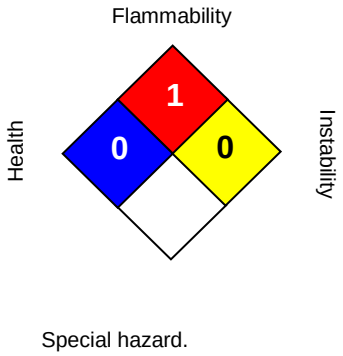
Philippines Inventory of Chemicals and Chemical Substances (PICCS)
On the inventory, or in compliance with the inventory

China Inventory of Existing Chemical Substances
On the inventory, or in compliance with the inventory

Taiwan Chemical Substance Inventory
not determined

Section: 16. OTHER INFORMATION

NFPA:



HMIS III:

HEALTH	0
FLAMMABILITY	1
PHYSICAL HAZARD	0

0 = not significant, 1 =Slight,
2 = Moderate, 3 = High
4 = Extreme, * = Chronic

Revision Date : 06/07/2019
Version Number : 1.0

Prepared By : Regulatory Affairs

REVISED INFORMATION: Significant changes to regulatory or health information for this revision is indicated by a bar in the left-hand margin of the SDS.

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.
For additional copies of an SDS visit www.ecolab.com/sds and request access.

NALCO Water
An Ecolab Company

SAFETY DATA SHEET

PERMATREAT™ PC-191T

Section: 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	PERMATREAT™ PC-191T
Other means of identification	:	Not applicable.
Recommended use	:	REVERSE OSMOSIS ANTISCALANT
Restrictions on use	:	Refer to available product literature or ask your local Sales Representative for restrictions on use and dose limits.
Company	:	Nalco Company 1601 W. Diehl Road Naperville, Illinois 60563-1198 USA TEL: (630)305-1000
Emergency telephone number	:	(800) 424-9300 (24 Hours) CHEMTREC
Issuing date	:	03/19/2018

Section: 2. HAZARDS IDENTIFICATION

GHS Classification

Not a hazardous substance or mixture.

GHS Label element

Precautionary Statements : **Prevention:**
Wash hands thoroughly after handling.
Response:
Get medical advice/ attention if you feel unwell.
Storage:
Store in accordance with local regulations.

Other hazards : None known.

Section: 3. COMPOSITION/INFORMATION ON INGREDIENTS

Pure substance/mixture : Mixture

No hazardous ingredients

Section: 4. FIRST AID MEASURES

In case of eye contact	:	Rinse with plenty of water. Get medical attention if symptoms occur.
In case of skin contact	:	Wash off with soap and plenty of water. Get medical attention if symptoms occur.
If swallowed	:	Rinse mouth. Get medical attention if symptoms occur.
If inhaled	:	Get medical attention if symptoms occur.

Protection of first-aiders	:	In event of emergency assess the danger before taking action. Do not put yourself at risk of injury. If in doubt, contact emergency responders. Use personal protective equipment as required.
Notes to physician	:	Treat symptomatically.
Most important symptoms and effects, both acute and delayed	:	See Section 11 for more detailed information on health effects and symptoms.

Section: 5. FIREFIGHTING MEASURES

Suitable extinguishing media	:	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Unsuitable extinguishing media	:	None known.
Specific hazards during firefighting	:	Not flammable or combustible.
Hazardous combustion products	:	Carbon oxides nitrogen oxides (NOx) Sulphur oxides Oxides of phosphorus
Special protective equipment for firefighters	:	Use personal protective equipment.
Specific extinguishing methods	:	Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

Section: 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Refer to protective measures listed in sections 7 and 8.
Environmental precautions	:	No special environmental precautions required.
Methods and materials for containment and cleaning up	:	Stop leak if safe to do so. Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13). For large spills, dike spilled material or otherwise contain material to ensure runoff does not reach a waterway. Flush away traces with water.

Section: 7. HANDLING AND STORAGE

Advice on safe handling	:	For personal protection see section 8. Wash hands after handling.
Conditions for safe storage	:	Keep out of reach of children. Keep container tightly closed. Store in suitable labelled containers.

Suitable material	:	The following compatibility data is suggested based on similar product data and/or industry experience: HDPE (high density polyethylene), Stainless Steel 304, Polyethylene (rigid), Polypropylene (rigid), CPVC (rigid), 100% phenolic resin liner, Epoxy phenolic resin, coated steel
Unsuitable material	:	The following compatibility data is suggested based on similar product data and/or industry experience: Brass, Buna-N, EPDM, Neoprene, Polyurethane, Fluoroelastomer, Chlorosulfonated polyethylene rubber, Shipping and long term storage compatibility with construction materials can vary; we therefore recommend that compatibility is tested prior to use.

Section: 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Contains no substances with occupational exposure limit values.

Engineering measures	:	Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

Personal protective equipment

Eye protection	:	Safety glasses
Hand protection	:	Wear protective gloves. Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough.
Skin protection	:	Wear suitable protective clothing.
Respiratory protection	:	No personal respiratory protective equipment normally required.
Hygiene measures	:	Wash hands before breaks and immediately after handling the product.

Section: 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Liquid
Colour	:	clear amber - yellow green
Odour	:	Ammoniacal
Flash point	:	> 93.3 °C
pH	:	10.0 - 11.5,(1 %), (25 °C)
Odour Threshold	:	no data available
Melting point/freezing point	:	no data available
Initial boiling point and boiling range	:	no data available
Evaporation rate	:	no data available
Flammability (solid, gas)	:	no data available
Upper explosion limit	:	no data available
Lower explosion limit	:	no data available

Vapour pressure	:	no data available
Relative vapour density	:	no data available
Relative density	:	1.335 - 1.362, (15.6 °C),
Density	:	1.127 g/cm3 , 11.3 lb/gal
Water solubility	:	completely soluble
Solubility in other solvents	:	no data available
Partition coefficient: n-octanol/water	:	Pow: 3.5, log Pow: 0.544
Auto-ignition temperature	:	no data available
Thermal decomposition	:	no data available
Viscosity, dynamic	:	no data available
Viscosity, kinematic	:	no data available
Molecular weight	:	no data available
VOC	:	0 %, Calculation method

Section: 10. STABILITY AND REACTIVITY

Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	No dangerous reaction known under conditions of normal use.
Conditions to avoid	:	Freezing temperatures.
Incompatible materials	:	None known.
Hazardous decomposition products	:	In case of fire, hazardous decomposition products may be produced such as: Carbon oxides nitrogen oxides (NOx) Sulphur oxides Oxides of phosphorus

Section: 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure	:	Inhalation, Eye contact, Skin contact

Potential Health Effects

Eyes	:	Health injuries are not known or expected under normal use.
Skin	:	Health injuries are not known or expected under normal use.
Ingestion	:	Health injuries are not known or expected under normal use.
Inhalation	:	Health injuries are not known or expected under normal use.

Chronic Exposure	:	Health injuries are not known or expected under normal use.

Experience with human exposure

Eye contact	:	No symptoms known or expected.
Skin contact	:	No symptoms known or expected.
Ingestion	:	No symptoms known or expected.
Inhalation	:	No symptoms known or expected.

Toxicity

Product

Acute oral toxicity	:	LD50 rat: > 17,800 mg/kg Test substance: Similar Product
Acute inhalation toxicity	:	no data available
Acute dermal toxicity	:	LD50 rabbit: > 15,800 mg/kg Test substance: Similar Product
Skin corrosion/irritation	:	Species: Rabbit Exposure time: 24 hrs Result: 0.3 Method: Draize Test Test substance: Similar Product
Serious eye damage/eye irritation	:	Species: rabbit Exposure time: 24 hrs Result: 3.7 Method: Draize Test Test substance: Similar Product
Respiratory or skin sensitization	:	no data available
Carcinogenicity	:	no data available
Reproductive effects	:	no data available
Germ cell mutagenicity	:	no data available
Teratogenicity	:	no data available
STOT - single exposure	:	no data available
STOT - repeated exposure	:	no data available
Aspiration toxicity	:	no data available

Section: 12. ECOLOGICAL INFORMATION

Ecotoxicity

Environmental Effects	:	This product has no known ecotoxicological effects.

Product

Toxicity to fish	:	LC50 Oncorhynchus mykiss (rainbow trout): > 330 mg/l

Exposure time: 96 hrs
Test substance: Similar Product

LC50 Cyprinodon variegatus (sheepshead minnow): 8,132 mg/l
Exposure time: 96 hrs
Test substance: Similar Product

LC50 Lepomis macrochirus (Bluegill sunfish): > 330 mg/l
Exposure time: 96 hrs
Test substance: Similar Product

LC50 Ictalurus punctatus (channel catfish): 1,212 mg/l
Exposure time: 96 hrs
Test substance: Similar Product

LC50 Oncorhynchus mykiss (rainbow trout): 4,530 mg/l
Exposure time: 96 hrs
Test substance: Product
Test Type: Static

NOEC Oncorhynchus mykiss (rainbow trout): 3,600 mg/l
Exposure time: 96 hrs
Test substance: Product
Test Type: Static

LC50 Inland Silverside: > 10,000 mg/l
Exposure time: 96 h
Test substance: Product

NOEC Inland Silverside: 10,000 mg/l
Exposure time: 96 h
Test substance: Product

Toxicity to daphnia and other aquatic invertebrates : LC50 Grass Shrimp: 4,575 mg/l
Exposure time: 96 hrs
Test substance: Similar Product

LC50 Daphnia magna (Water flea): 1,673 mg/l
Exposure time: 48 hrs
Test substance: Product
Test Type: Static

EC50 Daphnia magna (Water flea): 297 mg/l
Exposure time: 48 hrs
Test substance: Similar Product

NOEC Daphnia magna (Water flea): 1,296 mg/l
Exposure time: 48 hrs
Test substance: Product
Test Type: Static

LC50 Mysid Shrimp (Mysidopsis bahia): 8,263 mg/l
Exposure time: 96 h
Test substance: Product

NOEC Mysid Shrimp (Mysidopsis bahia): 6,000 mg/l
Exposure time: 96 h
Test substance: Product

Toxicity to algae : LC50 Green Algae (Pseudokirchneriella subcapitata, previously Selenastrum capricornutum): 20 mg/l
Exposure time: 96 hrs
Test substance: Similar Product

Toxicity to fish (Chronic toxicity) : LOEC: 47.6 mg/l
Exposure time: 60 Days
Species: Oncorhynchus mykiss (rainbow trout)
Test substance: Similar Product

NOEC: 23 mg/l
Exposure time: 60 Days
Species: Oncorhynchus mykiss (rainbow trout)
Test substance: Similar Product

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : LOEC: 50 mg/l
Exposure time: 28 Days
Species: Daphnia magna
Test substance: Similar Product
Test Type: 3 Brood

NOEC: 25 mg/l
Exposure time: 28 Days
Species: Daphnia magna
Test substance: Similar Product
Test Type: 3 Brood

Toxicity to terrestrial organisms : LC50 Bobwhite Quail: > 2,510 mg/kg
Exposure time: 14 Days
Test substance: Similar Product

LC50 Mallard Duck: > 2,510 mg/kg
Exposure time: 14 Days
Test substance: Similar Product

Persistence and degradability

Total Organic Carbon (TOC) : 65,000 mg/l

Mobility

The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM, provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models.
If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	:	<5%
Water	:	30 - 50%
Soil	:	50 - 70%

The portion in water is expected to be soluble or dispersible.

Bioaccumulative potential

no data available

Other information

no data available

Section: 13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it is not a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261, since it does not have the characteristics of Subpart C, nor is it listed under Subpart D.

Disposal methods	:	Where possible recycling is preferred to disposal or incineration. If recycling is not practicable, dispose of in compliance with local regulations. Dispose of wastes in an approved waste disposal facility.
Disposal considerations	:	Dispose of as unused product. Empty containers should be taken to an approved waste handling site for recycling or disposal. Do not re-use empty containers.

Section: 14. TRANSPORT INFORMATION

The shipper/consignor/sender is responsible to ensure that the packaging, labeling, and markings are in compliance with the selected mode of transport.

Land transport (DOT)

Proper shipping name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

Air transport (IATA)

Proper shipping name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

Sea transport (IMDG/IMO)

Proper shipping name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

Section: 15. REGULATORY INFORMATION

TSCA list : Not relevant

EPCRA - Emergency Planning and Community Right-to-Know Act

CERCLA Reportable Quantity

This material does not contain any components with a CERCLA RQ.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 311/312 Hazards	:	No SARA Hazards
SARA 302	:	No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.
SARA 313	:	This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

California Prop 65
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

INTERNATIONAL CHEMICAL CONTROL LAWS :

United States TSCA Inventory
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

Australia. Industrial Chemical (Notification and Assessment) Act
All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

Canadian Domestic Substances List (DSL)
The substance(s) in this preparation are included in or exempted from the Domestic Substance List (DSL).

Japan. ENCS - Existing and New Chemical Substances Inventory
All substances in this product comply with the Law Regulating the Manufacture and Importation Of Chemical Substances and are listed on the Existing and New Chemical Substances list (ENCS).

Korea. Korean Existing Chemicals Inventory (KECI)
All substances in this product comply with the Chemical Control Act (CCA) and are listed on the Existing Chemicals List (ECL)

Philippines Inventory of Chemicals and Chemical Substances (PICCS)
All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippines Inventory of Chemicals & Chemical Substances (PICCS).

China Inventory of Existing Chemical Substances
All substances in this product comply with the Provisions on the Environmental Administration of New Chemical Substances and are listed on or exempt from the Inventory of Existing Chemical Substances China (IECSC).

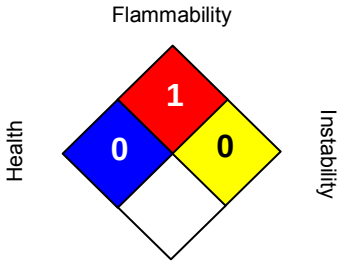
New Zealand. Inventory of Chemicals (NZIoC), as published by ERMA New Zealand
All substances in this product comply with the Hazardous Substances and New Organisms (HSNO) Act 1996,and are listed on or are exempt from the New Zealand Inventory of Chemicals.

Taiwan Chemical Substance Inventory
All substances in this product comply with the Taiwan Existing Chemical Substances Inventory (ECSI).

Section: 16. OTHER INFORMATION

PERMATREAT™ PC-191T

NFPA:



Special hazard.

HMIS III:

HEALTH	0
FLAMMABILITY	1
PHYSICAL HAZARD	0

0 = not significant, 1 =Slight,
2 = Moderate, 3 = High
4 = Extreme, * = Chronic

Revision Date	:	03/19/2018
Version Number	:	1.2
Prepared By	:	Regulatory Affairs

REVISED INFORMATION: Significant changes to regulatory or health information for this revision is indicated by a bar in the left-hand margin of the SDS.

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.
For additional copies of an SDS visit www.nalco.com and request access.

MacDermid

245 Freight St Waterbury, CT 06702

SAFETY DATA SHEET

Product name OCEANIC HW 443R

Code 174832

Section 1. Identification

Product name : OCEANIC HW 443R

Relevant identified uses of the substance or mixture and uses advised against

Identified uses
Industrial use only.

Uses advised against	**Reason**
Not applicable.	

Supplier's details : MacDermid
245 Freight St
Waterbury, CT 06702

Emergency telephone number (with hours of operation) : Chemtrec (1-800-424-9300) 24 Hours

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : ACUTE TOXICITY (oral) - Category 4
SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2A
CARCINOGENICITY - Category 2

Percentage of the mixture consisting of ingredient(s) of unknown toxicity: 5%

GHS label elements

Hazard pictograms :

Signal word : Warning

Hazard statements : Harmful if swallowed.
Causes serious eye irritation.
Suspected of causing cancer.

Precautionary statements

Prevention : Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. Wear eye or face protection. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling.

Section 2. Hazards identification

Response : IF exposed or concerned: Get medical attention. IF SWALLOWED: Call a POISON CENTER or physician if you feel unwell. Rinse mouth. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.

Storage : Store locked up.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazards not otherwise classified : None known.

Section 3. Composition/information on ingredients

Hazardous ingredients	%	CAS number
ethylene glycol	35 - 45	107-21-1
arylsulfonamidocarboxylic acid	3 - 7	proprietary
diethanolamine	0.1 - 0.3	111-42-2

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. If necessary, call a poison center or physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Ingestion : Harmful if swallowed. Irritating to mouth, throat and stomach.

Over-exposure signs/symptoms

Section 4. First aid measures

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : In a fire or if heated, a pressure increase will occur and the container may burst.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Section 6. Accidental release measures

Large spill : Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not ingest. Avoid breathing vapor or mist. If during normal use the material presents a respiratory hazard, use only with adequate ventilation or wear appropriate respirator. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
ethylene glycol	**OSHA PEL 1989 (United States, 3/1989).** CEIL: 50 ppm CEIL: 125 mg/m³ **ACGIH TLV (United States, 6/2013).** C: 100 mg/m³ Form: Aerosol
diethanolamine	**OSHA PEL 1989 (United States, 3/1989).** TWA: 3 ppm 8 hours. TWA: 15 mg/m³ 8 hours. **NIOSH REL (United States, 10/2013).** TWA: 3 ppm 10 hours. TWA: 15 mg/m³ 10 hours. **ACGIH TLV (United States, 6/2013).** **Absorbed through skin.** TWA: 1 mg/m³ 8 hours. Form: Inhalable fraction and vapor

Appropriate engineering controls : If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Section 8. Exposure controls/personal protection

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Liquid.

Color : Pink

Odor : Amine-like.

Odor threshold : Not available.

pH : 9.6

Melting point : Not available.

Boiling point : Not available.

Flash point : Not available.

Evaporation rate : Not available.

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Not available.

Vapor pressure : Not available.

Vapor density : Not available.

Relative density : 1.071

Solubility : Not available.

Solubility in water : Soluble

Partition coefficient: n-octanol/water : Not available.

I-730

Section 9. Physical and chemical properties

Auto-ignition temperature : Not available.

Decomposition temperature : Not available.

Viscosity : Not available.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : No specific data.

Incompatible materials : Oxidizers

Hazardous decomposition products : Thermal decomposition may yield carbon monoxide and/or carbon dioxide.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
ethylene glycol	LD50 Oral	Rat	4700 mg/kg	-

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
ethylene glycol	Eyes - Mild irritant	Rabbit	-	24 hours 500 milligrams	-
	Eyes - Mild irritant	Rabbit	-	1 hours 100 milligrams	-
	Eyes - Moderate irritant	Rabbit	-	6 hours 1440 milligrams	-
	Skin - Mild irritant	Rabbit	-	555 milligrams	-
diethanolamine	Eyes - Severe irritant	Rabbit	-	24 hours 750 Micrograms	-
	Eyes - Severe irritant	Rabbit	-	5500 milligrams	-
	Skin - Mild irritant	Rabbit	-	24 hours 500 milligrams	-
	Skin - Mild irritant	Rabbit	-	50 milligrams	-

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Classification

I-731

Section 11. Toxicological information

Product/ingredient name	OSHA	IARC	NTP
diethanolamine	-	2B	-

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
diethanolamine	Category 2	Not determined	Not determined

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Ingestion : Harmful if swallowed. Irritating to mouth, throat and stomach.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : No known significant effects or critical hazards.

Carcinogenicity : Suspected of causing cancer. Risk of cancer depends on duration and level of exposure.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Section 11. Toxicological information

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Oral	1250 mg/kg

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
ethylene glycol	Acute LC50 6900000 µg/l Fresh water	Crustaceans - Ceriodaphnia dubia - Neonate	48 hours
	Acute LC50 41000000 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 8050000 µg/l Fresh water	Fish - Pimephales promelas	96 hours
diethanolamine	Acute EC50 12 mg/l Fresh water	Algae - Pseudokirchneriella subcapitata	96 hours
	Acute LC50 28800 µg/l Fresh water	Crustaceans - Ceriodaphnia dubia - Neonate	48 hours
	Acute LC50 2150 µg/l Fresh water	Daphnia - Daphnia pulex	48 hours
	Acute LC50 100 mg/l Fresh water	Fish - Pimephales promelas - Juvenile (Fledgling, Hatchling, Weanling)	96 hours

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
ethylene glycol	-1.36	-	low
diethanolamine	-1.43	-	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

I-733

Section 14. Transport information

	DOT Classification	IMDG	IATA
UN number	UN3082	Not regulated.	Not regulated.
UN proper shipping name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. CONTAINS ETHYLENE GLYCOL	ØRGANIC ADDITIVE	ØRGANIC ADDITIVE
Transport hazard class(es)	9	-	-
Packing group	III	-	-
Environmental hazards	Yes.	No.	No.
Additional information	Reportable quantity 1396 gal Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements.	-	

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Section 15. Regulatory information

U.S. Federal regulations : **United States inventory (TSCA 8b)**: All components are listed or exempted.

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Immediate (acute) health hazard
Delayed (chronic) health hazard

I-734

Section 15. Regulatory information

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
ethylene glycol diethanolamine	35 - 45 0.1 - 0.3	No. No.	No. No.	No. No.	Yes. Yes.	No. Yes.

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	ethylene glycol	107-21-1	35 - 45
Supplier notification	ethylene glycol	107-21-1	35 - 45

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts : The following components are listed: ETHYLENE GLYCOL

New York : The following components are listed: Ethylene glycol; Diethanolamine

New Jersey : The following components are listed: ETHYLENE GLYCOL; 1,2-ETHANEDIOL; DIETHANOLAMINE; ETHANOL, 2,2'-IMINOBIS-

Pennsylvania : The following components are listed: 1,2-ETHANEDIOL; ETHANOL, 2,2'-IMINOBIS-

California Prop. 65

WARNING: This product contains a chemical known to the State of California to cause cancer.

Ingredient name	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level
diethanolamine	Yes.	No.	No.	No.

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol (Annexes A, B, C, E)

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Inform Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

Section 16. Other information

History

Date of printing : 7/17/2015.

Date of issue/Date of revision : 7/17/2015.

Section 16. Other information

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
UN = United Nations

Indicates information that has changed from previously issued version.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Safety Data Sheets: Crude Oil Sweet; Deepclean

Waste Stream: Completion Fluids/Contaminated Brine

Waste Sheet Profile Number: 20140506-021

SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: **CRUDE OIL SWEET**
Product Description: Petroleum Crude Oil
Product Code: 949094-00
Intended Use: Crude oil

COMPANY IDENTIFICATION

Supplier: **U.S. Production**
22777 Springwoods Village Parkway
Spring, TX 77389 USA

24 Hour Health Emergency 609-737-4411
ExxonMobil Transportation No. 800-424-9300 or 703-527-3887 CHEMTREC

SECTION 2 HAZARDS IDENTIFICATION

This material is hazardous according to regulatory guidelines (see (M)SDS Section 15).

CLASSIFICATION:

Flammable liquid: Category 2.
Eye irritation: Category 2A. Carcinogen: Category 1B. Specific target organ toxicant (central nervous system): Category 3. Specific target organ toxicant (repeated exposure): Category 2. Aspiration toxicant: Category 1.

LABEL:
Pictogram:

Signal Word: Danger

Hazard Statements:
H225: Highly flammable liquid and vapor. H304: May be fatal if swallowed and enters airways. H319: Causes serious eye irritation. H336: May cause drowsiness or dizziness. H350: May cause cancer. H373: May cause

damage to organs through prolonged or repeated exposure. Blood, Liver, Spleen, Thymus

Precautionary Statements:
P201: Obtain special instructions before use. P202: Do not handle until all safety precautions have been read and understood. P210: Keep away from heat/sparks/open flames/hot surfaces. -- No smoking. P233: Keep container tightly closed. P240: Ground / bond container and receiving equipment. P241: Use explosion-proof electrical, ventilating, and lighting equipment. P242: Use only non-sparking tools. P243: Take precautionary measures against static discharge. P260: Do not breathe mist / vapours. P264: Wash skin thoroughly after handling. P271: Use only outdoors or in a well-ventilated area. P273: Avoid release to the environment. P280: Wear protective gloves/protective clothing/eye protection/face protection.P301 + P310: IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. P303 + P361 + P353: IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. P304 + P340: IF INHALED: Remove person to fresh air and keep comfortable for breathing. P305 + P351 + P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P308 + P313: IF exposed or concerned: Get medical advice/ attention. P312: Call a POISON CENTER or doctor/physician if you feel unwell. P331: Do NOT induce vomiting. P337 + P313: If eye irritation persists: Get medical advice/attention. P370 + P378: In case of fire: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish. P391: Collect spillage.P403 + P235: Store in a well-ventilated place. Keep cool. P405: Store locked up.P501: Dispose of contents and container in accordance with local regulations.

Contains: PETROLEUM CRUDE OIL

Other hazard information:

HAZARD NOT OTHERWISE CLASSIFIED (HNOC): None as defined under 29 CFR 1910.1200.

PHYSICAL / CHEMICAL HAZARDS

Material can accumulate static charges which may cause an ignition. Material can release vapors that readily form flammable mixtures. Vapor accumulation could flash and/or explode if ignited.

HEALTH HAZARDS

High-pressure injection under skin may cause serious damage. Under conditions of poor personal hygiene and prolonged repeated contact, some polycyclic aromatic compounds (PACs) have been suspected as a cause of skin cancer in humans. Hydrogen sulfide, a highly toxic gas, may be present. Signs and symptoms of overexposure to hydrogen sulfide include respiratory and eye irritation, dizziness, nausea, coughing, a sensation of dryness and pain in the nose, and loss of consciousness. Odor does not provide a reliable indicator of the presence of hazardous levels in the atmosphere. Repeated exposure may cause skin dryness or cracking. May be irritating to nose, throat, and lungs. May cause central nervous system depression. Exposure to benzene is associated with cancer (acute myeloid leukemia and myelodysplastic syndrome), damage to the blood-producing system, and serious blood disorders (see Section 11).

ENVIRONMENTAL HAZARDS

Expected to be toxic to aquatic organisms. May cause long-term adverse effects in the aquatic environment.

NFPA Hazard ID:	Health:	2	Flammability:	3	Reactivity:	0
HMIS Hazard ID:	Health:	2*	Flammability:	3	Reactivity:	0

NOTE: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary

from person to person.

SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

This material is defined as a complex substance.

Hazardous Substance(s) or Complex Substance(s) required for disclosure

Name	CAS#	Concentration*	GHS Hazard Codes
PETROLEUM CRUDE OIL	8002-05-9	100%	H225, H304, H336, H350(1B), H319(2A), H373, H401, H411

Hazardous Constituent(s) Contained in Complex Substance(s) required for disclosure

Name	CAS#	Concentration*	GHS Hazard Codes
BENZENE	71-43-2	1 - 5%	H225, H303, H304, H340(1B), H350(1A), H315, H319(2A), H372, H401
CYCLOHEXANE	110-82-7	1 - 5%	H225, H304, H336, H315, H400(M factor 1), H410(M factor 1)
N-HEXANE	110-54-3	1 - 5%	H225, H304, H336, H361(F), H315, H373, H401, H411
NAPHTHALENE	91-20-3	1 - 5%	H228(2), H302, H351, H400(M factor 1), H410(M factor 1)
TOLUENE	108-88-3	1 - 5%	H225, H304, H336, H361(D), H315, H373, H401, H412
XYLENES	1330-20-7	1 - 5%	H226, H303, H304, H312, H332, H335, H315, H320(2B), H373, H401, H412

* All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume.

NOTE: Hydrogen sulfide (H2S) may be present in the material in trace quantities (by weight) and, when present, may accumulate to toxic or flammable concentrations in enclosed spaces such as tanks or tanker/railcar headspaces.

As per paragraph (i) of 29 CFR 1910.1200, formulation is considered a trade secret and specific chemical identity and exact percentage (concentration) of composition may have been withheld. Specific chemical identity and exact percentage composition will be provided to health professionals, employees, or designated representatives in accordance with applicable provisions of paragraph (i).

SECTION 4 FIRST AID MEASURES

INHALATION

Immediately remove from further exposure. Get immediate medical assistance. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. Give supplemental oxygen, if available. If breathing has stopped, assist ventilation with a mechanical device.

SKIN CONTACT

Remove contaminated clothing. Dry wipe exposed skin and cleanse with waterless hand cleaner and follow by washing thoroughly with soap and water. For those providing assistance, avoid further skin contact to yourself or others. Wear impervious gloves. Launder contaminated clothing separately before reuse. Discard contaminated articles that cannot be laundered. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury. For hot product: Immediately immerse in or flush affected area with large amounts of cold water to dissipate heat. Cover with clean cotton sheeting or gauze and get prompt medical attention.

EYE CONTACT

Flush thoroughly with water for at least 15 minutes. Get medical assistance.

INGESTION

Seek immediate medical attention. Do not induce vomiting.

NOTE TO PHYSICIAN

If ingested, material may be aspirated into the lungs and cause chemical pneumonitis. Treat appropriately. This material, or a component, may be associated with cardiac sensitization following very high exposures (well above occupational exposure limits) or with concurrent exposure to high stress levels or heart-stimulating substances like epinephrine. Administration of such substances should be avoided.

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

Appropriate Extinguishing Media: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

Inappropriate Extinguishing Media: Straight Streams of Water

FIRE FIGHTING

Fire Fighting Instructions: Evacuate area. If a leak or spill has not ignited, use water spray to disperse the vapors and to protect personnel attempting to stop a leak. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Firefighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

Unusual Fire Hazards: Highly flammable. Vapors are flammable and heavier than air. Vapors may travel across the ground and reach remote ignition sources causing a flashback fire danger. Exposure to fire can generate toxic fumes. Hazardous material. Firefighters should consider protective equipment indicated in Section 8.

Hazardous Combustion Products: Hydrogen sulfide, Incomplete combustion products, Oxides of carbon, Smoke, Fume, Sulfur oxides

FLAMMABILITY PROPERTIES

Flash Point [Method]: <21°C (70°F) [ASTM D-92]
Flammable Limits (Approximate volume % in air): LEL: N/D UEL: N/D
Autoignition Temperature: N/D

SECTION 6 ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations. US regulations require reporting releases of this material to the environment which exceed the applicable reportable quantity or oil spills which could reach any waterway including intermittent dry creeks. The National Response Center can be reached at (800)424-8802.

PROTECTIVE MEASURES

Avoid contact with spilled material. Warn or evacuate occupants in surrounding and downwind areas if required due to toxicity or flammability of the material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for advice on the minimum requirements for personal protective equipment. Additional protective measures may be necessary, depending on the specific circumstances and/or the expert judgment of the emergency responders.

For emergency responders: Respiratory protection: half-face or full-face respirator with filter(s) for organic vapor and, when applicable, H2S, or Self Contained Breathing Apparatus (SCBA) can be used depending on the size of spill and potential level of exposure. If the exposure cannot be completely characterized or an oxygen deficient atmosphere is possible or anticipated, SCBA is recommended. Chemical goggles are recommended if splashes or contact with eyes is possible. Work gloves that are resistant to aromatic hydrocarbons are recommended. If contact with hot product is possible or anticipated, gloves should be heat-resistant and thermally insulated. Note: gloves made of PVA are not water-resistant, and are not suitable for emergency use. Small spills: normal antistatic work clothes are usually adequate. Large spills: full body suit of chemical resistant, antistatic and, if necessary, heat resistant and thermal insulated material is recommended.

SPILL MANAGEMENT

Land Spill: Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Stop leak if you can do it without risk. All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Prevent entry into waterways, sewer, basements or confined areas. A vapor suppressing foam may be used to reduce vapors. Use clean non-sparking tools to collect absorbed material. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Large Spills: Water spray may reduce vapor; but may not prevent ignition in closed spaces.

Water Spill: Stop leak if you can do it without risk. Warn other shipping. Remove from the surface by skimming or with suitable absorbents. If permitted by regulatory authorities the use of suitable dispersants should be considered where indicated in local oil spill contingency plans.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS

Use booms as a barrier to protect shorelines. Use containment booms when the ambient temperature is below the flash point of the material. Large Spills: Dike far ahead of liquid spill for later recovery and disposal. Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7 HANDLING AND STORAGE

HANDLING

Avoid all personal contact. Crude oils can contain trace levels of natural impurities including heavy metals, such as mercury, nickel or lead, as well as naturally occurring radioactive material. As the impurity content may concentrate during refining/processing, process operations, including equipment, materials and products should be evaluated to identify and manage any potential risks to health, safety or the environment or regulatory concerns.

Prevent exposure to ignition sources, for example use non-sparking tools and explosion-proof equipment. Potentially toxic/irritating fumes/vapors may be evolved from heated or agitated material. Use only with adequate ventilation. Do not enter storage areas or confined spaces unless adequately ventilated. Harmful amounts of H2S may be present. Material may contain trace amounts of naturally occurring radioactive material (NORM), which will accumulate in process equipment and storage vessels. Prevent small spills and leakage to avoid slip hazard. Material can accumulate static charges which may cause an electrical spark (ignition source). Use proper bonding and/or ground procedures. However, bonding and grounds may not eliminate the hazard from static accumulation. Consult local applicable standards for guidance. Additional references include American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practice on Static Electricity) or CENELEC CLC/TR 50404 (Electrostatics - Code of practice for the avoidance of hazards due to static electricity).

Static Accumulator: This material is a static accumulator. A liquid is typically considered a nonconductive, static accumulator if its conductivity is below 100 pS/m (100x10E-12 Siemens per meter) and is considered a semiconductive, static accumulator if its conductivity is below 10,000 pS/m. Whether a liquid is nonconductive or semiconductive, the precautions are the same. A number of factors, for example liquid temperature, presence of contaminants, anti-static additives and filtration can greatly influence the conductivity of a liquid.

STORAGE

Ample fire water supply should be available. A fixed sprinkler/deluge system is recommended. The type of container used to store the material may affect static accumulation and dissipation. Keep container closed. Handle containers with care. Open slowly in order to control possible pressure release. Store in a cool, well-ventilated area. Outside or detached storage preferred. Storage containers should be grounded and bonded. Fixed storage containers, transfer containers and associated equipment should be grounded and bonded to prevent accumulation of static charge.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMIT VALUES

Exposure limits/standards (Note: Exposure limits are not additive)

Substance Name	Form	Limit / Standard			NOTE	Source
BENZENE		OSHA Action level	0.5 ppm		N/A	OSHA Sp.Reg.
BENZENE		STEL	5 ppm		N/A	OSHA Sp.Reg.
BENZENE		TWA	1 ppm		N/A	OSHA Sp.Reg.
BENZENE		STEL	1 ppm		N/A	ExxonMobil
BENZENE		TWA	0.5 ppm		N/A	ExxonMobil

BENZENE		STEL	2.5 ppm		Skin	ACGIH
BENZENE		TWA	0.5 ppm		Skin	ACGIH
CYCLOHEXANE		TWA	1050 mg/m3	300 ppm	N/A	OSHA Z1
CYCLOHEXANE		TWA	100 ppm		N/A	ACGIH
N-HEXANE		TWA	1800 mg/m3	500 ppm	N/A	OSHA Z1
N-HEXANE		TWA	50 ppm		Skin	ACGIH
NAPHTHALENE		TWA	50 mg/m3	10 ppm	N/A	OSHA Z1
NAPHTHALENE		TWA	10 ppm		Skin	ACGIH
PETROLEUM CRUDE OIL		TWA	2000 mg/m3	500 ppm	N/A	OSHA Z1
TOLUENE		Ceiling	300 ppm		N/A	OSHA Z2
TOLUENE		Maximum concentration	500 ppm		N/A	OSHA Z2
TOLUENE		TWA	200 ppm		N/A	OSHA Z2
TOLUENE		TWA	20 ppm		N/A	ACGIH
XYLENES		TWA	435 mg/m3	100 ppm	N/A	OSHA Z1
XYLENES		STEL	150 ppm		N/A	ACGIH
XYLENES		TWA	100 ppm		N/A	ACGIH
Hydrogen sulfide		Ceiling	20 ppm		N/A	OSHA Z2
Hydrogen sulfide		Maximum concentration	50 ppm		N/A	OSHA Z2
Hydrogen sulfide		STEL	14 mg/m3	10 ppm	N/A	ExxonMobil
Hydrogen sulfide		TWA	7 mg/m3	5 ppm	N/A	ExxonMobil
Hydrogen sulfide		STEL	5 ppm		N/A	ACGIH
Hydrogen sulfide		TWA	1 ppm		N/A	ACGIH

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

Biological limits

Substance	Specimen	Sampling Time	Limit	Determinant	Source
BENZENE	Creatinine in urine	End of shift	25 ug/g	S-Phenylmercapturic acid	ACGIH BELs (BEIs)
BENZENE	Creatinine in urine	End of shift	500 ug/g	t,t-Muconic acid	ACGIH BELs (BEIs)
N-HEXANE	Urine	End of shift	0.5 mg/l	2,5-Hexanedione, without hydrolysis	ACGIH BELs (BEIs)
NAPHTHALENE	No Biological Specimen provided	End of shift	Not Assigned	1-Naphthol, with hydrolysis + 2-Naphthol, with hydrolysis	ACGIH BELs (BEIs)
TOLUENE	Blood	Prior to last shift of work wk	0.02 mg/l	Toluene	ACGIH BELs (BEIs)
TOLUENE	Creatinine in urine	End of shift	0.3 mg/g	o-Cresol, with hydrolysis	ACGIH BELs (BEIs)

TOLUENE	Urine	End of shift	0.03 mg/l	Toluene	ACGIH BELs (BEIs)
XYLENES	Creatinine in urine	End of shift	1.5 g/g	Methylhippuric acids	ACGIH BELs (BEIs)

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:

Use explosion-proof ventilation equipment to stay below exposure limits.

PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:

Positive-pressure, air-supplied respirator in areas where H2S vapors may accumulate is recommended.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:

Chemical resistant gloves are recommended. If contact with forearms is likely wear gauntlet style gloves.

Eye Protection: Chemical goggles are recommended.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:

Chemical/oil resistant clothing is recommended.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

ENVIRONMENTAL CONTROLS

Comply with applicable environmental regulations limiting discharge to air, water and soil. Protect the environment by applying appropriate control measures to prevent or limit

emissions.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Note: Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications. Contact the Supplier for additional information.

GENERAL INFORMATION

Physical State: Liquid
Color: Black
Odor: Petroleum/Solvent
Odor Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 15 °C): 0.661 - 1.013
Flammability (Solid, Gas): N/A
Flash Point [Method]: <21°C (70°F) [ASTM D-92]
Flammable Limits (Approximate volume % in air): LEL: N/D UEL: N/D
Autoignition Temperature: N/D
Boiling Point / Range: > 35°C (95°F)
Decomposition Temperature: N/D
Vapor Density (Air = 1): N/D
Vapor Pressure: 0 kPa (0 mm Hg) at 20 C - 106.4 kPa (800 mm Hg) at 20 °C
Evaporation Rate (n-butyl acetate = 1): N/D
pH: N/A
Log Pow (n-Octanol/Water Partition Coefficient): N/D
Solubility in Water: Negligible
Viscosity: >0.42 cSt (0.42 mm2/sec) at 40 °C
Oxidizing Properties: See Hazards Identification Section.

OTHER INFORMATION

Freezing Point: N/D
Melting Point: N/A
Pour Point: -73°C (-99°F) - 48°C (118°F)

SECTION 10 STABILITY AND REACTIVITY

REACTIVITY: See sub-sections below.

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: Avoid heat, sparks, open flames and other ignition sources.

MATERIALS TO AVOID: Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

POSSIBILITY OF HAZARDOUS REACTIONS: Hazardous polymerization will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

INFORMATION ON TOXICOLOGICAL EFFECTS

Hazard Class	Conclusion / Remarks
Inhalation	
Acute Toxicity: No end point data for material.	Not determined.
Irritation: No end point data for material.	Elevated temperatures or mechanical action may form vapors, mist, or fumes which may be irritating to the eyes, nose, throat, or lungs.
Ingestion	
Acute Toxicity (Rat): LD50 > 5000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 401
Skin	
Acute Toxicity (Rabbit): LD50 > 2000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 402
Skin Corrosion/Irritation: Data available.	May dry the skin leading to discomfort and dermatitis. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 404
Eye	
Serious Eye Damage/Irritation: Data available.	Irritating and will injure eye tissue. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 405
Sensitization	
Respiratory Sensitization: No end point data for material.	Not expected to be a respiratory sensitizer.
Skin Sensitization: Data available.	Not expected to be a skin sensitizer. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 406
Aspiration: Data available.	May be fatal if swallowed and enters airways. Based on physico-chemical properties of the material.
Germ Cell Mutagenicity: Data available.	Not expected to be a germ cell mutagen. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 471 474 479
Carcinogenicity: Data available.	Caused cancer in laboratory animals. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 451
Reproductive Toxicity: Data available.	Not expected to be a reproductive toxicant. Based on test data for structurally similar materials. Test method unavailable.
Lactation: No end point data for material.	Not expected to cause harm to breast-fed children.
Specific Target Organ Toxicity (STOT)	
Single Exposure: Data available.	May cause drowsiness or dizziness. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 401 402
Repeated Exposure: Data available.	Concentrated, prolonged or deliberate exposure may cause organ damage. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 411

TOXICITY FOR SUBSTANCES

NAME	ACUTE TOXICITY
NAPHTHALENE	Inhalation Lethality: 4 hour(s) LC50 > 0.4 mg/l (Max attainable vapor conc.) (Rat); Oral Lethality: LD50 533 mg/kg (Mouse)

OTHER INFORMATION

For the product itself:

Target Organs Repeated Exposure: Blood, Liver, Spleen, Thymus

Vapor/aerosol concentrations above recommended exposure levels are irritating to the eyes and respiratory tract, may cause headaches, dizziness, anesthesia, drowsiness, unconsciousness and other central nervous system effects including death.

May cause central nervous system disorder (e.g., narcosis involving a loss of coordination, weakness, fatigue, mental confusion and blurred vision) and/or damage.

Small amounts of liquid aspirated into the lungs during ingestion or from vomiting may cause chemical pneumonitis or pulmonary edema. Exposure to this material, or one of its components, in situations where there is the potential for high levels, such as in confined spaces or with abuse, may result in abnormal heart rhythm (arrhythmia). High-level exposure to hydrocarbons (above occupational exposure limits) may initiate arrhythmia in a worker that is undergoing stress or is taking a heart-stimulating substance such as epinephrine, a nasal decongestant, or an asthma or cardiovascular drug.

Crude oil: Contains polycyclic aromatic compounds (PACs). Prolonged and / or repeated exposure by skin or inhalation of certain PACs may cause cancer of the skin, lung, and of other sites of the body. In animal studies, some crudes produced skin tumors in mice, while other crudes produced no tumors. Developmental studies of crude oil in lab animals showed reduced fetal weight and increased fetal resorptions at maternally toxic levels. Repeated dermal exposure to crude oils in rats resulted in toxicity to the blood, liver, thymus, and bone marrow.

Contains:

BENZENE: Caused cancer (acute myeloid leukemia and myelodysplastic syndrome), damage to the blood-producing system, and serious blood disorders in human studies. Caused genetic effects and effects on the immune system in laboratory animal and some human studies. Caused toxicity to the fetus and cancer in laboratory animal studies.

HYDROGEN SULFIDE : Chronic health effects due to repeated exposures to low levels of H2S have not been established. High level (700 ppm) acute exposure can result in sudden death. High concentrations will lead to cardiopulmonary arrest due to nervous system toxicity and pulmonary edema. Lower levels (150 ppm) may overwhelm sense of smell, eliminating warning of exposure. Symptoms of overexposure to H2S include headache, fatigue, insomnia, irritability, and gastrointestinal problems. Repeated exposures to approximately 25 ppm will irritate mucous membranes and the respiratory system and have been implicated in some eye damage.

NAPHTHALENE: Exposure to high concentrations of naphthalene may cause destruction of red blood cells, anemia, and cataracts. Naphthalene caused cancer in laboratory animal studies, but the relevance of these findings to humans is uncertain.

N-HEXANE: Prolonged and/or repeated exposures to n-Hexane can cause progressive and potentially irreversible damage to the peripheral nervous system (e.g. fingers, feet, arms, legs, etc.). Simultaneous exposure to Methyl Ethyl Ketone (MEK) or Methyl Isobutyl Ketone (MIBK) and n-Hexane can potentiate the risk of adverse effects from n-Hexane on the peripheral nervous system. n-Hexane has been shown to cause testicular damage at high doses in male rats. The relevance of this effect for humans is unknown.

TOLUENE : Concentrated, prolonged or deliberate inhalation may cause brain and nervous system damage. Prolonged and repeated exposure of pregnant animals (> 1500 ppm) have been reported to cause adverse fetal developmental effects.

ETHYLBENZENE: Caused cancer in laboratory animal studies. The relevance of these findings to humans is uncertain.

The following ingredients are cited on the lists below:

Chemical Name	CAS Number	List Citations

BENZENE	71-43-2	1, 3, 6
ETHYL BENZENE	100-41-4	5
NAPHTHALENE	91-20-3	2, 5

--REGULATORY LISTS SEARCHED--

1 = NTP CARC
2 = NTP SUS
3 = IARC 1
4 = IARC 2A
5 = IARC 2B
6 = OSHA CARC

SECTION 12 ECOLOGICAL INFORMATION

The information given is based on data for the material, components of the material, or for similar materials, through the application of bridging principals.

ECOTOXICITY

Material -- Expected to be toxic to aquatic organisms. May cause long-term adverse effects in the aquatic environment.

MOBILITY

More volatile component -- Highly volatile, will partition rapidly to air. Not expected to partition to sediment and wastewater solids.

Less volatile component -- Low solubility and floats and is expected to migrate from water to the land. Expected to partition to sediment and wastewater solids.

PERSISTENCE AND DEGRADABILITY

Biodegradation:

Low molecular wt. component -- Expected to be inherently biodegradable

High molecular wt. component -- Expected to biodegrade slowly.

Photolysis:

More water soluble component -- Expected to degrade at a moderate rate in water when exposed to sunlight.

Atmospheric Oxidation:

More volatile component -- Expected to degrade rapidly in air

BIOACCUMULATION POTENTIAL

Components -- Has the potential to bioaccumulate.

ECOLOGICAL DATA

Ecotoxicity

Test	Duration	Organism Type	Test Results
Aquatic - Acute Toxicity	48 hour(s)	Invertebrate	EC50 10 - 100 mg/l: data for similar materials

SECTION 13 DISPOSAL CONSIDERATIONS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS

Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products.

REGULATORY DISPOSAL INFORMATION

RCRA Information: Disposal of unused product may be subject to RCRA regulations (40 CFR 261). Disposal of the used product may also be regulated due to ignitability, corrosivity, reactivity or toxicity as determined by the Toxicity Characteristic Leaching Procedure (TCLP). Potential RCRA characteristics: IGNITABILITY. TCLP (BENZENE)

Empty Container Warning Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

SECTION 14 TRANSPORT INFORMATION

LAND (DOT)

Proper Shipping Name: PETROLEUM CRUDE OIL
Hazard Class & Division: 3
ID Number: 1267
Packing Group: II
Marine Pollutant: No
ERG Number: 128
Label(s): 3
Transport Document Name: UN1267, PETROLEUM CRUDE OIL, 3, PG II

LAND (TDG)

Proper Shipping Name: PETROLEUM CRUDE OIL
Hazard Class & Division: 3
UN Number: 1267
Packing Group: II
Special Provisions: 92,106,150

Footnote: Marine Pollutant designation is applicable only if shipped over water.

SEA (IMDG)

Proper Shipping Name: PETROLEUM CRUDE OIL
Hazard Class & Division: 3
EMS Number: F-E, S-E
UN Number: 1267
Packing Group: II
Marine Pollutant: Yes
Label(s): 3

Transport Document Name: UN1267, PETROLEUM CRUDE OIL, 3, PG II, (21°C c.c.), MARINE POLLUTANT

AIR (IATA)

Proper Shipping Name: PETROLEUM CRUDE OIL
Hazard Class & Division: 3
UN Number: 1267
Packing Group: II
Label(s) / Mark(s): 3
Transport Document Name: UN1267, PETROLEUM CRUDE OIL, 3, PG II

SECTION 15 REGULATORY INFORMATION

OSHA HAZARD COMMUNICATION STANDARD: This material is considered hazardous in accordance with OSHA HazCom 2012, 29 CFR 1910.1200.

Listed or exempt from listing/notification on the following chemical inventories: AICS, DSL, ENCS, IECSC, KECI, PICCS, TCSI, TSCA

SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302

CERCLA: This material is not subject to any special reporting under the requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Contact local authorities to determine if other reporting requirements apply.

SARA (311/312) REPORTABLE GHS HAZARD CLASSES: Aspiration Hazard, Carcinogenicity, Flammable (gases, aerosols, liquids, or solids), Serious eye damage or eye irritation, Specific Target Organ toxicity (single or repeated exposure)

SARA (313) TOXIC RELEASE INVENTORY:

Chemical Name	CAS Number	Typical Value
BENZENE	71-43-2	1 - 5%
CYCLOHEXANE	110-82-7	1 - 5%
ETHYL BENZENE	100-41-4	0.1 - 1%
N-HEXANE	110-54-3	1 - 5%
NAPHTHALENE	91-20-3	1 - 5%
POLYNUCLEAR AROMATIC HYDROCARBONS		> 0.1%
TOLUENE	108-88-3	1 - 5%
XYLENES	1330-20-7	1 - 5%

The following ingredients are cited on the lists below:

Chemical Name	CAS Number	List Citations
BENZENE	71-43-2	1, 2, 4, 10, 11, 13, 15, 16, 17, 18, 19
CYCLOHEXANE	110-82-7	1, 4, 13, 16, 17, 18, 19
ETHYL BENZENE	100-41-4	1, 4, 10, 17, 19
N-HEXANE	110-54-3	1, 4, 13, 16, 17, 18, 19
NAPHTHALENE	91-20-3	1, 4, 10, 13, 16, 17, 18, 19
PETROLEUM CRUDE OIL	8002-05-9	4, 13, 16, 17, 18
POLYNUCLEAR AROMATIC HYDROCARBONS		18
TOLUENE	108-88-3	1, 4, 11, 13, 15, 16, 17, 18, 19
XYLENES	1330-20-7	1, 4, 13, 15, 16, 17, 18, 19

--REGULATORY LISTS SEARCHED--

1 = ACGIH ALL	6 = TSCA 5a2	11 = CA P65 REPRO	16 = MN RTK
2 = ACGIH A1	7 = TSCA 5e	12 = CA RTK	17 = NJ RTK
3 = ACGIH A2	8 = TSCA 6	13 = IL RTK	18 = PA RTK
4 = OSHA Z	9 = TSCA 12b	14 = LA RTK	19 = RI RTK
5 = TSCA 4	10 = CA P65 CARC	15 = MI 293	

Code key: CARC=Carcinogen; REPRO=Reproductive

SECTION 16 OTHER INFORMATION

WARNING: Cancer and Reproductive Harm - www.P65Warnings.ca.gov.

This warning is given to comply with California Health and Safety Code 25249.6 and does not constitute an admission or a waiver of rights.

N/D = Not determined, N/A = Not applicable

KEY TO THE H-CODES CONTAINED IN SECTION 3 OF THIS DOCUMENT (for information only):
H225: Highly flammable liquid and vapor; Flammable Liquid, Cat 2
H226: Flammable liquid and vapor; Flammable Liquid, Cat 3
H302: Harmful if swallowed; Acute Tox Oral, Cat 4
H303: May be harmful if swallowed; Acute Tox Oral, Cat 5
H304: May be fatal if swallowed and enters airways; Aspiration, Cat 1
H312: Harmful in contact with skin; Acute Tox Dermal, Cat 4
H315: Causes skin irritation; Skin Corr/Irritation, Cat 2
H319(2A): Causes serious eye irritation; Serious Eye Damage/Irr, Cat 2A
H320(2B): Causes eye irritation; Serious Eye Damage/Irr, Cat 2B
H332: Harmful if inhaled; Acute Tox Inh, Cat 4
H335: May cause respiratory irritation; Target Organ Single, Resp Irr
H336: May cause drowsiness or dizziness; Target Organ Single, Narcotic
H340(1B): May cause genetic defects; Germ Cell Mutagenicity, Cat 1B
H350(1A): May cause cancer; Carcinogenicity, Cat 1A
H350(1B): May cause cancer; Carcinogenicity, Cat 1B
H351: Suspected of causing cancer; GHS Carcinogenicity, Cat 2
H361(D): Suspected of damaging the unborn child; Repro Tox, Cat 2 (Develop)
H361(F): Suspected of damaging fertility; Repro Tox, Cat 2 (Fertility)
H372: Causes damage to organs through prolonged or repeated exposure; Target Organ, Repeated, Cat 1

H373: May cause damage to organs through prolonged or repeated exposure; Target Organ, Repeated, Cat 2
H400: Very toxic to aquatic life; Acute Env Tox, Cat 1
H401: Toxic to aquatic life; Acute Env Tox, Cat 2
H410: Very toxic to aquatic life with long lasting effects; Chronic Env Tox, Cat 1
H411: Toxic to aquatic life with long lasting effects; Chronic Env Tox, Cat 2
H412: Harmful to aquatic life with long lasting effects; Chronic Env Tox, Cat 3

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:
Section 08: Biological Exposure Limits (ACG BEL) Table information was modified.
Section 16: Materials Covered information was modified.
THIS MSDS COVERS THE FOLLOWING MATERIALS: AASGARD BLEND CRUDE OIL | AASGARD CONDENSATE | AASGARD CRUDE OIL | ABO CRUDE OIL | ABU ATTIFEL CRUDE OIL | ACACIA CRUDE OIL | AKTOBINSK CRUDE OIL | ALBA CONDENSATE | ALBERTA CONDENSATE | ALBIAN PREMIUM SCO CRUDE OIL | ALEXANDRIA RESID CRUDE OIL | ALGERIAN CONDENSATE | ALGERIAN SR RESID ALGIERS CRUDE OIL | ALGERIAN SR RESID SKIKDA CRUDE OIL | ALVHEIM CRUDE OIL | AMENAM BLEND CRUDE OIL | AMNA CRUDE OIL | AMOKURA CRUDE OIL | ANACO WAX DILUENT CRUDE OIL | ANACO WAX EXPORT CRUDE OIL | ANASURIA CRUDE OIL | ANDROMEDE CRUDE OIL | ANGSI CRUDE OIL | ANGUS CRUDE OIL | ANTAN CRUDE OIL | ARABIAN SUPER LIGHT CRUDE OIL | ARDJUNA CRUDE OIL | ARDMORE CRUDE OIL | ARIMBI CRUDE OIL | ASTRAEA CRUDE OIL | AVALON CRUDE OIL | AZERI HEAVY CRUDE OIL | AZERI LIGHT CRUDE OIL | BADIN CRUDE OIL | BAKKEN SWEET C.O. | BALDER BLEND CRUDE OIL | BANFF CRUDE OIL | BANYU URIP CRUDE OIL | BAOBAB CRUDE OIL | BARBADOS CRUDE OIL | BARENTS SEA CRUDE OIL | BASKER CRUDE OIL | BATON ROUGE HLS CRUDE OIL | BATUQUE CRUDE OIL | BAYOU CHOCTAW SWEET CRUDE OIL | BAYU-UNDAN CONDENSATE | BEATRICE CRUDE OIL | BEBATIK CRUDE OIL | BELANAK CRUDE OIL | BELIZE CRUDE OIL | BELRIDGE HEAVY CRUDE OIL | BENCHAMAS CRUDE OIL | BIG HILL SWEET CRUDE OIL | BIJUPIRA-SALEMA CRUDE OIL | BIMA CRUDE OIL | BINTULU CONDENSATE | BINTULU CRUDE OIL | BOLIVIAN BLEND CRUDE OIL | BOLIVIAN RECON CRUDE OIL | BOLOBO BLEND CRUDE OIL | BOMBAY HIGH CRUDE OIL | BONGA CRUDE OIL | BONGKOT CONDENSATE (51) | BONGKOT CONDENSATE (53) | BONNY LIGHT CRUDE OIL | BOSI CRUDE OIL | BOTLECK CONDENSATE | BOZHONG CRUDE OIL | BRAEFOOT CONDENSATE | BRASS RIVER CRUDE OIL | BREGA CRUDE OIL | BRENT BLEND CRUDE OIL | BROOKLAND CRUDE OIL | BRUNEI CONDENSATE | BRYAN MOUND SWEET CRUDE OIL | BUCKLAND CRUDE OIL | BUFFALO CRUDE OIL | BURUN CRUDE OIL | CABINDA CRUDE OIL | CAKERWALA CONDENSATE | CALYPSO CRUDE OIL | CAMISEA CASHIRIARI CRUDE OIL | CANADON SECO CRUDE OIL | CANELA CRUDE OIL | CANO LIMON CRUDE OIL | CAOFEDIAN CRUDE OIL | CAPTAIN CRUDE OIL | CARMOPOLIS CRUDE OIL | CEIBA CRUDE OIL | CERES CRUDE OIL | CHAUNOY CRUDE OIL | CHECHNYA CRUDE OIL | CHELEKEN CRUDE OIL | CHINGUETTI CRUDE OIL | CLAIR CRUDE OIL | CLIFF HEAD CRUDE OIL | CLOCHES CRUDE OIL | CLYDE CRUDE OIL | CONGO COMPOSITE (Coco) CRUDE OIL | CPC BLEND CRUDE OIL | CRAVO CRUDE OIL | CRUDE OIL | CRUDE OIL (<0.002% H2S) | CRUDE OIL SWEET ("Sweet" applied by definition of Society of Petroleum Engineers for oils containing sulfur compounds < 1%) | CURLEW CRUDE OIL | DAI HUNG CRUDE OIL | DALIA CRUDE OIL | DAQING CRUDE OIL | DE RUYTER CRUDE OIL | DEN HELDER CONDENSATE | DIDON CRUDE OIL | DJENO BLEND CRUDE OIL | DOBA | DOMESTIC SWEET CRUDE | DORTYOL CRUDE OIL | DOUGLAS CRUDE OIL | DRAUGEN CRUDE OIL | DUMBARTON CRUDE OIL | DURI CRUDE OIL | DUTCH MIX CRUDE OIL | EA CRUDE OIL | EAST TEXAS SWEET CRUDE OIL | EAST ZEIT CRUDE OIL | EBOK CRUDE OIL | EBOME MARINE CRUDE OIL | EGINA CRUDE OIL | EKOFISK CRUDE OIL | EL SHARARA CRUDE OIL | EL WAFA CRUDE OIL | ELEPHANT CRUDE OIL | ELK HILLS CRUDE OIL | EMPIRE (HLS) CRUDE OIL | ENFIELD CRUDE OIL | ERHA CRUDE OIL | ES SIDER CRUDE OIL | ESCALANTE CRUDE OIL | ESPADARTE CRUDE OIL | ESPOIR CRUDE OIL | ETAME CRUDE OIL | ETTRICK CRUDE OIL | EZZAOUIA CRUDE OIL | F3 CONDENSATE | FEDERATED PIPELINE CRUDE OIL | FHR HYDROCRACKATE CRUDE OIL | FIFE CRUDE OIL | FIFE/ANGUS BLEND CRUDE OIL | FLOTTA MIX CRUDE OIL | FOINAVEN CRUDE OIL |

FORCADOS CRUDE OIL | FORSETI CRUDE OIL | FORTIES BLEND CRUDE OIL | FULMAR MIX CRUDE OIL | GALEOTA MIX CRUDE OIL | GALVESTON 42 CRUDE OIL | GALVESTON 51 CRUDE OIL | GAMBA CRUDE OIL | GERAGAI CRUDE OIL | GIPPSLAND EXPORT CRUDE OIL | GIPPSLAND NEAT CRUDE OIL | GIRASSOL CRUDE OIL | GJOA CRUDE OIL | GLITNE CRUDE OIL | GOLDENEYE CRUDE OIL | GRAND ISLE PIPELINE MIX CRUDE OIL | GRANE CRUDE OIL | GREGORIO CRUDE OIL | GRYPHON BLEND CRUDE OIL | GUADUAS CRUDE OIL | GUAFITA CRUDE OIL | GULF COAST MIX CRUDE OIL | GULLFAKS A/B CRUDE OIL | GULLFAKS BLEND CRUDE OIL | GULLFAKS C CRUDE OIL | HANNOVER CRUDE OIL | HANZ CRUDE OIL | HANZE CRUDE OIL | HARDING CRUDE OIL | HEBRON-BEN NEVIS BLEND CRUDE OIL | HEIDRUN CRUDE OIL | HIBERNIA BLEND CRUDE OIL | HIDRA CRUDE OIL | HIGH ISLAND CRUDE OIL | HIGH POUR LIBYAN CRUDE OIL | HIGH POUR OFICINA CRUDE OIL | HOUGH CRUDE OIL | HT SHALE NAPHTHA CRUDE OIL | HUSKY SYNTHETIC BLEND CRUDE OIL | IKAN PARI CRUDE OIL | IMA CRUDE OIL | ISIS CRUDE OIL | JACKSON CRUDE OIL | JASMIM CRUDE OIL | JASMINE (KRAB) CRUDE OIL | JASMINE CRUDE OIL | JATIBARANG CRUDE OIL | JOHNSON BAYOU CRUDE OIL | JONES CREEK | JOTUN BLEND CRUDE OIL | JUNO CRUDE OIL | KAJI-SEMOGA CRUDE OIL | KAKAP CRUDE OIL | KALININGRAD CRUDE OIL | KARACHAGANAK CONDENSATE | KASHAGAN CRUDE OIL | KATAPA CRUDE OIL | KAZAKH CRUDE OIL | KENKIYAK CRUDE OIL | KHUFF CONDENSATE | KIAME CRUDE OIL | KIDURONG CRUDE OIL | KISSANJE BLEND CRUDE OIL | KITTIWAKE CRUDE OIL | KNK CRUDE OIL | KOLE BLEND CRUDE OIL | KOME A1/A2 CRUDE OIL | KOME LK CRUDE OIL | KOME YO/M1 CRUDE OIL | KRIBI CRUDE OIL | KRISTIN CRUDE OIL | KUITO CRUDE OIL | KUMKOL CRUDE OIL | KYLE CRUDE OIL | KYLE/CURLEW BLEND CRUDE OIL | KYZILORDA CRUDE OIL | LAN TAY CONDENSATE | LANGSA CRUDE OIL | LEADON CRUDE OIL | LENNOX CRUDE OIL | LIBYAN LSSR CRUDE OIL | LIGHT LOUISIANA SWEET CRUDE OIL | LION CRUDE OIL | LITHUANIAN CRUDE OIL | LIUHUA CRUDE OIL | LIVERPOOL BLEND CRUDE OIL | LIZA CRUDE | LOKELE CRUDE OIL | LOWER VOLGA CRUDE OIL | LUCINA BLEND CRUDE OIL | LUFENG CRUDE OIL | MADURA CRUDE OIL | MAGAWISH CRUDE OIL | MAKAT CRUDE OIL | MALAMPAYA CONDENSATE | MANGARA CRUDE OIL | MANIS CRUDE OIL | MARIA INES CRUDE OIL | MARIMBA CRUDE OIL | MARLIM CRUDE OIL | MASA CRUDE OIL | MASILA CRUDE OIL | MAUI CONDENSATE | MAVACOLA CRUDE OIL | MAYNA CRUDE OIL | MEDANITOS CRUDE OIL | MELLITAH CONDENSATE | MESSLA CRUDE OIL | MIANDOUM CRUDE OIL | MIDLAND SWEET C.O. | MIKKEL CONDENSATE | MIRZAANI CRUDE OIL | MIXED BLEND SWEET | MIXED SWEET BLEND CRUDE OIL | MONDO CRUDE OIL | MONDOULI CRUDE OIL | MONTANA MIX CRUDE OIL | MOUDI CRUDE OIL | MUBAREK CRUDE OIL | MUBARRAS CRUDE OIL | MUDI BLEND CRUDE OIL | MUTINEER-EXETER CRUDE OIL | N'KOSSA BLEND CRUDE OIL | NANG NUAN CRUDE OIL | NANHAI LIGHT CRUDE OIL | NANHAI MEDIUM CRUDE OIL | NEMBA CRUDE OIL | NEW BREGA CONDENSATE | NEWGRADE SYNTHETIC BLEND CRUDE OIL | NFC CONDENSATE | NILE BLEND CRUDE OIL | NJORD CRUDE OIL | NORNE CRUDE OIL | NOVOSERGIEVSKAYA CRUDE OIL | NUEVO CRUDE OIL | NWS CONDENSATE | NYA CRUDE OIL | OB RIVER HEAVY CRUDE OIL | OB RIVER LIGHT CRUDE OIL | OBE CRUDE OIL | OFICINA CRUDE OIL | OFON CRUDE OIL | OKAREM CRUDE OIL | OKONO CRUDE OIL | OKWORI CRUDE OIL | OLOMBENDO C.O. | ONAKO LIGHT CRUDE OIL | ONTARIO SWEET CRUDE OIL | ORIBI CRUDE OIL | ORMEN LANGE CRUDE OIL | ORQUIDEA CRUDE OIL | OSEBERG BLEND CRUDE OIL | OSO CONDENSATE | PAGERUNGAN CRUDE OIL | PALANCA CRUDE OIL | PALANCA BLEND CRUDE OIL | PALAS CRUDE OIL | PALO BLANCO CRUDE OIL | PANYU CRUDE OIL | PARENTIS CRUDE OIL | PATTANI BLEND CRUDE OIL | PEMBINA CRUDE OIL | PENARA BLEND CRUDE OIL | PENG LAI CRUDE OIL | PENNINGTON CRUDE OIL | PERPETUA CRUDE OIL | PETROLE BRUT | PHET CRUDE OIL | PICT CRUDE OIL | PIERCE CRUDE OIL | PINE ISLAND CONDENSATE | PLUTAO CRUDE OIL | PURPE CONDENSATE | Q16 CONDENSATE | QARUN CRUDE OIL | QATAR RETURN CONDENSATE | QINHUANGDAO (QHD) CRUDE OIL | QUA IBOE (NIGERIAN LIGHT) CRUDE OIL | RABI LIGHT CRUDE OIL | RAINBOW CRUDE OIL | RAMBA CRUDE OIL | RANGELAND SOUR CRUDE OIL | RANGELAND SWEET CRUDE OIL | REMBOUE CRUDE OIL | RGN CRUDE OIL | RHEMOURA CRUDE OIL | RINCON CRUDE OIL | RINGHORNE CRUDE OIL | ROLLER CRUDE OIL | RONCADOR CRUDE OIL | ROSA CRUDE OIL | ROSS CRUDE OIL | ROSS/BLAKE CRUDE OIL | ROZEWIE CRUDE OIL | RUBY CRUDE OIL | SABLE CRUDE OIL | SABLE ISLAND

CONDENSATE | SAHARAN BLEND ARZEW CRUDE OIL | SAHARAN BLEND BEJAIA (S) CRUDE OIL | SAHARAN BLEND BEJAIA (W) CRUDE OIL | SAHARAN BLEND SKIKDA CRUDE OIL | SAIGAK CRUDE OIL | SALADIN CRUDE OIL | SAMGORI CRUDE OIL | SAN JOAQUIN VALLEY LIGHT BLEND CRUDE OIL | SAN MARTIN CRUDE OIL | SAN SEBASTIAN CRUDE OIL | SANTA CRUZ CRUDE OIL | SARATOV CRUDE OIL | SARIR CRUDE OIL | SARKHOON CONDENSATE | SAXI CRUDE OIL | SAXI BLEND CRUDE OIL | SCHIEHALLION CRUDE OIL | SCOTIAN LIGHT BLEND CRUDE OIL | SCURLOCK LAROSE CRUDE OIL | SEDIGI CRUDE OIL | SEMBA CRUDE OIL | SHABWA CRUDE OIL | SHELL SYNTHETIC BLEND CRUDE OIL | SHENGLI CRUDE OIL | SIBERIAN LIGHT CRUDE OIL | SINCOR MEDIUM (10%) SCO CRUDE OIL | SINCOR SWEET SCO CRUDE OIL | SIRI CRUDE OIL | SIRTICA CRUDE OIL | SLEIPNER (West) CRUDE OIL | SLEIPNER CONDENSATE | SOUR LIGHT EDMONTON CRUDE OIL | SOUTH BLEND CRUDE OIL | SOUTH LOUISIANA INTERMEDIATE CRUDE OIL | SOUTH PARS CONDENSATE | SOUTHWEST LINE CRUDE OIL | SOYO CRUDE OIL | STAG CRUDE OIL | STATFJORD A CRUDE OIL | STATFJORD B CRUDE OIL | STATFJORD BLEND CRUDE OIL | STATFJORD C CRUDE OIL | STYBARROW CRUDE OIL | SU TU DEN CRUDE OIL | SUIZHONG CRUDE OIL | SUKOWATI CRUDE OIL | SUN MP 5 CRUDE OIL | SUNCOR (OSA) SCO CRUDE OIL | SUNCOR (OSN) SCO CRUDE OIL | SWEET CRUDE OIL | SYD ARNE CRUDE OIL | SYRIAN LIGHT CRUDE OIL | TAZERKA CRUDE OIL | TCHATAMBA MARINE CRUDE OIL | TENGIZ CRUDE OIL | TERENGGANU CONDENSATE | TERRA NOVA CRUDE OIL | THAMAMA CONDENSATE | THAYYEM CRUDE OIL | THUNDER HORSE CRUDE OIL | TIERRA DEL FUEGO CRUDE OIL | TRINTOPEC CRUDE OIL | TRITON BLEND CRUDE OIL | TROLL BLEND CRUDE OIL | TULIPA CRUDE OIL | TYRIHANS NORTH CRUDE OIL | TYRIHANS SOUTH CRUDE OIL | UDANG CRUDE OIL | UJUNG PANGKAH WEST CRUDE OIL | UKPOKITI CRUDE OIL | URALS BELOKAMENKA CRUDE OIL | URALS VYSOTSK CRUDE OIL | USAN BLEND CRUDE OIL | USINSK CRUDE OIL | UWEINATE CONDENSATE | VALENTINE CRUDE OIL | VARANUS BLEND CRUDE OIL | VARG CRUDE OIL | VENICE CRUDE OIL | VITYAZ (Sakhalin 2) CRUDE OIL | WAFA BLEND (-w- Elephant) CRUDE OIL | WALIO CRUDE OIL | WEEKS ISLAND CRUDE OIL | WENCHANG CRUDE OIL | WESSEX CRUDE OIL | WEST HACKBERRY SWEET CRUDE OIL | WEST SENO CRUDE OIL | WEST TEXAS INTERMEDIATE CRUDE OIL | WESTERN DESERT BLEND CRUDE OIL | WHITE ROSE CRUDE OIL | WHITE SEA CRUDE OIL | WYTCH FARM CRUDE OIL | XIKOMBA CRUDE OIL | YETAGUN CONDENSATE | YOHO CRUDE OIL | YOMBO CRUDE OIL | ZAGORSKAYA CRUDE OIL | ZAIKINSKAYA CRUDE OIL | ZAIRE CRUDE OIL | ZARZAITINE CRUDE OIL | ZINIA CRUDE OIL | ZUEITINA CRUDE OIL | BRRF: Preflashed crude

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MHC: 1A, 0, 0, 2, 1, 1 PPEC: DVF

DGN: 2000339VUS (1014034)

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Safety data sheet number MI13958
Version 2
Revision date 11/Mar/2015
Supercedes date 04/Feb/2014

Safety Data Sheet
DEEPCLEAN†

Quantity restrictions apply! Not to be used in quantities of 1 tonne or more within the EEA.

1. Identification of the substance/preparation and of the Company/undertaking

1.1 Product identifier

Product name DEEPCLEAN†
Product code MI13958

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended use Completion fluid additive.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier identification
M-I Drilling Fluids UK Limited
C/O Schlumberger
Enterprise Drive
Westhill Industrial Estate
Westhill, AB32 6TQ
Scotland UK
+47 51577424
MISDS@slb.com

1.4 Emergency Telephone Number

Emergency telephone - (24 Hour) Australia +61 2801 44558, Asia Pacific +65 3158 1074, China +86 10 5100 3039, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, New Zealand +64 9929 1483, USA 001 281 561 1600

2. Hazards identification

2.1 Classification of the substance or mixture

Regulation (EC) No. 1272/2008

Health hazards

Aspiration toxicity	Category 1
Acute oral toxicity	Category 4
Acute inhalation toxicity - dust/mist	Category 4
Skin corrosion/irritation	Category 2
Serious eye damage/eye irritation	Category 1
Skin sensitisation	Category 1

Environmental hazards Not classified

Physical Hazards Not classified

2.2 Label Elements

Signal word
DANGER

Hazard statements
H302 - Harmful if swallowed
H304 - May be fatal if swallowed and enters airways
H315 - Causes skin irritation
H317 - May cause an allergic skin reaction
H318 - Causes serious eye damage
H332 - Harmful if inhaled

Precautionary Statements - EU (§28, 1272/2008)
P280 - Wear protective gloves/ protective clothing/ eye protection/ face protection
P301 + P310 - IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician
P302 + P352 - IF ON SKIN: Wash with plenty of soap and water
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a POISON CENTER or doctor/ physician
P331 - Do NOT induce vomiting

Supplementary precautionary statements
P261 - Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray
P264 - Wash face, hands and any exposed skin thoroughly after handling
P270 - Do not eat, drink or smoke when using this product
P271 - Use only outdoors or in a well-ventilated area
P272 - Contaminated work clothing should not be allowed out of the workplace
P304 + P340 - IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P330 - Rinse mouth
P333 + P313 - If skin irritation or rash occurs: Get medical advice/ attention
P362 - Take off contaminated clothing and wash before re-use
P501 - Dispose of contents/container in accordance with local regulations.

Classification according to EU Directives 67/548/EEC or 1999/45/EC

Indication of danger
Xn - Harmful
Xi - Irritant

R-code(s)
Xn;R20/22, R65, Xi;R38, R41, R43

Contains

D-Glucopyranose, oligomeric, C8-10 glycosides

2-Butoxyethanol

Citrus Extract

Hydrocarbons, C11-C14, n-alkanes, isoalkanes, cyclics, <2% aromatics

For the full text of the R-phrases and H-Statements mentioned in this Section, see Section 16.

2.3 Other data

Not classified as PBT/vPvB by current EU criteria

Australian statement of hazardous/dangerous nature

Classified as Hazardous according to the criteria of NOHSC.
HAZARDOUS SUBSTANCE. NON-DANGEROUS GOODS.

3. Composition/information on ingredients

3.1 Substances

Not Applicable

3.2 Mixtures

Component	EC-No.	CAS-No	Weight % - range	Classification (67/548)	Classification (Reg. 1272/2008)	REACH registration number
D-Glucopyranose, oligomeric, C8-10 glycosides	500-220-1	68515-73-1	30-60	Xi; R41	Eye Dam. 1(H318)	No data available
2-Butoxyethanol	203-905-0	111-76-2	10-30	Xn; R20/21/22 Xi; R36/38	Acute Tox. 4 (H302) Acute Tox. 4 (H312) Acute Tox. 4 (H332) Skin Irrit. 2 (H315) Eye Irrit. 2 (H319)	No data available
Citrus Extract		68647-72-3	10-30	F; R10 Xn; R65 Xi; R38, R43	Flam Liq.3(H226) Skin Irrit.2(H315) Skin Sens.1(H317) Asp Tox.1(H304)	No data available
Hydrocarbons, C11-C14, n-alkanes, isoalkanes, cyclics, <2% aromatics		64742-47-8	10-30	Xn; R65	Asp. Tox. 1 (H304)	No data available

Comments
Citrus extract can use either CAS# 8028-48-6 or 68647-72-3.

4. First aid measures

4.1 First Aid

Inhalation	If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.
Ingestion	Do not induce vomiting without medical advice. If vomiting occurs spontaneously, minimize the risk of aspiration by properly positioning the affected person. Never give anything by mouth to an unconscious person. Seek medical attention if irritation occurs.
Skin contact	Wash off immediately with soap and plenty of water removing all contaminated clothes and shoes. Get medical attention immediately if symptoms occur.
Eye contact	Remove contact lenses. Promptly wash eyes with lots of water while lifting eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

4.2 Most important symptoms and effects, both acute and delayed

General advice	The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.
Main symptoms	
Inhalation	Please see Section 11. Toxicological Information for further information.
Ingestion	Please see Section 11. Toxicological Information for further information.
Skin contact	Please see Section 11. Toxicological Information for further information.
Eye contact	Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician	Treat symptomatically.

5. Fire-fighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing media appropriate for surrounding material.

Extinguishing media which shall not be used for safety reasons
None known.

5.2 Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
None known.

Hazardous combustion products
Thermal decomposition can lead to release of irritating gases and vapours.

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. See also section 8.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and materials for containment and cleaning up

Methods for Containment
Prevent further leakage or spillage if safe to do so. Dike far ahead of liquid spill for later disposal.

Methods for cleaning up
Absorb with earth, sand or other non-combustable material and transfer to containers for later disposal. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Do not breathe vapors or spray mist. Avoid spills and splashing during use.

Hygiene measures
Use good work and personal hygiene practices to avoid exposure. When using do not smoke, eat or drink. Wash hands before eating, drinking or smoking. Remove contaminated clothing.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions	Ensure adequate ventilation. Keep airborne concentrations below exposure limits.
Storage	Keep containers tightly closed in a dry, cool and well-ventilated place. Avoid contact with: Heat, flames and sparks Strong oxidising agents Strong acids. Strong alkalies. Strong reducing agents.
Storage class	Chemical storage.

Packaging material Use specially constructed containers only

7.3 Specific end uses

See also Section 1.2.

8. Exposure controls/personal protection

8.1 Control parameters

Exposure limits OEL for "Normal and branched chain alkanes, > C7: 1200 mg/m³
No biological limit allocated

Component	EU OEL - Third List	Austria	Australia	Denmark
D-Glucopyranose, oligomeric, C8-10 glycosides	Not determined	Not determined	Not determined	Not determined
2-Butoxyethanol	20 ppm TWA 98 mg/m³ TWA 50 ppm STEL 246 mg/m³ STEL Possibility of significant uptake through the skin	Not determined	skin notation 20 ppm TWA; 96.9 mg/m³ TWA 50 ppm STEL; 242 mg/m³ STEL	20 ppm TWA 98 mg/m³ TWA Potential for cutaneous absorption
Citrus Extract	Not determined	Not determined	Not determined	Not determined
Hydrocarbons, C11-C14, n-alkanes, isoalkanes, cyclics, <2% aromatics	Not determined	Not determined	Not determined	Not determined

Component	Finland	France	Germany	Hungary
D-Glucopyranose, oligomeric, C8-10 glycosides	Not determined	Not determined	Not determined	Not determined
2-Butoxyethanol	Not determined	2 ppm 9.8 mg/m³	10 ppm MAK 49 mg/m³ MAK	Not determined
Citrus Extract	Not determined	Not determined	Not determined	Not determined
Hydrocarbons, C11-C14, n-alkanes, isoalkanes, cyclics, <2% aromatics	Not determined	Not determined	Not determined	Not determined

Component	New Zealand	Italy	Netherlands	Norway
D-Glucopyranose, oligomeric, C8-10 glycosides	Not Determined	Not determined	Not determined	Not determined
2-Butoxyethanol	25 ppm TWA 121 mg/m³ TWA Possibility of significant uptake through the skin	Not determined	100 mg/m³	10 ppm TWA 50 mg/m³ TWA 20 ppm STEL 75 mg/m³ STEL Skin
Citrus Extract	Not Determined	Not determined	Not determined	Not determined
Hydrocarbons, C11-C14, n-alkanes, isoalkanes, cyclics, <2% aromatics	Not Determined	Not determined	Not determined	Not determined

Component	Poland	Portugal	Romania	Russia

D-Glucopyranose, oligomeric, C8-10 glycosides	Not determined	Not determined	Not determined	Not determined
2-Butoxyethanol	200 mg/m³ STEL Skin 98 mg/m³ TWA	20 ppm TWA	Not determined	5 mg/m³ MAC
Citrus Extract	Not determined	Not determined	Not determined	Not determined
Hydrocarbons, C11-C14, n-alkanes, isoalkanes, cyclics, <2% aromatics	Not determined	Not determined	Not determined	Not determined

Component	Spain	Switzerland	Turkey	UK
D-Glucopyranose, oligomeric, C8-10 glycosides	Not determined	Not determined	Not determined	Not determined
2-Butoxyethanol	50 ppm VLA-EC 245 mg/m³ VLA-EC Skin 20 ppm VLA-ED indicative limit value 98 mg/m³ VLA-ED indicative limit value	20 ppm STEL 98 mg/m³ STEL Skin 10 ppm MAK 49 mg/m³ MAK	50 ppm STEL 246 mg/m³ STEL Skin 20 ppm TWA 98 mg/m³ TWA	50 ppm STEL 246 mg/m³ STEL Skin 25 ppm TWA 123 mg/m³ TWA
Citrus Extract	Not determined	Not determined	Not determined	Not determined
Hydrocarbons, C11-C14, n-alkanes, isoalkanes, cyclics, <2% aromatics	Not determined	Not determined	Not determined	Not determined

8.2 Exposure controls

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering measures to reduce exposure
Ensure adequate ventilation. Mechanical ventilation or local exhaust ventilation is required.

Personal protective equipment

Eye protection — It is good practice to wear goggles when handling any chemical. Tightly fitting safety goggles.

Hand protection — Use protective gloves made of:, Nitrile, Neoprene, Be aware that liquid may penetrate the gloves. Frequent change is advisable.

Respiratory protection — No personal respiratory protective equipment normally required, In case of insufficient ventilation wear suitable respiratory equipment, Use respirator with organic vapor protection (A, brown).

Skin and body protection — Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.

Hygiene measures — Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state	Liquid
Appearance	No information available
Odour	Citrus
Colour	Yellow
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH	No information available	
pH @ dilution		
Melting/freezing point		
Boiling point/range	No information available	
Flash Point	>61 °C	
Evaporation rate		
Flammability (solid, gas)	Not Applicable	
Flammability Limits in Air		
Upper flammability Limit	Not applicable	
Lower flammability limit	Not applicable	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	No information available	
Bulk density	No information available	
Relative density	0.90 - 0.94 sg	@ 20°C.
Water solubility	Dispersible	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity		
Viscosity, dynamic	No information available	
Log Pow	Not determined	

Explosive properties	Not Applicable
Oxidizing properties	None known.

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	None
Density VALUE	No information available

10. Stability and reactivity

10.1 Reactivity

No specific reactivity hazards associated with this product.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerisation does not occur.

10.4 Conditions to avoid

Heat, flames and sparks.

10.5 Incompatible materials

No materials to be especially mentioned. Strong oxidising agents. Strong acids. Strong reducing agents. Strong alkalies.

10.6 Hazardous decomposition products

See also section 5.2.

11. Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Inhalation Harmful by inhalation.

Eye contact Causes serious eye damage.

Skin contact Causes skin irritation. May cause an allergic skin reaction. May be absorbed through the skin in harmful amounts.

Ingestion Harmful if swallowed. May be fatal if swallowed and enters airways.

Acute toxicity Not Applicable.

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
D-Glucopyranose, oligomeric, C8-10 glycosides	No data available	No data available	No data available
2-Butoxyethanol	= 470 mg/kg (Rat)	= 220 mg/kg (Rabbit) = 2270 mg/kg (Rat)	= 2.21 mg/L (Rat) 4 h = 450 ppm (Rat) 4 h
Citrus Extract	No data available	No data available	No data available
Hydrocarbons, C11-C14, n-alkanes, isoalkanes, cyclics, <2% aromatics	> 5000 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	> 5.2 mg/L (Rat) 4 h

Sensitisation May cause sensitization by skin contact.

Mutagenic effects	This product does not contain any known or suspected mutagens.
Carcinogenicity	This product does not contain any known or suspected carcinogens.
Reproductive toxicity	This product does not contain any known or suspected reproductive hazards.
Routes of exposure	Skin contact. Inhalation. Ingestion. Eye contact.
Routes of entry	Skin absorption. Inhalation. Ingestion.
Specific target organ toxicity (single exposure)	Not classified
Specific target organ toxicity (repeated exposure)	Not classified.
Aspiration hazard	May be fatal if swallowed and enters airways.

12. Ecological information

12.1 Toxicity

The product component(s) are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Toxicity to algae
This product is not considered toxic to algae.

Toxicity to fish
This product is not considered toxic to fish.

Toxicity to daphnia and other aquatic invertebrates
This product is not considered toxic to invertebrates.

Component	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
D-Glucopyranose, oligomeric, C8-10 glycosides	No information available	No information available	No information available
2-Butoxyethanol	2950 mg/L LC50 (Lepomis macrochirus) = 96 h 1490 mg/L LC50 (Lepomis macrochirus) = 96 h	No information available	1000 mg/L EC50 (Daphnia magna) = 48 h 1698 - 1940 mg/L EC50 (Daphnia magna) = 24 h
Citrus Extract	No information available	No information available	No information available

Hydrocarbons, C11-C14, n-alkanes, isoalkanes, cyclics, <2% aromatics	2.2 mg/L LC50 (Lepomis macrochirus) = 96 h 45 mg/L LC50 (Pimephales promelas) = 96 h 2.4 mg/L LC50 (Oncorhynchus mykiss) = 96 h	No information available	4720 mg/L LC50 (Den-dronereides heteropoda) = 96 h

12.2 Persistence and degradability

Product is biodegradable.

12.3 Bioaccumulative potential

The product contains potentially bioaccumulating substances.

12.4 Mobility in soil

Mobility
Dispersible in water.

12.5 Results of PBT and vPvB assessment

Not classified as PBT/vPvB by current EU criteria.

12.6 Other adverse effects.

None known.

13. Disposal considerations

13.1 Waste treatment methods

Waste from residues / unused products — Dispose of in accordance with local regulations.

Contaminated packaging — Empty containers should be transported/delivered using a registered waste carrier for local recycling or waste disposal.

EWC waste disposal No. — According to the European Waste Catalogue, Waste Codes are not product specific, but application specific. Waste codes should be assigned by the user based on the application for which the product was used. The following Waste Codes are only suggestions: EWC waste disposal No: 07 01 04 Waste Code: 7152 Organic waste without halogen.

14. Transport information

The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA,ADR/RID/ADG).

14.1 UN number
Not regulated

14.2 Proper shipping name
Not regulated

14.3. Hazard class(es)

ADR/RID/ADN Hazard class	Not regulated
IMDG Hazard class	Not regulated
ICAO Hazard class/division	Not regulated

14.4 Packing group

ADR/RID/ADN Packing Group	Not regulated
IMDG Packing group	Not regulated
ICAO Packing group	Not regulated

14.5 Environmental hazard
No

14.6 Special precautions
Not Applicable

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
Please contact MISDS@slb.com for info regarding transport in Bulk.

15. Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Australian Standard for the Uniform Scheduling of Drugs and Poisons

2-Butoxyethanol
Schedule 6

New Zealand hazard classification	Corrosive
HSNO approval no.	HSR002625
Group number	N.O.S. (Toxic [6.1, 6.7], Corrosive) Group Standard 2006

Commission Regulation (EU) No 453/2010 of 20 May 2010 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH). Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC, including amendments.

This safety data sheet complies with the requirements of Regulation (EC) No. 1272/2008.

National Code of Practice for the Preparation of Material Safety Data Sheets 2nd Edition [NOHSC: 2011 (2003)].

National Occupational Health and Safety Commission's Approved Criteria for Classifying Hazardous Substances [NOHSC:1008 (2004) 3rd Edition].

National Occupational Health and Safety Commission's Exposure Standards for Atmospheric Contaminants in the occupational Environment [NOHSC:1003 (1995)].

Safe Work Australia.

Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP).

Not classified as Dangerous Goods by the criteria of the Australian Dangerous Goods Code (ADG Code) for transport by road or rail.

International inventories

USA, Toxic Substances Control Act inventory (TSCA)	Complies
European Union - EINECS and ELINCS	Complies
Canada, Domestic Substance List (DSL)	Complies
Philippines (PICCS)	Complies
Inventory - Japan - Existing and New Chemicals list	Does not Comply
China (IECSC)	Complies
Australia (AICS)	Complies
Korea (KECL)	Complies
Inventory - New Zealand - Inventory of Chemicals (NZIoC)	Complies

Restricted for use in Europe until REACH assessed. Please contact REACH@miswaco.slb.com if intended for use in Europe.

15.2 Chemical Safety Report

No information available

16. Other information

Prepared by	Global Regulatory Compliance - Chemicals (GRC - Chemicals) , Anne Karin (Anka) Fosse
Supercedes date	04/Feb/2014
Revision date	11/Mar/2015
Version	2
The following sections have been revised	2,, 8,, 11,, 16, There have been changes with regard to classification, Updated according to GHS/CLP.

Text of R phrases mentioned in Section 3
R10 - Flammable
R38 - Irritating to skin
R41 - Risk of serious damage to eyes
R43 - May cause sensitization by skin contact
R65 - Harmful: may cause lung damage if swallowed

R20/22 - Harmful by inhalation and if swallowed
R36/38 - Irritating to eyes and skin

Full text of H-Statements referred to under sections 2 and 3

H302 - Harmful if swallowed
H304 - May be fatal if swallowed and enters airways
H315 - Causes skin irritation
H317 - May cause an allergic skin reaction
H318 - Causes serious eye damage
H332 - Harmful if inhaled
H226 - Flammable liquid and vapor
H319 - Causes serious eye irritation

†A mark of M-I L.L.C.

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Safety Data Sheets: Fluorescent Bulbs

Waste Stream: Fluorescent Bulbs

EPA Waste Profile Sheet Number: 20140506-023

DAMAR®

SAFETY DATA SHEET (SDS)

for: Fluorescent Bulbs

Section 1. Identification

1.1. Company:

Damar Worldwide 4 LLC
Telephone: (800) 238-9080
805 N Carnation Dr
Aurora, MO 65605

1.2. Product: Compact Fluorescent Bulbs

Section 2. Hazards Identification

NOTE

Grinding, sanding and/or mechanical manipulation of this product may change and alter the hazards and information listed in all of the following sections in ways that can not be predicted.

2.1. Hazard Classification: Inert, Article

2.2. OSHA Regulatory Status:

This product, when intact, is not known to be hazardous as defined by OSHA's Hazard Communication Standard, 29 CFR 1910.1200. This product is exempt from OSHA's Hazard Communication Standard requirements for an MSDS because it meets the definition of an "article". An article is a manufactured item: (1) which is formed to a specific shape or design during manufacture (2) which has end use function(s) dependent in whole or in part upon its shape or design during end use: and (3) which does not release, or otherwise result in exposure to, a hazardous chemical under normal conditions of use. Any product which meets the definition of an "article" is exempt from the requirements of the Standard.

2.3. Hazardous Ingredients

Ingredient	CAS Number	OSHA PEL mg/m^3	ACGIH TLV	% By Weight
Glass	(65997-17-3)	15	10	<96.0%
Phosphor Powder (as nuisance dust)		15	10	<2.5%
Yttrium Oxide	(1314-36-9)	1	1	<0.5%
Barium Carbonate	(0513-77-9)	0.5	0.5	<0.1%
Manganese Carbonate	(598-62-9)	5	5	<0.1%
Tin	(7440-31-5)	0.1	0.1	<0.1%
Indium	(7440-74-6)	0.1		<0.07%
Bismuth	(7440-69-9)			<0.005%
Mercury	(7439-97-6)	0.1	0.025	~0.025%

2.4. The Phosphor Powder materials are ceramic phosphors. The ceramics are Barium Aluminate and Yttrium Oxide. The PEL and TLV are given where available for the base materials. There is no data for the ceramics as mixtures.

2.5. GHS Classification:

2.5.1. Acute toxicity oral: unknown; unlikely

2.5.2. Acute toxicity dermal: unknown; unlikely

2.5.3. Aspiration hazard: unknown; unlikely

2.6. Signal Word: Not Applicable

2.7. Hazard Statement:
This article is essentially inert under most conditions including those most likely to be present in a fire or other emergency situation.

2.8. Pictograms: Not Applicable

2.9. Precautionary Statement:
Call a POISON CENTER if you feel unwell.
This product is an electrical device that when used in or along with appropriate equipment designed for those products and constructed for use with such products, has no special health or safety concerns.
Additional information regarding applications or technical specifications for this product may be available at http://www.damarww.com.

2.10. Description of any hazards not otherwise classified:

2.10.1. Primary routes of particulate entry: Ingestion, Eye/Skin Contact.

2.10.2. Skin Exposure:

2.10.2.1. Minor laceration and/or abrasion may occur if product is broken, sharp objects pierce coating and then come into contact with skin. Alteration/damage to the product can result in exposure to additional unforeseen and unpredictable hazards including but not limited to electrical hazards..

2.10.2.2. Refer to Sections 7 and 8 for additional information regarding Handling and Personal Protective Equipment (PPE).

2.10.3. Eye Exposure:
Injury may occur if eyes are subjected to prolonged direct exposure to bright light.

2.10.4. Respiratory Exposure:
Inhalable dust and particulates may be generated if product is pulverized. As with any particulate matter, respirable particles may cause mechanical irritation of the respiratory system and/or lung injury.

2.11. NFPA Rating: Health 1 Fire 1 Instability/Reactivity 0

Section 3. Composition/Information on Ingredients

3.1. Exempt article ingredients not measured

3.2. These items are light bulbs in various shapes, configurations, and designs. All contain a small fluorescent tube (either twisted or bent to shape), a plastic housing (containing an electronic circuit to start the lamp), and a threaded base for use in standard incandescent lamp sockets (or a pin base for use in a GU24 socket). Some lamps utilize a glass, or plastic, outer envelope to enclose the fluorescent tube.

Section 4. First Aid Measures

4.1. Eyes: Not Applicable

4.2. Skin:

4.2.1. Wash with soap and water.

4.2.2. Treat lacerations using standard first aid procedures.

4.2.3. Seek medical attention.

4.3. Inhalation: Not Applicable

4.4. Call poison center if you feel unwell.

4.5. Physicians: Treat according to person's condition and specifics of exposure.

Section 5. Fire Fighting Measures

5.1. Flash point: Not applicable/determined

5.2. Lower/Upper Explosive Limit: Not applicable/determined

5.3. Extinguishing Media: Water, CO_2, and sand.

5.4. Extinguishing Media to Avoid: None

5.5. Protection of Firefighters

5.5.1. Hazardous Decomposition Products: Not applicable/determined

5.5.2. Unusual Fire and Explosion Data:
Material may be electrically conductive.

5.5.3. Protective Equipment and Precautions for Firefighters:
Standard protective equipment and precautions – Self-contained breathing apparatus (SCBA) and full firefighting turnout gear

5.6. Unusual Fire Hazards: None known

Section 6. Accidental Release Measures

6.1. Pieces of broken fixture components may form sharp edges and fine particulate matter can be created. Sweep up loose material while wearing eye protection, respiratory protection, and gloves as needed to prevent irritation and/or lacerations. Place gathered material in an impermeable container and label appropriately.

6.2. Refer to Sections 5 and 8 for personal protective equipment requirements.

6.3. Refer to Sections 13 and 15 for possible additional guidance regarding regulatory requirements.

Section 7. Handling & Storage

7.1. Use normal good material and housekeeping practices to avoid breakage.

7.2. Always disconnect power before installing, inspecting, removing or replacing bulbs.

7.3. After disconnecting power allow sufficient time for bulb to cool before attempting to make contact. Heat resistant gloves may be suggested for additional safety.

7.4. Follow NFPA 654 (dusts) and 484 for metal dust for managing dust hazards.

Section 8. Exposure Controls/Personal Protection

8.1. Appropriate Engineering Controls:
Do not use any light bulb in applications where humans and/or animals will be subjected to direct long-term uncomfortable visual exposure to light emissions as this could result in eye injury. If bulb appears damaged, remove power and then repair or replace the product before returning it to service. If any materials are to be processed in such a manner as to create particulates (mechanical breaking as part of end of product life disposal and recycling), use exhaust ventilation and/or wet working methods to minimize release of particulate to workroom air and employee breathing

8.2. Personal Protective Equipment

8.2.1. Respiratory:
None required under normal use conditions. Appropriate local ventilation or an air purifying respirator should be used if the articles are being abraded or reduced in size using mechanical methods.

8.2.2. Skin Protection:

8.2.2.1. If risk of breakage is present impermeable and/or cut resistant gloves should be worn.

8.2.2.2. Operating light bulbs are hot. Use of temperature resistant gloves is recommended.
Always allow sufficient time for product to cool prior to touching.

8.2.3. Eye/Face Protection:
Wear safety glasses with side shields to avoid chance of product getting into unprotected eye. If service personnel need to work with a lit bulb without light diffusers and/or filters installed, appropriate light filtering eye wear should be used.

8.3. General Hygiene Considerations:
Workers should wash their face and hands prior to eating, drinking, or smoking.

8.4. Additional Exposure Information: Not Applicable

Section 9. Physical and Chemical Properties

9.1. Physical form: Solid

9.2. Color: Opaque/Translucent

9.3.	Odor	Little / none
9.4.	Odor threshold:	Not applicable/determined
9.5.	pH:	Not applicable/determined
9.6.	Sublimes at:	Not applicable/determined
9.7.	Decomposition temperature:	No vapor expected
9.8.	Evaporation rate:	0
9.9.	Relative density (g/cc):	Not applicable/determined
9.10.	Vapor density (air = 1):	No vapor expected
9.11.	Fat solubility (mg/kg, °C):	Not applicable/determined
9.12.	Water solubility (mg/kg °C):	Not applicable/determined
9.13.	Partition coefficient (low Pow):	Not applicable/determined
9.14.	Flammability:	Not applicable/determined
	Flash point (°C):	Not applicable/determined
	Explosivity limits (% v/v):	Not applicable/determined
9.15.	Auto-ignition temperature (°C):	Not applicable/determined
9.16.	Volatility by Weight:	<0.01%
9.17.	Oxidizing properties:	None known
9.18.	Other physical-chemical properties:	None known
9.19.	Viscosity:	Solid

Section 10. Stability and Reactivity

10.1.	Reactivity:	Normally stable
10.2.	Chemical Stability:	Normally stable
10.3.	Hazardous polymerization Conditions:	Will not occur

10.4. Conditions to avoid:
Rapid temperature change may result in broken envelope.

10.5. Materials to Avoid (incompatible):
Because of heat generated by bulb during operation flammable materials and objects adversely affected by heating or drying action should be avoided.

Section 11. Toxicological Information

11.1.	Acute toxicity oral:	None known
11.2.	Carcinogenicity:	

11.2.1. Some components may contain carcinogens listed by IARC, but these quantities typically are well below 0.1% of the total.

11.3.	Acute toxicity inhalation:	None known
11.4.	Skin irritation / corrosion:	None known
11.5.	Serious damage to eyes / eye irritation:	None known
11.6.	Skin and respiratory sensitization:	None known

11.7.	Specific target organ toxicity following single or repeated exposure:	None known
11.8.	Toxicity following single exposure:	
	Oral:	None known
	Inhalation:	None known
11.9.	Toxicity repeated exposure:	None known
11.10.	Reproductive toxicity:	Not applicable/determined
11.11.	STOT - single exposure:	Not applicable/determined
11.12.	STOT - repeated exposure:	Not applicable/determined
11.13.	Aspiration hazard:	Not applicable/determined

Section 12. Ecological Information

12.1.	Air:	Atmospheric contamination should not occur
12.2.	Water:	Solid; little to no solubility; may sink in water
12.3.	Soil:	Transformation in landfill unlikely
12.4.	Degradation:	not biodegradable
12.5.	Toxicity to water organisms:	unlikely/low risk
12.6.	Toxicity to soil organisms:	unlikely/low risk
12.7.	Bioaccumulation:	Solid; little to no solubility
12.8.	Water treatment plants:	Solid; little to no solubility; unlikely to affect bacteria

Section 13. Disposal Considerations

13.1. Normal precautions should be taken for the collection of glass particles in the event a lamp is broken.

13.2. All disposal options should be evaluated with respect to federal, state, and local requirements. Before disposing of waste lamps, check with federal, state, and/or local officials for current guidelines and regulations. Damar encourages recycling of its products through qualified recycling facilities.

Section 14. Transport Information

14.1. This material is not classified as a hazardous material or dangerous good by the U.S. Department of Transportation, the International Air Transport Association, or the International Maritime Organization

Section 15. Regulatory Information

15.1. The contents of this SDS comply with United Nations (GHS) or Globally Harmonized System of Classification and Labeling of Chemicals.

15.2. U.S. California Safe Drinking Water & Toxic Enforcement Act (Proposition 65): This product may contain chemicals or product chemicals when heated known to the state of California to cause cancer, birth defects, or other reproductive harm.

15.3. Section 302 Extremely Hazardous Substances (40 CFR 355): None

15.4. Section 304 CERCLA Hazardous Substances (40 CFR 302): None

15.5. Section 311/312 Hazard Class (40 CFR 370):

15.5.1. Acute: No

15.5.2. Chronic: No

15.5.3. Fire: No

15.5.4. Pressure: No

15.5.5. Reactive: No

15.6. Section 311 Toxic Chemicals (40 CFR 372):
None present in a regulated quantity nor intentionally added

15.7. As an article, these mercury-containing lamps, when shipped in the manufacturer's original packaging, may be regulated for air, truck, or ocean shipment. As a waste, these lamps may be regulated in various states and local communities.

Section 16. Other Information

16.1. Preparer: Damar Worldwide 4 LLC, Technical and Testing Department

16.2. Disclaimer:
The information contained in this Material Safety Data Sheet is supplied in conformity with 29 CFR 1910.1200 of the OSHA Hazard Communication Standard. The information set forth herein is presented in good faith and believed to be correct. No representations are made as to the completeness or accuracy thereof. The purchaser is solely responsible for compliance with all applicable laws and regulations concerning the use of this product. Neither Preparer nor Company assumes any liability or responsibility for its use.

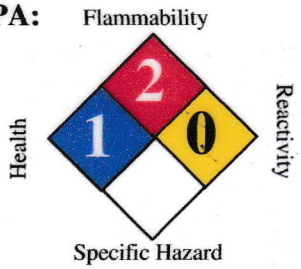
Safety Data Sheets: Jet Fuel; Marine Gas Oil (MGO)

Waste Stream: Fuel

EPA Waste Profile Sheet Number: 20140506-024

Material Safety Data Sheet
Jet Fuel

NFPA:



TESORO

HMIS III:

HEALTH	1
FLAMMABILITY	2
PHYSICAL	0

0 = Insignificant, 1 = Slight, 2 = Moderate, 3 = High, 4 = Extreme

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Jet Fuel

Synonyms : Jet Fuel - A, B, A-I, A-50, High Sulfur, Military, Jet A & B Aviation Turbine Fuel, Jet A-I, Jet A; Avjet For Blending; Jet Q Turbine Fuel, Aviation Fuel; Turbine Fuel; JP-4; JP-5; JP-8, Av-Jet, 888100004452

MSDS Number : 888100004452 **Version** : 2.12

Product Use Description : Fuel

Company : For: Tesoro Refining & Marketing Co.
19100 Ridgewood Parkway, San Antonio, TX 78259

Tesoro Call Center : (877) 783-7676 **Chemtrec (Emergency Contact)** : (800) 424-9300

SECTION 2. HAZARDS IDENTIFICATION

Emergency Overview

Regulatory status : This material is considered hazardous by the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard (29 CFR 1910.1200).

Signal Word : WARNING

Hazard Summary : Harmful or fatal if swallowed. Harmful by inhalation. Irritating to eyes, respiratory system and skin. Affects central nervous system. Flammable.

Potential Health Effects

Eyes : Severe eye irritant. Contact may cause stinging, watering, redness, swelling, and eye damage.

Skin : Prolonged or repeated skin contact with liquid may cause defatting resulting in drying, redness and possible blistering. Practically non-toxic if absorbed following acute (single) exposure. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are repeatedly exposed.

Ingestion : Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest and death may occur.

Inhalation : Inhalation of fumes or mist may result in respiratory tract irritation and central

nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death. WARNING: the burning of any hydrocarbon as a fuel in an area without adequate ventilation may result in hazardous levels of combustion products, including carbon monoxide, and inadequate oxygen levels, which may cause unconsciousness, suffocation, and death.

Chronic Exposure : Similar products produced skin cancer and systemic toxicity in laboratory animals following repeated applications. The significance of these results to human exposures has not been determined - see Section 11 Toxicological Information.

Target Organs : Eyes, Skin, Respiratory system, Irritation from skin exposure may aggravate existing open wounds, skin disorders, and dermatitis (rash)

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Weight %
Kerosene (petroleum)	8008-20-6	100%
Naphthalene	91-20-3	0 to 3%
Ethyl Benzene	100-41-4	0 to 1%
Trimethy Benzene	95-63-6	0 to 1%
Ethyl Benzene	100-41-4	0 to 1%
Diethylene Glycol Monomethyl Ether	111-77-3	0 to 0.15%
Alkyl Dithiothiadiazole	N/A	0 to 15%

SECTION 4. FIRST AID MEASURES

Inhalation : If inhaled, remove to fresh air. If not breathing, give artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

Skin contact : Take off all contaminated clothing immediately. Wash off immediately with soap and plenty of water. Wash contaminated clothing before re-use. If skin irritation persists, seek medical attention.

Eye contact : In case of eye contact, remove contact lens and rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Seek medical attention immediately.

Ingestion : Do NOT induce vomiting. Do not give liquids. Seek medical attention immediately. If vomiting does occur naturally, keep head below the hips to reduce the risks of aspiration. Monitor for breathing difficulties. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

Notes to physician : Symptoms: Aspiration may cause pulmonary edema and pneumonitis. Treatment: Do not induce vomiting, use gastric lavage only. Remove from further exposure and treat symptomatically.

SECTION 5. FIRE-FIGHTING MEASURES

Form	:	Liquid
Flash point	:	38 °C (100 °F) minimum
Auto Ignition temperature	:	210 °C (410 °F)
Lower explosive limit	:	0.7 %(V)
Upper explosive limit	:	5.0 %(V)
Suitable extinguishing media	:	Carbon dioxide (CO2), Water spray, Dry chemical, Foam, Keep containers and surroundings cool with water spray., Do not use a solid water stream as it may scatter and spread fire., Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.
Specific hazards during fire fighting	:	Fire Hazard. Do not use a solid water stream as it may scatter and spread fire. Cool closed containers exposed to fire with water spray. Sealed containers may rupture when heated. Above the flash point, explosive vapor-air mixtures may be formed. Vapors can flow along surfaces to distant ignition source and flash back.
Special protective equipment for fire-fighters	:	Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing.
Further information	:	Exposure to decomposition products may be a hazard to health. Standard procedure for chemical fires.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions	:	ACTIVATE FACILITY'S SPILL CONTINGENCY OR EMERGENCY RESPONSE PLAN if applicable. Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to contain spill areas. Spills may infiltrate subsurface soil and groundwater; professional assistance may be necessary to determine the extent of subsurface impact.
Environmental precautions	:	Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection.
Methods for cleaning up	:	Take up with sand or oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

SECTION 7. HANDLING AND STORAGE

Handling	:	Keep away from fire, sparks and heated surfaces. No smoking near areas where material is stored or handled. The product should only be stored and handled in areas with intrinsically safe electrical classification.

Advice on protection against fire and explosion : Hydrocarbon liquids including this product can act as a non-conductive flammable liquid (or static accumulators), and may form ignitable vapor-air mixtures in storage tanks or other containers. Precautions to prevent static-initated fire or explosion during transfer, storage or handling, include but are not limited to these examples:

(1) Ground and bond containers during product transfers. Grounding and bonding may not be adequate protection to prevent ignition or explosion of hydrocarbon liquids and vapors that are static accumulators.

(2) Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil or diesel) is loaded into tanks previously containing low flash point products (such gasoline or naphtha).

(3) Storage tank level floats must be effectively bonded.

For more information on precautions to prevent static-initated fire or explosion, see NFPA 77, Recommended Practice on Static Electricity (2007), and API Recommended Practice 2003, Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents (2008).

Dust explosion class : Not applicable

Requirements for storage areas and containers : Keep away from flame, sparks, excessive temperatures and open flame. Use approved containers. Keep containers closed and clearly labeled. Empty or partially full product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose containers to sources of ignition. Store in a well-ventilated area. The storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

Advice on common storage : Keep away from food, drink and animal feed. Incompatible with oxidizing agents. Incompatible with acids.

Other data : Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

List	Components	CAS-No.	Type:	Value
OSHA Z1	Naphthalene	91-20-3	PEL	10 ppm 50 mg/m3
	Ethyl Benzene	100-41-4	PEL	100 ppm 435 mg/m3
ACGIH	Naphthalene	91-20-3	TWA	10 ppm
		91-20-3	STEL	15 ppm
	Kerosene (petroleum)	8008-20-6	TWA	200 mg/m3
	Ethyl Benzene	100-41-4	TWA	100 ppm 434 mg/m3
			STEL	125 ppm 543 mg/m3

Protective measures : Keep out of reach of children.

Engineering measures : Use only intrinsically safe electrical equipment approved for use in classified areas. Emergency eye wash capability should be available in the vicinity of any potential splash exposure.

Eye protection	:	Goggles and face shield as needed to prevent eye and face contact.
Hand protection	:	Gloves constructed of nitrile, neoprene, or PVC are recommended.
Skin and body protection	:	Chemical protective clothing such as DuPont TyChem ®, Barricade or equivalent, recommended based on degree of exposure. Consult manufacturer specifications for further information.
Respiratory protection	:	NIOSH/MSHA approved positive-pressure self-contained breathing apparatus (SCBA) or Type C positive-pressure supplied air with escape bottle must be used for gas concentrations above occupational exposure limits, for potential of uncontrolled release, if exposure levels are not known, or in an oxygen-deficient atmosphere.
Work / Hygiene practices	:	Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Form	:	Liquid
Appearance	:	Light yellow to white
Odor	:	Characteristic Petroleum distillate
Flash point	:	38 °C (100 °F) minimum
Auto Ignition temperature	:	210 °C (410 °F)
Thermal decomposition	:	No decomposition if stored and applied as directed.
Lower explosive limit	:	0.7 %(V)
Upper explosive limit	:	5.0 %(V)
pH	:	Not applicable
Specific gravity	:	0.8 (H20=1)
Freezing point	:	-45°C to -62°C (-50°F to -80°F)
Boiling Range	:	160 - 300 °C(320 - 572 °F)
Vapor Pressure	:	6.9 hPa at 20 °C (68 °F)
Relative Vapor Density	:	4.5
Density	:	0.8 g/cm3
Water solubility	:	Insoluble
Viscosity, kinematic	:	1.6 mm2/s at 40 °C (104 °F)

Percent Volatiles	:	100 %
Conductivity (conductivity can be reduced by environmental factors such as a decrease in temperature)		Diesel Fuel Oils at terminal load rack: At least 25 pS/m Ultra Low Sulfur Diesel (ULSD) without conductivity additive: 0 pS/m to 5 pS/m ULSD at terminal load rack with conductivity additive: At least 50 pS/m but conductivity may decrease from environmental factors such as temperature drop. JP-8 at terminal load rack: 150 pS/m to 600 pS/m

SECTION 10. STABILITY AND REACTIVITY

Conditions to avoid	:	Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources. Keep away from strong oxidizers.
Materials to avoid	:	Keep away from strong oxidizers such as nitric and sulfuric acids.
Hazardous decomposition products	:	Risk of explosion. In case of fire hazardous decomposition products may be produced such as: Smoke. Hydrocarbons. Carbon Monoxide and Carbon Dioxide.
Thermal decomposition	:	No decomposition if stored and applied as directed.
Hazardous reactions	:	Stable under normal conditions of use; however, incompatible with strong acids and strong oxidizers.

SECTION 11. TOXICOLOGICAL INFORMATION

Carcinogenicity

NTP	:	Naphthalene (CAS-No.: 91-20-3)
IARC	:	Kerosene is not listed as carcinogenic by NTP, OSHA, and ACGIH. IARC has listed kerosene as a probable human carcinogen. naphthalene (CAS-No.: 91-20-3) Kerosene (petroleum) (CAS-No.: 8008-20-6)
CA Prop 65	:	WARNING! This product contains a chemical known to the State of California to cause cancer. Naphthalene (CAS-No.: 91-20-3)
Skin irritation	:	Irritating to skin.
Eye irritation	:	Irritating to eyes.
Further information	:	Kerosene does not have a measurable effect on human reproduction or development. Kerosene is not listed as carcinogenic by NTP, OSHA, and ACGIH. IARC has listed kerosene as a probable human carcinogen. Some petroleum distillates have been found to cause adverse reproductive effects in laboratory animals. Acute and chronic exposure to kerosene may result in CNS effects including irritability, restlessness, ataxia, drowsiness, convulsions, coma and death. The most common health effect associated with chronic kerosene exposure is dermatitis.

Component:

Kerosene (petroleum)	8008-20-6	Acute oral toxicity LD50 rat Dose: 5 mg/kg Acute dermal toxicity LD50 rabbit Dose: 2,001 mg/kg

		Acute inhalation toxicity: LC50 rat Dose: 5.28 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation
Naphthalene	91-20-3	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute dermal toxicity: LD50 rat Dose: 2,501 mg/kg Acute inhalation toxicity: LC50 rat Dose: 101 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Carcinogenicity: N11.00422130

SECTION 12. ECOLOGICAL INFORMATION

Additional ecological information : Release of this product should be prevented from contaminating soil and water and from entering drainage and sewer systems. U.S.A. regulations require reporting spills of this material that could reach any surface waters. The toll free number for the U.S. Coast Guard National Response Center is (800) 424-8802. Naphthalene (91-20-3) one of the ingredients in this mixture is classified as a Marine Pollutant.

Component:

Naphthalene	91-20-3	Toxicity to algae: EC50 Species: Dose: 33 mg/l Exposure time: 24 h

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal : Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility.
Processing, use or contamination of this product may change the waste management options.
State and local disposal regulations may differ from federal disposal regulations.
Dispose of container and unused contents in accordance with federal, state and local requirements.

SECTION 14. TRANSPORT INFORMATION

CFR

Proper shipping name	: Fuel, aviation, turbine engine
UN-No.	: 1863
Class	: 3
Packing group	: III

TDG

Proper shipping name	:	Fuel, aviation, turbine engine
UN-No.	:	UN1863
Class	:	3
Packing group	:	III

IATA Cargo Transport

UN UN-No.	:	UN1863
Description of the goods	:	Fuel, aviation, turbine engine
Class	:	3
Packaging group	:	III
ICAO-Labels	:	3
Packing instruction (cargo aircraft)	:	366
Packing instruction (cargo aircraft)	:	Y344

IATA Passenger Transport

UN UN-No.	:	UN1863
Description of the goods	:	Fuel, aviation, turbine engine
Class	:	3
Packaging group	:	III
ICAO-Labels	:	3
Packing instruction (passenger aircraft)	:	355
Packing instruction (passenger aircraft)	:	Y344

IMDG-Code

UN-No.	:	UN 1863
Description of the goods	:	Fuel, aviation, turbine engine
Class	:	3
Packaging group	:	III
IMDG-Labels	:	3
EmS Number	:	F-E S-E
Marine pollutant	:	Yes

SECTION 15. REGULATORY INFORMATION

OSHA Hazards	:	Toxic by inhalation. Highly toxic by ingestion Moderate skin irritant Severe eye irritant Combustible
TSCA Status	:	On TSCA Inventory
DSL Status	:	All components of this product are on the Canadian DSL list.
SARA 311/312 Hazards	:	Acute Health Hazard Chronic Health Hazard Fire Hazard

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIROMENT)

The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil. Fractions of crude oil, and products (both finished and intermediate) from the crude oil refining process and any indigenous components of such from the CERCLA Section 103 reporting requirements. However, other federal reporting requirements, including SARA Section 304, as well as the Clean Water Act may still apply.

California Prop. 65 : WARNING! This product contains a chemical known to the State of California to cause cancer.

Naphthalene 91-20-3

SECTION 16. OTHER INFORMATION

Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

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Revision Date : 01/27/2011

40, 41, 42, 43, 44, 45, 60, 113, 137, 138, 139, 140, 141, 142, 263, 285, 1048, 1117, 1137, 1138, 1546

MATERIAL SAFETY DATA SHEET

(SOLAS regulation VI/5-1 format)

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: **MARINE GAS OIL**
Alternate Product Name: MGO - DMA
Product Description: Hydrocarbons and Additives
Product Code: 708441
Intended Use: Fuel
MARPOL Annex I Category: Gas oils, including ship's bunkers
See Section 14 for transportation information related to the Bill of Lading, other shipping documents

COMPANY IDENTIFICATION

Country	Company	Emergency Telephone Number
International Sales	ExxonMobil Marine Fuels Ermyn House MP 31 Ermyn Way Leatherhead, KT22 8UX UK	(UK) (+44) (0) 23 8089 1558
Belgium	ExxonMobil Petroleum & Chemical BVBA Polderdijkweg Haven 447 - 2030 Antwerpen, Belgium	+32 (0) 487 545 780
Canada	Imperial Oil 505 Quarry Park Boulevard SE Calgary, AB T2C 5N1 Canada	1-866-232-9563
France	Esso SAF Tour Manhattan La Defense 2 5/6 Place de l'Iris 92400 Courbevoie France	+33 08 1000 3353
Hong Kong	ExxonMobil Hong Kong Limited: 2201, 22/F, Central Plaza 18 Harbour Road, Wanchai, Hong Kong	+1 609 737 4411
Italy	Esso Italiana SRL Viale Castello della Magliana 25 Rome 00148 Italy	+39 0382 24444
Netherlands	Esso Nederland BV Graaf Engelbertlaan 75 4837 DS Breda The Netherlands	+32 (0) 487 545 780
New Zealand	Mobil Oil New Zealand Limited Vero Centre 48 Shortland Street Auckland 1140 New Zealand	National Poison Center +64 3 479 7248 Freephone 0800 764 766
Norway	Esso Norge AS Drammensveien 149 Skøyen N-0213	Emergency: (NO) +47 33 37 73 00 Poison: (NO) +47 22 59 13 00

	Oslo, Norway	
Singapore	ExxonMobil Asia Pacific Pte Limited 1 HarbourFront Place #06-00 HarbourFront Tower One Singapore 098633	01-609-737-4411
Thailand	Esso (Thailand) Public Company Limited 3195/17-29 Rama 4 Road, Klong Ton, Klong Toey District Bangkok, Thailand 10110	+1-609-737-4411
United Kingdom	Esso Petroleum Company Limited Ermyn House MP 31 Ermyn Way Leatherhead, KT22 8UX UK	+32 (0) 487 545 780
United States	ExxonMobil Oil Corporation 22777 Springwoods Village Parkway Spring, TX 77389 USA	+1 609 737 4411

This (M)SDS is a document with no country specific information included.

SECTION 2 HAZARDS IDENTIFICATION

This material is hazardous according to UN GHS Criteria. Classification includes all GHS hazard classes. For hazard categories with two cut-off/concentration limits, classification was based on the higher limit.

GHS CLASSIFICATION:

Flammable liquid: Category 3.
Acute inhalation toxicant: Category 4.
Skin irritation: Category 2.
Carcinogen: Category 2.
Specific target organ toxicant (repeated exposure): Category 2.
Aspiration toxicant: Category 1.
Acute aquatic toxicant: Category 2.
Chronic aquatic toxicant: Category 2.

GHS Label Elements:
Pictogram:

Signal Word: Danger

Hazard Statements:

Physical: H226: Flammable liquid and vapour.
Health: H304: May be fatal if swallowed and enters airways. H315: Causes skin irritation. H332: Harmful if inhaled. H351: Suspected of causing cancer. H373: May cause damage to organs through prolonged or repeated exposure.
Environmental: H411: Toxic to aquatic life with long lasting effects.

Precautionary Statements:

Prevention: P201: Obtain special instructions before use. P202: Do not handle until all safety precautions have been read and understood. P210: Keep away from heat/sparks/open flames/hot surfaces. -- No smoking. P233: Keep container tightly closed. P240: Ground/bond container and receiving equipment. P241: Use explosion-proof electrical, ventilating and lighting equipment. P242: Use only non-sparking tools. P243: Take precautionary measures against static discharge. P260: Do not breathe mist / vapours. P264: Wash skin thoroughly after handling. P271: Use only outdoors or in a well-ventilated area. P273: Avoid release to the environment. P280: Wear protective gloves/protective clothing/eye protection/face protection.
Response: P301 + P310: IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. P302 + P352: IF ON SKIN: Wash with plenty of soap and water. P303 + P361 + P353: IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. P304 + P340: IF INHALED: Remove person to fresh air and keep comfortable for breathing. P308 + P313: IF exposed or concerned: Get medical advice/attention. P312: Call a POISON CENTER or doctor/physician if you feel unwell. P331: Do NOT induce vomiting. P332 + P313: If skin irritation occurs: Get medical advice/attention. P362 + P364: Take off contaminated clothing and wash it before reuse. P370 + P378: In case of fire: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish. P391: Collect spillage.
Storage: P403 + P235: Store in a well-ventilated place. Keep cool. P405: Store locked up.
Disposal: P501: Dispose of contents and container in accordance with local regulations.

Contains: FUELS, DIESEL

Other hazard information:

PHYSICAL / CHEMICAL HAZARDS

Material can accumulate static charges which may cause an ignition. Material can release vapours that readily form flammable mixtures. Vapour accumulation could flash and/or explode if ignited.

HEALTH HAZARDS

High-pressure injection under skin may cause serious damage. Under conditions of poor personal hygiene and prolonged repeated contact, some polycyclic aromatic compounds (PACs) have been suspected as a cause of skin cancer in humans. Hydrogen sulphide, a highly toxic gas, may be present. Signs and symptoms of overexposure to hydrogen sulphide include respiratory and eye irritation, dizziness, nausea, coughing, a sensation of dryness and pain in the nose, and loss of consciousness. Odour does not provide a reliable indicator of the presence of hazardous levels in the atmosphere. May be irritating to the eyes, nose, throat, and lungs.

ENVIRONMENTAL HAZARDS

No additional hazards.

NOTE: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

This material is defined as a mixture.

Hazardous Substance(s) or Complex Substance(s) required for disclosure

Name	CAS#	Concentration*	GHS Hazard Codes
FUELS, DIESEL	68334-30-5	> 99 %	H227, H304, H332, H351,

			H315, H373, H401, H411

Hazardous Constituent(s) Contained in Complex Substance(s) required for disclosure

Name	CAS#	Concentration*	GHS Hazard Codes
Hydrogen sulphide	7783-06-4	< 0.0002%	H220, H280, H330(2), H400(M factor 1)

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

NOTE: Composition may contain up to 0.5% performance additives and / or dyes.

SECTION 4 FIRST AID MEASURES

INHALATION

Immediately remove from further exposure. Get immediate medical assistance. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. Give supplemental oxygen, if available. If breathing has stopped, assist ventilation with a mechanical device.

SKIN CONTACT

Remove contaminated clothing. Dry wipe exposed skin and cleanse with waterless hand cleaner and follow by washing thoroughly with soap and water. For those providing assistance, avoid further skin contact to yourself or others. Wear impervious gloves. Launder contaminated clothing separately before reuse. Discard contaminated articles that cannot be laundered. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

EYE CONTACT

Flush thoroughly with water. If irritation occurs, get medical assistance.

INGESTION

Seek immediate medical attention. Do not induce vomiting.

ACUTE AND DELAYED SYMPTOMS/EFFECTS

See Toxicological Section

NOTE TO PHYSICIAN

If ingested, material may be aspirated into the lungs and cause chemical pneumonitis. Treat appropriately.

PRE-EXISTING MEDICAL CONDITIONS WHICH MAY BE AGGRAVATED BY EXPOSURE

Contains hydrocarbon solvent/petroleum hydrocarbons; skin contact may aggravate an existing dermatitis.

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

Appropriate Extinguishing Media: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

Inappropriate Extinguishing Media: Straight streams of water

FIRE FIGHTING

Fire Fighting Instructions: Evacuate area. Prevent run-off from fire control or dilution from entering streams, sewers or drinking water supply. Fire-fighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

Unusual Fire Hazards: Hazardous material. Firefighters should consider protective equipment indicated in Section 8.

Hazardous Combustion Products: Aldehydes, Incomplete combustion products, Oxides of carbon, Smoke, Fume, Sulphur oxides

FLAMMABILITY PROPERTIES

Flash Point [Method]: >=60°C (140°F) [Typical]
Flammable Limits (Approximate volume % in air): LEL: 1.0 UEL: 6.0
Autoignition Temperature: >250°C (482°F)

SECTION 6 ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations.

PROTECTIVE MEASURES

Avoid contact with spilled material. Warn or evacuate occupants in surrounding and downwind areas if required, due to toxicity or flammability of the material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for advice on the minimum requirements for personal protective equipment. Additional protective measures may be necessary, depending on the specific circumstances and/or the expert judgment of the emergency responders.

For emergency responders: Respiratory protection: half-face or full-face respirator with filter(s) for organic vapor and, when applicable, H2S, or Self Contained Breathing Apparatus (SCBA) can be used depending on the size of spill and potential level of exposure. If the exposure cannot be completely characterized or an oxygen deficient atmosphere is possible or anticipated, SCBA is recommended. Work gloves that are resistant to aromatic hydrocarbons are recommended. Note: gloves made of polyvinyl acetate (PVA) are not water-resistant and are not suitable for emergency use. Chemical goggles are recommended if splashes or contact with eyes is possible. Small spills: normal antistatic work clothes are usually adequate. Large spills: full body suit of chemical resistant, antistatic material is recommended.

SPILL MANAGEMENT

Land Spill: Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Stop leak if you can do so without risk. All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Prevent entry into waterways, sewer, basements or confined areas. A vapour-suppressing foam may be used to reduce vapour. Use clean non-sparking tools to collect absorbed material. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Large Spills: Water spray may reduce vapour, but may not prevent ignition in enclosed spaces.

Water Spill: Stop leak if you can do so without risk. Confine the spill immediately with booms. Warn other shipping. Remove from the surface by skimming or with suitable absorbents. Seek the advice of a specialist before using dispersants.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction

and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS

Large Spills: Dyke far ahead of liquid spill for later recovery and disposal. Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7 HANDLING AND STORAGE

HANDLING

Avoid all personal contact. Do not siphon by mouth. Harmful amounts of H2S may be present. The toxic and olfactory (sense of smell) fatigue properties of hydrogen sulfide require that air monitoring alarms and respiratory protection be used where the concentration might be expected to reach a harmful level, such as in an enclosed space, heated transport vessel, or in a spill or leak situation.

Do not use as a cleaning solvent or other non-motor fuel uses. For use as a motor fuel only. It is dangerous and/or unlawful to put petrol into unapproved containers. Do not fill container while it is in or on a vehicle. Static electricity may ignite vapour and cause fire. Place container on ground when filling and keep nozzle in contact with container. Do not use electronic devices (including but not limited to cellular phones, computers, calculators, pagers or other electronic devices etc) in or around any fuelling operation or storage area unless the devices are certified intrinsically safe by an approved national testing agency and to the safety standards required by national and/or local laws and regulations. Prevent small spills and leakage to avoid slip hazard. Material can accumulate static charges which may cause an electrical spark (ignition source). Use proper bonding and/or ground procedures. However, bonding and grounds may not eliminate the hazard from static accumulation. Consult local applicable standards for guidance. Additional references include American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practice on Static Electricity) or CENELEC CLC/TR 50404 (Electrostatics - Code of practice for the avoidance of hazards due to static electricity).

Static Accumulator: This material is a static accumulator. A liquid is typically considered a nonconductive, static accumulator if its conductivity is below 100 pS/m (100x10E-12 Siemens per meter) and is considered a semiconductive, static accumulator if its conductivity is below 10,000 pS/m. Whether a liquid is nonconductive or semiconductive, the precautions are the same. A number of factors, for example liquid temperature, presence of contaminants, anti-static additives and filtration can greatly influence the conductivity of a liquid.

STORAGE

The type of container used to store the material may affect static accumulation and dissipation. Keep container closed. Handle containers with care. Open slowly in order to control possible pressure release. Store in a cool, well-ventilated area. Storage containers should be earthed and bonded. Fixed storage containers, transfer containers and associated equipment should be earthed and bonded to prevent accumulation of static charge. Keep away from incompatible materials.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMIT VALUES

Exposure limits/standards (Note: Exposure limits are not additive)

Substance Name	Form	Limit/Standard			Note	Source	Year
FUELS, DIESEL	Stable Aerosol.	TWA	5 mg/m3		Skin	ExxonMobil	2019
FUELS, DIESEL	Vapour.	TWA	200 mg/m3		Skin	ExxonMobil	2019

FUELS, DIESEL [total hydrocarb, vapour&aerosol]	Inhalable fraction and vapour	TWA	100 mg/m3		Skin	ACGIH	2018
Hydrogen sulphide		STEL	14 mg/m3	10 ppm		ExxonMobil	2019
Hydrogen sulphide		TWA	7 mg/m3	5 ppm		ExxonMobil	2019

Biological limits

No biological limits allocated.

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:

Use explosion-proof ventilation equipment to stay below exposure limits.

PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:

Positive-pressure, air-supplied respirator in areas where H2S vapours may accumulate is recommended.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapour warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:

Chemical resistant gloves are recommended. If contact with forearms is likely wear gauntlet style gloves. Nitrile,Viton

Eye Protection: If contact with material is likely, chemical goggles are recommended.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:

Chemical/oil resistant clothing is recommended.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

ENVIRONMENTAL CONTROLS

Comply with applicable environmental regulations limiting discharge to air, water and soil. Protect the environment by applying appropriate control measures to prevent or limit emissions.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Note: Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications. Contact the Supplier for additional information.

GENERAL INFORMATION

Physical State: Liquid
Colour: Amber
Odour: Petroleum/Solvent
Odour Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 15 °C): 0.8 - 0.89
Flammability (Solid, Gas): N/A
Flash Point [Method]: >=60°C (140°F) [Typical]
Flammable Limits (Approximate volume % in air): LEL: 1.0 UEL: 6.0
Autoignition Temperature: >250°C (482°F)
Boiling Point / Range: > 180°C (356°F)
Decomposition Temperature: N/D
Vapour Density (Air = 1): > 2 at 101 kPa
Vapour Pressure: < 0.04 kPa (0.3 mm Hg) at 20 °C
Evaporation Rate (n-butyl acetate = 1): N/D
pH: N/D
Log Pow (n-Octanol/Water Partition Coefficient): > 3.5
Solubility in Water: Negligible
Viscosity: 1.5 cSt (1.5 mm2/sec) at 40ºC - 6 cSt (6 mm2/sec) at 40ºC
Oxidizing Properties: See Hazards Identification Section.

OTHER INFORMATION

Freezing Point: N/D
Melting Point: N/A
Pour Point: < 0°C (32°F)

SECTION 10 STABILITY AND REACTIVITY

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: Open flames and high energy ignition sources.

MATERIALS TO AVOID: Alkalies, Halogens, Strong Acids, Strong Bases, Strong oxidisers

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

POSSIBILITY OF HAZARDOUS REACTIONS: Hazardous polymerization will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

Route of Exposure	Conclusion / Remarks
Inhalation	
Toxicity (Rat): LC50 4100 mg/m3	Moderately toxic. Based on test data for structurally similar materials.
Irritation: No end point data for material.	Elevated temperatures or mechanical action may form vapours, mist, or fumes which may be irritating to the eyes, nose, throat, or lungs.
Ingestion	
Toxicity (Rat): LD50 > 5000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Skin	
Toxicity (Rabbit): LD50 > 5000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Irritation (Rabbit): Data available.	Irritating to the skin. Based on test data for structurally similar materials.
Eye	
Irritation (Rabbit): Data available.	May cause mild, short-lasting discomfort to eyes. Based on test data for structurally similar materials.

OTHER HEALTH EFFECTS FROM SHORT AND LONG TERM EXPOSURE
Anticipated health effects from sub-chronic, chronic, respiratory or skin sensitization, mutagenicity, reproductive toxicity, carcinogenicity, target organ toxicity (single exposure or repeated exposure), aspiration toxicity and other effects based on human experience and/or experimental data.

For the product itself:

Vapour concentrations above recommended exposure levels are irritating to the eyes and the respiratory tract, may cause headaches and dizziness, are anaesthetic and may have other central nervous system effects. Small amounts of liquid aspirated into the lungs during ingestion or from vomiting may cause chemical pneumonitis or pulmonary edema.
Diesel exhaust fumes: Carcinogenic in animal tests. Inhalation exposures to exhaust for 2 years in test animals resulted in lung tumours and lymphoma. Extract of particulate produced skin tumours in test animals. Caused mutations in-vitro. Diesel fuel: Carcinogenic in animal tests. Caused mutations in-vitro. Repeated dermal exposures to high concentrations in test animals resulted in reduced litter size and litter weight, and increased fetal resorptions at maternally toxic doses. Dermal exposure to high concentrations resulted in severe skin irritation with weight loss and some mortality. Inhalation exposure to high concentrations resulted in

respiratory tract irritation, lung changes/infiltration/accumulation, and reduction in lung function.

Contains:

HYDROGEN SULPHIDE: Chronic health effects due to repeated exposures to low levels of H2S have not been established. High level (700 ppm) acute exposure can result in sudden death. High concentrations will lead to cardiopulmonary arrest due to nervous system toxicity and pulmonary edema. Lower levels (150 ppm) may overwhelm sense of smell, eliminating warning of exposure. Symptoms of overexposure to H2S include headache, fatigue, insomnia, irritability, and gastrointestinal problems. Repeated exposures to approximately 25 ppm will irritate mucous membranes and the respiratory system and have been implicated in some eye damage.

IARC Classification:
The following ingredients are cited on the lists below: None.

--REGULATORY LISTS SEARCHED--

1 = IARC 1 2 = IARC 2A 3 = IARC 2B

SECTION 12 ECOLOGICAL INFORMATION

The information given is based on data for the material, components of the material, or for similar materials, through the application of bridging principals.

ECOTOXICITY

Material -- Expected to be toxic to aquatic organisms. May cause long-term adverse effects in the aquatic environment.

MOBILITY

More volatile component -- Highly volatile, will partition rapidly to air. Not expected to partition to sediment and wastewater solids.

High molecular wt. component -- Low solubility and floats and is expected to migrate from water to the land. Expected to partition to sediment and wastewater solids.

PERSISTENCE AND DEGRADABILITY

Biodegradation:

Material -- Expected to be inherently biodegradable

Atmospheric Oxidation:

More volatile component -- Expected to degrade rapidly in air

INTERNATIONAL OIL POLLUTION COMPENSATION (IOPC)

Material is considered a non-persistent oil.

SECTION 13 DISPOSAL CONSIDERATIONS

DISPOSAL METHODS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

MARPOL - see International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) which provides technical aspects at controlling pollutions from ships.

DISPOSAL RECOMMENDATIONS

Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products.

Empty Container Warning Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

SECTION 14 TRANSPORT INFORMATION

SEA (IMDG)

Proper Shipping Name: GAS OIL
Hazard Class & Division: 3
EMS Number: F-E, S-E
UN Number: 1202
Packing Group: III
Marine Pollutant: Yes
Label(s): 3
Transport Document Name: UN1202, GAS OIL, 3, PG III, (60°C c.c.), MARINE POLLUTANT

Note - this material is being carried under the scope of MARPOL Annex I

SECTION 15 REGULATORY INFORMATION

REGULATORY STATUS AND APPLICABLE LAWS AND REGULATIONS

Listed or exempt from listing/notification on the following chemical inventories (May contain substance(s) subject to notification to the EPA Active TSCA inventory prior to import to USA): AICS, DSL, ENCS, IECSC, KECI, PICCS, TSCA

SECTION 16 OTHER INFORMATION

N/D = Not determined, N/A = Not applicable
KEY TO THE H-CODES CONTAINED IN SECTION 3 OF THIS DOCUMENT (for information only):
H220: Extremely flammable gas; Flammable Gas, Cat 1
H227: Combustible liquid; Flammable Liquid, Cat 4
H280: Contains gas under pressure; may explode if heated; Pressurized Gas
H304: May be fatal if swallowed and enters airways; Aspiration, Cat 1
H315: Causes skin irritation; Skin Corr/Irritation, Cat 2

H330(2): Fatal if inhaled; Acute Tox Inh, Cat 2
H332: Harmful if inhaled; Acute Tox Inh, Cat 4
H351: Suspected of causing cancer; GHS Carcinogenicity, Cat 2
H373: May cause damage to organs through prolonged or repeated exposure; Target Organ, Repeated, Cat 2
H400: Very toxic to aquatic life; Acute Env Tox, Cat 1
H401: Toxic to aquatic life; Acute Env Tox, Cat 2
H411: Toxic to aquatic life with long lasting effects; Chronic Env Tox, Cat 2

THIS MATERIAL SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:
Section 01: IMO R&S Emergency Numbers information was modified.
Section 08: Exposure Limits Table information was modified.
Revision Date: 05 Jun 2019

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DGN: 7109765I (1016784)

Safety Data Sheet: Shell Gadinia 30

Waste Stream: Lube Oil

EPA Waste Sheet Profile Number: 20140506-025

Material Safety Data Sheet

1. MATERIAL AND COMPANY IDENTIFICATION

Material Name : **Shell Gadinia 30**
Uses : Engine oil.

Manufacturer/Supplier : **SOPUS Products**
PO BOX 4427
Houston, TX 77210-4427
USA
MSDS Request : 877-276-7285

Emergency Telephone Number
Spill Information : 877-242-7400
Health Information : 877-504-9351

2. COMPOSITION/INFORMATION ON INGREDIENTS

Highly refined mineral oils and additives.
The highly refined mineral oil contains <3% (w/w) DMSO-extract, according to IP346.

3. HAZARDS IDENTIFICATION

Emergency Overview

Appearance and Odour : Brown. Liquid at room temperature. Slight hydrocarbon.

Health Hazards : Not classified as dangerous for supply or conveyance.
Safety Hazards : Not classified as flammable but will burn.
Environmental Hazards : Not classified as dangerous for the environment.

Health Hazards : Not expected to be a health hazard when used under normal conditions.

Health Hazards
Inhalation : Under normal conditions of use, this is not expected to be a primary route of exposure.
Skin Contact : Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis.
Eye Contact : May cause slight irritation to eyes.
Ingestion : Low toxicity if swallowed.
Other Information : Used oil may contain harmful impurities.
Signs and Symptoms : Oil acne/folliculitis signs and symptoms may include formation of black pustules and spots on the skin of exposed areas. Ingestion may result in nausea, vomiting and/or diarrhoea.
Aggravated Medical Conditions : Pre-existing medical conditions of the following organ(s) or organ system(s) may be aggravated by exposure to this material: Skin.

Environmental Hazards	:	Not classified as dangerous for the environment.
Additional Information	:	Under normal conditions of use or in a foreseeable emergency, this product does not meet the definition of a hazardous chemical when evaluated according to the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

4. FIRST AID MEASURES

General Information	:	Not expected to be a health hazard when used under normal conditions.
Inhalation	:	No treatment necessary under normal conditions of use. If symptoms persist, obtain medical advice.
Skin Contact	:	Remove contaminated clothing. Flush exposed area with water and follow by washing with soap if available. If persistent irritation occurs, obtain medical attention.
Eye Contact	:	Flush eye with copious quantities of water. If persistent irritation occurs, obtain medical attention.
Ingestion	:	In general no treatment is necessary unless large quantities are swallowed, however, get medical advice.
Advice to Physician	:	Treat symptomatically.

5. FIRE FIGHTING MEASURES

Clear fire area of all non-emergency personnel.

Flash point	:	> 200 °C / 392 °F (PMCC / ASTM D93)
Upper / lower Flammability or Explosion limits	:	Typical 1 - 10 %(V)(based on mineral oil)
Auto ignition temperature	:	> 320 °C / 608 °F
Specific Hazards	:	Hazardous combustion products may include: A complex mixture of airborne solid and liquid particulates and gases (smoke). Carbon monoxide. Unidentified organic and inorganic compounds.
Suitable Extinguishing Media	:	Foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.
Unsuitable Extinguishing Media	:	Do not use water in a jet.
Protective Equipment for Firefighters	:	Proper protective equipment including breathing apparatus must be worn when approaching a fire in a confined space.

6. ACCIDENTAL RELEASE MEASURES

Avoid contact with spilled or released material. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. See Chapter 13 for information on disposal. Observe the relevant local and international regulations.

Protective measures	:	Avoid contact with skin and eyes. Use appropriate containment to avoid environmental contamination. Prevent from spreading

or entering drains, ditches or rivers by using sand, earth, or other appropriate barriers.

Clean Up Methods : Slippery when spilt. Avoid accidents, clean up immediately. Prevent from spreading by making a barrier with sand, earth or other containment material. Reclaim liquid directly or in an absorbent. Soak up residue with an absorbent such as clay, sand or other suitable material and dispose of properly.

Additional Advice : Local authorities should be advised if significant spillages cannot be contained.

7. HANDLING AND STORAGE

General Precautions : Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols. Properly dispose of any contaminated rags or cleaning materials in order to prevent fires. Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material.

Handling : Avoid prolonged or repeated contact with skin. Avoid inhaling vapour and/or mists. When handling product in drums, safety footwear should be worn and proper handling equipment should be used.

Storage : Keep container tightly closed and in a cool, well-ventilated place. Use properly labelled and closeable containers. Store at ambient temperature.

Recommended Materials : For containers or container linings, use mild steel or high density polyethylene.

Unsuitable Materials : PVC.

Additional Information : Polyethylene containers should not be exposed to high temperatures because of possible risk of distortion.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational Exposure Limits

Material	Source	Type	ppm	mg/m3	Notation
Oil mist, mineral	ACGIH	TWA(Inhalable fraction.)		5 mg/m3	
Oil mist, mineral	OSHA Z1	PEL(Mist.)		5 mg/m3	
Oil mist, mineral	OSHA Z1A	TWA(Mist.)		5 mg/m3	
Oil mist, mineral	OSHA Z1	(Mist.)			Listed.

Additional Information	:	Shell has adopted as Interim Standards the OSHA Z1A values that were established in 1989 and later rescinded.
Exposure Controls	:	The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances. Appropriate measures include: Adequate ventilation to control airborne concentrations. Where material is heated, sprayed or mist formed, there is greater potential for airborne concentrations to be generated.
Personal Protective Equipment	:	Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.
Respiratory Protection	:	No respiratory protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid breathing of material. If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation. Check with respiratory protective equipment suppliers. Where air-filtering respirators are suitable, select an appropriate combination of mask and filter. Select a filter suitable for combined particulate/organic gases and vapours [boiling point >65°C(149 °F)].
Hand Protection	:	Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739) made from the following materials may provide suitable chemical protection: PVC, neoprene or nitrile rubber gloves. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, glove thickness, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended.
Eye Protection	:	Wear safety glasses or full face shield if splashes are likely to occur.
Protective Clothing	:	Skin protection not ordinarily required beyond standard issue work clothes.
Monitoring Methods	:	Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls. For some substances biological monitoring may also be appropriate.
Environmental Exposure Controls	:	Minimise release to the environment. An environmental assessment must be made to ensure compliance with local environmental legislation.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Brown. Liquid at room temperature.
Odour	:	Slight hydrocarbon.
pH	:	Not applicable.
Initial Boiling Point and Boiling Range	:	> 280 °C / 536 °F estimated value(s)
Pour point	:	Typical -18 °C / 0 °F
Flash point	:	> 200 °C / 392 °F (PMCC / ASTM D93)
Upper / lower Flammability or Explosion limits	:	Typical 1 - 10 %(V) (based on mineral oil)
Auto-ignition temperature	:	> 320 °C / 608 °F
Vapour pressure	:	< 0.5 Pa at 20 °C / 68 °F (estimated value(s))
Specific gravity	:	Typical 0.897 at 15 °C / 59 °F
Density	:	Typical 897 kg/m3 at 15 °C / 59 °F
Water solubility	:	Negligible.
n-octanol/water partition coefficient (log Pow)	:	> 6 (based on information on similar products)
Kinematic viscosity	:	Typical 104 mm2/s at 40 °C / 104 °F
Vapour density (air=1)	:	> 1 (estimated value(s))
Evaporation rate (nBuAc=1)	:	Data not available

10. STABILITY AND REACTIVITY

Stability	:	Stable.
Conditions to Avoid	:	Extremes of temperature and direct sunlight.
Materials to Avoid	:	Strong oxidising agents.
Hazardous Decomposition Products	:	Hazardous decomposition products are not expected to form during normal storage.

11. TOXICOLOGICAL INFORMATION

Basis for Assessment	:	Information given is based on data on the components and the toxicology of similar products.
Acute Oral Toxicity	:	Expected to be of low toxicity: LD50 > 5000 mg/kg , Rat
Acute Dermal Toxicity	:	Expected to be of low toxicity: LD50 > 5000 mg/kg , Rabbit
Acute Inhalation Toxicity	:	Not considered to be an inhalation hazard under normal conditions of use.
Skin Irritation	:	Expected to be slightly irritating. Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis.
Eye Irritation	:	Expected to be slightly irritating.
Respiratory Irritation	:	Inhalation of vapours or mists may cause irritation.
Sensitisation	:	Not expected to be a skin sensitiser.
Repeated Dose Toxicity	:	Not expected to be a hazard.
Mutagenicity	:	Not considered a mutagenic hazard.
Carcinogenicity	:	Product contains mineral oils of types shown to be non-carcinogenic in animal skin-painting studies. Highly refined mineral oils are not classified as carcinogenic by the International Agency for Research on Cancer (IARC). Other components are not known to be associated with carcinogenic

effects.

Reproductive and Developmental Toxicity	:	Not expected to be a hazard.
Additional Information	:	Used oils may contain harmful impurities that have accumulated during use. The concentration of such impurities will depend on use and they may present risks to health and the environment on disposal. ALL used oil should be handled with caution and skin contact avoided as far as possible. Continuous contact with used engine oils has caused skin cancer in animal tests.

12. ECOLOGICAL INFORMATION

Ecotoxicological data have not been determined specifically for this product. Information given is based on a knowledge of the components and the ecotoxicology of similar products.

Acute Toxicity	:	Poorly soluble mixture. May cause physical fouling of aquatic organisms. Expected to be practically non toxic: LL/EL/IL50 > 100 mg/l (to aquatic organisms) LL/EL50 expressed as the nominal amount of product required to prepare aqueous test extract. Mineral oil is not expected to cause any chronic effects to aquatic organisms at concentrations less than 1 mg/l.
Mobility	:	Liquid under most environmental conditions. Floats on water. If it enters soil, it will adsorb to soil particles and will not be mobile.
Persistence/degradability	:	Expected to be not readily biodegradable. Major constituents are expected to be inherently biodegradable, but the product contains components that may persist in the environment.
Bioaccumulation	:	Contains components with the potential to bioaccumulate.
Other Adverse Effects	:	Product is a mixture of non-volatile components, which are not expected to be released to air in any significant quantities. Not expected to have ozone depletion potential, photochemical ozone creation potential or global warming potential.

13. DISPOSAL CONSIDERATIONS

Material Disposal	:	Recover or recycle if possible. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations. Do not dispose into the environment, in drains or in water courses.
Container Disposal	:	Dispose in accordance with prevailing regulations, preferably to a recognised collector or contractor. The competence of the collector or contractor should be established beforehand.
Local Legislation	:	Disposal should be in accordance with applicable regional, national, and local laws and regulations.

14. TRANSPORT INFORMATION

US Department of Transportation Classification (49CFR)
This material is not subject to DOT regulations under 49 CFR Parts 171-180.

IMDG
This material is not classified as dangerous under IMDG regulations.

IATA (Country variations may apply)
This material is either not classified as dangerous under IATA regulations or needs to follow country specific requirements.

15. REGULATORY INFORMATION

The regulatory information is not intended to be comprehensive. Other regulations may apply to this material.

Federal Regulatory Status

Notification Status

EINECS	All components listed or polymer exempt.
TSCA	All components listed.
DSL	All components listed.

Shell classifies this material as an "oil" under the CERCLA Petroleum Exclusion, therefore releases to the environment are not reportable under CERCLA.

SARA Hazard Categories (311/312)
No SARA 311/312 Hazards.

State Regulatory Status

California Safe Drinking Water and Toxic Enforcement Act (Proposition 65)

This material does not contain any chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

16. OTHER INFORMATION

NFPA Rating (Health, Fire, Reactivity)	:	0, 1, 0
MSDS Version Number	:	8.2
MSDS Effective Date	:	03/07/2012
MSDS Revisions	:	A vertical bar (|) in the left margin indicates an amendment from the previous version.
MSDS Regulation	:	The content and format of this MSDS is in accordance with the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
MSDS Distribution	:	The information in this document should be made available to all who may handle the product.
Disclaimer	:	The information contained herein is based on our current knowledge of the underlying data and is intended to describe the product for the purpose of health, safety and environmental requirements only. No warranty or guarantee is expressed or implied regarding the accuracy of these data or the results to be obtained from the use of the product.

Safety Data Sheets: Shell Gadinia 30; NGL No 2 Diesel Fuel Low Sulfur All Grades

Waste Stream: Oily Water

EPA Waste Profile Sheet Number: 20140506-027

Material Safety Data Sheet

1. MATERIAL AND COMPANY IDENTIFICATION

Material Name : **Shell Gadinia 30**
Uses : Engine oil.

Manufacturer/Supplier : **SOPUS Products**
PO BOX 4427
Houston, TX 77210-4427
USA
MSDS Request : 877-276-7285

Emergency Telephone Number
Spill Information : 877-242-7400
Health Information : 877-504-9351

2. COMPOSITION/INFORMATION ON INGREDIENTS

Highly refined mineral oils and additives.
The highly refined mineral oil contains <3% (w/w) DMSO-extract, according to IP346.

3. HAZARDS IDENTIFICATION

Emergency Overview

Appearance and Odour : Brown. Liquid at room temperature. Slight hydrocarbon.

Health Hazards : Not classified as dangerous for supply or conveyance.
Safety Hazards : Not classified as flammable but will burn.
Environmental Hazards : Not classified as dangerous for the environment.

Health Hazards : Not expected to be a health hazard when used under normal conditions.

Health Hazards
Inhalation : Under normal conditions of use, this is not expected to be a primary route of exposure.
Skin Contact : Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis.
Eye Contact : May cause slight irritation to eyes.
Ingestion : Low toxicity if swallowed.
Other Information : Used oil may contain harmful impurities.
Signs and Symptoms : Oil acne/folliculitis signs and symptoms may include formation of black pustules and spots on the skin of exposed areas. Ingestion may result in nausea, vomiting and/or diarrhoea.
Aggravated Medical Conditions : Pre-existing medical conditions of the following organ(s) or organ system(s) may be aggravated by exposure to this material: Skin.

Environmental Hazards	:	Not classified as dangerous for the environment.
Additional Information	:	Under normal conditions of use or in a foreseeable emergency, this product does not meet the definition of a hazardous chemical when evaluated according to the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

4. FIRST AID MEASURES

General Information	:	Not expected to be a health hazard when used under normal conditions.
Inhalation	:	No treatment necessary under normal conditions of use. If symptoms persist, obtain medical advice.
Skin Contact	:	Remove contaminated clothing. Flush exposed area with water and follow by washing with soap if available. If persistent irritation occurs, obtain medical attention.
Eye Contact	:	Flush eye with copious quantities of water. If persistent irritation occurs, obtain medical attention.
Ingestion	:	In general no treatment is necessary unless large quantities are swallowed, however, get medical advice.
Advice to Physician	:	Treat symptomatically.

5. FIRE FIGHTING MEASURES

Clear fire area of all non-emergency personnel.

Flash point	:	> 200 °C / 392 °F (PMCC / ASTM D93)
Upper / lower Flammability or Explosion limits	:	Typical 1 - 10 %(V)(based on mineral oil)
Auto ignition temperature	:	> 320 °C / 608 °F
Specific Hazards	:	Hazardous combustion products may include: A complex mixture of airborne solid and liquid particulates and gases (smoke). Carbon monoxide. Unidentified organic and inorganic compounds.
Suitable Extinguishing Media	:	Foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.
Unsuitable Extinguishing Media	:	Do not use water in a jet.
Protective Equipment for Firefighters	:	Proper protective equipment including breathing apparatus must be worn when approaching a fire in a confined space.

6. ACCIDENTAL RELEASE MEASURES

Avoid contact with spilled or released material. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. See Chapter 13 for information on disposal. Observe the relevant local and international regulations.

Protective measures	:	Avoid contact with skin and eyes. Use appropriate containment to avoid environmental contamination. Prevent from spreading

		or entering drains, ditches or rivers by using sand, earth, or other appropriate barriers.
Clean Up Methods	:	Slippery when spilt. Avoid accidents, clean up immediately. Prevent from spreading by making a barrier with sand, earth or other containment material. Reclaim liquid directly or in an absorbent. Soak up residue with an absorbent such as clay, sand or other suitable material and dispose of properly.
Additional Advice	:	Local authorities should be advised if significant spillages cannot be contained.

7. HANDLING AND STORAGE

General Precautions	:	Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols. Properly dispose of any contaminated rags or cleaning materials in order to prevent fires. Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material.
Handling	:	Avoid prolonged or repeated contact with skin. Avoid inhaling vapour and/or mists. When handling product in drums, safety footwear should be worn and proper handling equipment should be used.
Storage	:	Keep container tightly closed and in a cool, well-ventilated place. Use properly labelled and closeable containers. Store at ambient temperature.
Recommended Materials	:	For containers or container linings, use mild steel or high density polyethylene.
Unsuitable Materials	:	PVC.
Additional Information	:	Polyethylene containers should not be exposed to high temperatures because of possible risk of distortion.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational Exposure Limits

Material	Source	Type	ppm	mg/m3	Notation
Oil mist, mineral	ACGIH	TWA(Inhalable fraction.)		5 mg/m3	
Oil mist, mineral	OSHA Z1	PEL(Mist.)		5 mg/m3	
Oil mist, mineral	OSHA Z1A	TWA(Mist.)		5 mg/m3	
Oil mist, mineral	OSHA Z1	(Mist.)			Listed.

Additional Information	:	Shell has adopted as Interim Standards the OSHA Z1A values that were established in 1989 and later rescinded.
Exposure Controls	:	The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances. Appropriate measures include: Adequate ventilation to control airborne concentrations. Where material is heated, sprayed or mist formed, there is greater potential for airborne concentrations to be generated.
Personal Protective Equipment	:	Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.
Respiratory Protection	:	No respiratory protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid breathing of material. If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation. Check with respiratory protective equipment suppliers. Where air-filtering respirators are suitable, select an appropriate combination of mask and filter. Select a filter suitable for combined particulate/organic gases and vapours [boiling point >65°C(149 °F)].
Hand Protection	:	Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739) made from the following materials may provide suitable chemical protection: PVC, neoprene or nitrile rubber gloves. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, glove thickness, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended.
Eye Protection	:	Wear safety glasses or full face shield if splashes are likely to occur.
Protective Clothing	:	Skin protection not ordinarily required beyond standard issue work clothes.
Monitoring Methods	:	Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls. For some substances biological monitoring may also be appropriate.
Environmental Exposure Controls	:	Minimise release to the environment. An environmental assessment must be made to ensure compliance with local environmental legislation.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Brown. Liquid at room temperature.
Odour	:	Slight hydrocarbon.
pH	:	Not applicable.
Initial Boiling Point and Boiling Range	:	> 280 °C / 536 °F estimated value(s)
Pour point	:	Typical -18 °C / 0 °F
Flash point	:	> 200 °C / 392 °F (PMCC / ASTM D93)
Upper / lower Flammability or Explosion limits	:	Typical 1 - 10 %(V) (based on mineral oil)
Auto-ignition temperature	:	> 320 °C / 608 °F
Vapour pressure	:	< 0.5 Pa at 20 °C / 68 °F (estimated value(s))
Specific gravity	:	Typical 0.897 at 15 °C / 59 °F
Density	:	Typical 897 kg/m3 at 15 °C / 59 °F
Water solubility	:	Negligible.
n-octanol/water partition coefficient (log Pow)	:	> 6 (based on information on similar products)
Kinematic viscosity	:	Typical 104 mm2/s at 40 °C / 104 °F
Vapour density (air=1)	:	> 1 (estimated value(s))
Evaporation rate (nBuAc=1)	:	Data not available

10. STABILITY AND REACTIVITY

Stability	:	Stable.
Conditions to Avoid	:	Extremes of temperature and direct sunlight.
Materials to Avoid	:	Strong oxidising agents.
Hazardous Decomposition Products	:	Hazardous decomposition products are not expected to form during normal storage.

11. TOXICOLOGICAL INFORMATION

Basis for Assessment	:	Information given is based on data on the components and the toxicology of similar products.
Acute Oral Toxicity	:	Expected to be of low toxicity: LD50 > 5000 mg/kg , Rat
Acute Dermal Toxicity	:	Expected to be of low toxicity: LD50 > 5000 mg/kg , Rabbit
Acute Inhalation Toxicity	:	Not considered to be an inhalation hazard under normal conditions of use.
Skin Irritation	:	Expected to be slightly irritating. Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis.
Eye Irritation	:	Expected to be slightly irritating.
Respiratory Irritation	:	Inhalation of vapours or mists may cause irritation.
Sensitisation	:	Not expected to be a skin sensitiser.
Repeated Dose Toxicity	:	Not expected to be a hazard.
Mutagenicity	:	Not considered a mutagenic hazard.
Carcinogenicity	:	Product contains mineral oils of types shown to be non-carcinogenic in animal skin-painting studies. Highly refined mineral oils are not classified as carcinogenic by the International Agency for Research on Cancer (IARC). Other components are not known to be associated with carcinogenic

effects.

Reproductive and Developmental Toxicity	:	Not expected to be a hazard.
Additional Information	:	Used oils may contain harmful impurities that have accumulated during use. The concentration of such impurities will depend on use and they may present risks to health and the environment on disposal. ALL used oil should be handled with caution and skin contact avoided as far as possible. Continuous contact with used engine oils has caused skin cancer in animal tests.

12. ECOLOGICAL INFORMATION

Ecotoxicological data have not been determined specifically for this product. Information given is based on a knowledge of the components and the ecotoxicology of similar products.

Acute Toxicity	:	Poorly soluble mixture. May cause physical fouling of aquatic organisms. Expected to be practically non toxic: LL/EL/IL50 > 100 mg/l (to aquatic organisms) LL/EL50 expressed as the nominal amount of product required to prepare aqueous test extract. Mineral oil is not expected to cause any chronic effects to aquatic organisms at concentrations less than 1 mg/l.
Mobility	:	Liquid under most environmental conditions. Floats on water. If it enters soil, it will adsorb to soil particles and will not be mobile.
Persistence/degradability	:	Expected to be not readily biodegradable. Major constituents are expected to be inherently biodegradable, but the product contains components that may persist in the environment.
Bioaccumulation	:	Contains components with the potential to bioaccumulate.
Other Adverse Effects	:	Product is a mixture of non-volatile components, which are not expected to be released to air in any significant quantities. Not expected to have ozone depletion potential, photochemical ozone creation potential or global warming potential.

13. DISPOSAL CONSIDERATIONS

Material Disposal	:	Recover or recycle if possible. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations. Do not dispose into the environment, in drains or in water courses.
Container Disposal	:	Dispose in accordance with prevailing regulations, preferably to a recognised collector or contractor. The competence of the collector or contractor should be established beforehand.
Local Legislation	:	Disposal should be in accordance with applicable regional, national, and local laws and regulations.

14. TRANSPORT INFORMATION

US Department of Transportation Classification (49CFR)
This material is not subject to DOT regulations under 49 CFR Parts 171-180.

IMDG
This material is not classified as dangerous under IMDG regulations.

IATA (Country variations may apply)
This material is either not classified as dangerous under IATA regulations or needs to follow country specific requirements.

15. REGULATORY INFORMATION

The regulatory information is not intended to be comprehensive. Other regulations may apply to this material.

Federal Regulatory Status

Notification Status

EINECS	All components listed or polymer exempt.
TSCA	All components listed.
DSL	All components listed.

Shell classifies this material as an "oil" under the CERCLA Petroleum Exclusion, therefore releases to the environment are not reportable under CERCLA.

SARA Hazard Categories (311/312)
No SARA 311/312 Hazards.

State Regulatory Status

California Safe Drinking Water and Toxic Enforcement Act (Proposition 65)

This material does not contain any chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

16. OTHER INFORMATION

NFPA Rating (Health, Fire, Reactivity)	:	0, 1, 0
MSDS Version Number	:	8.2
MSDS Effective Date	:	03/07/2012
MSDS Revisions	:	A vertical bar (|) in the left margin indicates an amendment from the previous version.
MSDS Regulation	:	The content and format of this MSDS is in accordance with the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
MSDS Distribution	:	The information in this document should be made available to all who may handle the product.
Disclaimer	:	The information contained herein is based on our current knowledge of the underlying data and is intended to describe the product for the purpose of health, safety and environmental requirements only. No warranty or guarantee is expressed or implied regarding the accuracy of these data or the results to be obtained from the use of the product.

Crude Logistics

MATERIAL SAFETY DATA SHEET
NO. 2 DIESEL FUEL, LOW SULFUR, ALL GRADES

Prepared according to U.S. OSHA, CMA, ANSI, Canadian WHMIS, Australian WorkSafe, Japanese Industrial Standard JIS Z 7250:2000, and European Union REACH regulations

SECTION 1 - PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME:	**NO.2 DIESEL FUEL, LOW SULFUR, ALL GRADES**
CHEMICAL FAMILY NAME:	Diesel Fuel
U.N. NUMBER:	NA 1993
U.N. DANGEROUS GOODS CLASS:	Diesel Fuel, Class 3, Combustible Liquid with flash point greater than 100°F
SUPPLIER/MANUFACTURER'S NAME:	**NGL Crude Logistics, LLC.**
ADDRESS:	2900 North Loop West Suite 1250, Houston, TX 77092 USA
EMERGENCY PHONE:	**TOLL-FREE in USA/Canada** 800-424-9300 Chemtrec
BUSINESS PHONE:	713-730-7320 (Product Information)
WEB SITE:	www.nglep.com
DATE OF PREPARATION:	January 3, 2012
DATE OF LAST REVISION:	New

SECTION 2 - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:

Product Description: This product is a transparent, clear to yellow or red liquid with a characteristic or kerosene-like odor.

Health Hazards: Harmful if swallowed – may enter lungs if swallowed or vomited. May cause irritation to eyes upon contact. Vapors from heated product may cause respiratory irritation.

Flammability Hazards: Combustible liquid with a flash point of 52°C (125.6°F)

Reactivity Hazards: This product is not reactive.

Environmental Hazards: Release of the product may cause adverse effects to the aquatic environment.

Emergency Recommendations: Emergency responders must have personal protective equipment and fire protection appropriate for the situation to which they are responding.

US DOT SYMBOLS

CANADA (WHMIS) SYMBOLS

EUROPEAN and (GHS) Hazard Symbols

Signal Word: **Warning!**

EU LABELING AND CLASSIFICATION:

Classification of the substance or mixture according to Regulation (EC) No1272/2008 Annex 1

EC# 270-676-1Annex 1 Index# 649-227-00-2

GHS Hazard Classification(s):

Carcinogen Category 2

Aspiration Toxicity Category 2

Hazard Statement(s):

H304: May be fatal if swallowed and enters the airways

H320: Causes eye irritation

H335: May cause respiratory irritation

Precautionary Statement(s):

P260: Do not breath dust/fume/gas/mist/vapors/spray

P264: Wash hands thoroughly after handling

P280: Wear protective gloves/protective clothing/eye protection/face protection

EU HAZARD CLASSIFICATION PER DIRECTIVE 1999/45/EC:

[Xn] Harmful

Risk Phrases:

R20: Harmful if swallowed

R40: Limited evidence of carcinogenic effects

R65: Harmful: may cause lung damage if swallowed

Safety Phrases:

S37/39: Wear suitable gloves and eye/face protection

S45: In case of an accident or if you feel unwell, seek medical advice immediately

S62: If swallowed do not induce vomiting

HEALTH HAZARDS OR RISKS FROM EXPOSURE:

ACUTE:

INHALATION: Negligible unless heated to produce vapors. Vapors or finely misted materials may irritate the mucous membranes and cause irritation, dizziness, and nausea.

EYE CONTACT: May cause eye irritation with tearing, redness or stinging. High vapor concentrations may cause irritation.

SKIN CONTACT: Prolonged or repeated contact is not likely to cause significant skin irritation.

INGESTION: Harmful if swallowed - may enter lungs if swallowed or vomited.

CHRONIC:

Secondary effects of ingestion and subsequent aspiration into the lungs may cause pneumatocele (lung cavity) formation and chronic lung dysfunction.

TARGET ORGANS: ACUTE: Eye, Respiratory CHRONIC: None known

SECTION 3 - COMPOSITION AND INFORMATION ON INGREDIENTS

HAZARDOUS INGREDIENTS:	CAS #	EINECS #	ICSC #	WT %	HAZARD CLASSIFICATION; RISK PHRASES
Diesel Fuel No.2	68476-34-6	270-676-1	1561	100%	HAZARD CLASSIFICATION: Carc Cat 3, [Xn] Harmful RISK PHRASES: R40
Balance of other ingredients are non-hazardous or less than 1% in concentration (or 0.1% for carcinogens, reproductive toxins, or respiratory sensitizers).					

NOTE: ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-2004 format. This product has been classified in accordance with the hazard criteria of the 29 CFR 1200 and the MSDS contains all the information required by the 29 CFR 1200, EU Directives and the Japanese Industrial Standard *JIS Z 7250: 2000*.

SECTION 4 - FIRST-AID MEASURES

EYE CONTACT: If product enters the eyes, hold eyes open while under gentle running water for at least 15 minutes. Seek medical attention if irritation persists.

SKIN CONTACT: Wash skin thoroughly after handling product. Seek medical attention if irritation develops and persists. Remove contaminated clothing. Launder clothing before re-use.

INHALATION: If breathing becomes difficult, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Seek medical attention if breathing difficulty continues.

INGESTION: If product is swallowed, call physician or poison control center for most current response information. If professional advice is not available, do not induce vomiting. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or who cannot swallow. Take a copy of the label and/or MSDS with the victim to the health professional.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing respiratory system or eye problems may be aggravated by prolonged contact.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and eliminate over exposure.

SECTION 5 - FIRE-FIGHTING MEASURES

FLASH POINT: 125.6°F (52°C) (Pensky-Martens closed cup)

AUTOIGNITION TEMPERATURE: >489°F (>254°C)

FLAMMABLE LIMITS (in air by volume, %): Lower (LEL): 0.6% Upper (UEL): 7.5%

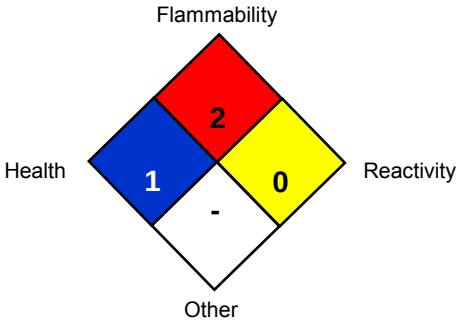
FIRE EXTINGUISHING MATERIALS: Extinguish with foam, carbon dioxide, dry powder or water fog.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Combustible liquid! This material releases vapors when heated above ambient temperatures.

SPECIAL FIRE-FIGHTING PROCEDURES: Incipient fire responders should wear eye protection. Structural firefighters must wear self-contained breathing apparatus and full protective equipment. Isolate materials not yet involved in the fire and protect personnel. Move containers from fire area if this can be done

without risk; otherwise, cool with carefully applied water spray. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas.

NFPA RATING SYSTEM



HMIS RATING SYSTEM

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM

HEALTH HAZARD (BLUE)	2
FLAMMABILITY HAZARD (RED)	2
PHYSICAL HAZARD (YELLOW)	0

PROTECTIVE EQUIPMENT			
EYES	RESPIRATORY	HANDS	BODY
	See Sect 8		See Sect 8

For Routine Industrial Use and Handling Applications

Hazard Scale: **0** = Minimal **1** = Slight **2** = Moderate **3** = Serious **4** = Severe * = Chronic hazard

SECTION 6 - ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Personnel should be trained for spill response operations.
SPILLS: Contain spill if safe to do so. Small Liquid Spills: Absorb with sand or other non-combustible absorbent material. Large Spillages: Use water spray to disperse vapors and dilute spill to a nonflammable mixture.
Prevent runoff from entering drains, sewers, or streams. Dike for later disposal. Dispose of in accordance with applicable federal, state, and local procedures (see Section 13, Disposal Considerations).

SECTION 7 - HANDLING AND STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash thoroughly after handling this product. Do not eat, drink, smoke, or apply cosmetics while handling this product. Avoid breathing vapors/mists generated by this product. Use in a well-ventilated location. Remove contaminated clothing immediately.

STORAGE AND HANDLING PRACTICES: Do not breathe mist or vapor. Do not get in eyes. Use only with adequate ventilation. Keep away from heat, sparks, and flame. Keep container tightly closed and in a well-ventilated place. Use caution when storing or processing at temperatures above 151°C.

SECTION 8 - EXPOSURE CONTROLS - PERSONAL PROTECTION

EXPOSURE LIMITS/GUIDELINES:

CHEMICAL NAME	CAS#	ACGIH TLV	OSHA TWA
Diesel Fuel No.2	68476-34-6	100 mg/m³ Skin	Not Listed

Currently, international exposure limits are established for the components of this product. Please check with competent authority in each country for the most recent limits.

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to ensure exposure levels are maintained below the exposure limits provided above. Use local exhaust ventilation to control airborne vapor. Ensure eyewash/safety shower stations are available near areas where this product is used.

The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with OSHA regulations found in 29 CFR Subpart I (beginning at 1910.132) or equivalent standard of Canada, or standards of EU member states (including EN 149 for respiratory PPE, and EN 166 for face/eye protection), and those of Japan. Please reference applicable regulations and standards for relevant details.

RESPIRATORY PROTECTION: Maintain airborne contaminant concentrations below exposure limit guidelines listed above. If necessary, use only respiratory protection authorized in the U.S. Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), equivalent U.S. State standards, Canadian CSA Standard Z94.4-93, the European Standard EN149, or by EU member states.

EYE PROTECTION: Use safety glasses or chemical goggles as appropriate to prevent eye contact. If necessary, refer to U.S. OSHA 29 CFR 1910.133 or appropriate Canadian Standards.

HAND PROTECTION: Use chemical resistant gloves to prevent skin contact. If necessary, refer to U.S. OSHA 29 CFR 1910.138 or appropriate Standards of Canada.

BODY PROTECTION: Use body protection appropriate to prevent contact as appropriate for task (e.g. lab coat, overalls). If necessary, refer to appropriate Standards of Canada, or appropriate Standards of the EU, Australian Standards, or relevant Japanese Standards.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE:	Liquid
APPEARANCE & ODOR:	Transparent, clear to yellow or red color with characteristic or kerosene-like odor.
ODOR THRESHOLD (PPM):	Mild
VAPOR PRESSURE (mmHg):	<2 mm Hg @ 20°C
VAPOR DENSITY (AIR=1):	AP 5
EVAPORATION RATE (nBuAc = 1):	Not Available
BOILING POINT (C°):	>154°C (>309°F)
FREEZING POINT (C°):	Not Available
pH:	Not Applicable
SPECIFIC GRAVITY 20°C: (WATER =1)	0.84
SOLUBILITY IN WATER (%)	Slight
VOC%:	840 g/l VOC (w/v)

SECTION 10 – STABILITY AND REACTIVITY

STABILITY: Product is stable
DECOMPOSITION PRODUCTS: None known
MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Strong oxidizing agents, acids
HAZARDOUS POLYMERIZATION: Will not occur
CONDITIONS TO AVOID: Contact with incompatible materials

SECTION 11 - TOXICOLOGICAL INFORMATION

TOXICITY DATA: The following toxicity data is available for this product:
CAS# 68476-34-6 Oral LD 50 12,000 mg/kg Rat

SUSPECTED CANCER AGENT: None of the ingredients of this product are found on the following lists: FEDERAL OSHA Z LIST, NTP, CAL/OSHA, IARC and therefore are not considered to be, or suspected to be cancer-causing agents by these agencies.

IRRITANT INFORMATION: Vapors from this product can be irritating to eyes and respiratory system.
SENSITIZER INFORMATION: This product is not considered a sensitizer.
REPRODUCTIVE TOXICITY INFORMATION: There is no evidence that this product may cause reproductive effects.

SECTION 12 - ECOLOGICAL INFORMATION

ENVIRONMENTAL STABILITY: This product is biodegradable
EFFECT OF MATERIAL ON PLANTS or ANIMALS: This material has not been tested for its effects on plants and animals.
EFFECT OF CHEMICAL ON AQUATIC LIFE: This material has not been tested for effects on aquatic life.

MATERIAL SAFETY DATA SHEET
NO. 2 DIESEL FUEL, LOW SULFUR, ALL GRADES

SECTION 13 - DISPOSAL CONSIDERATIONS

WASTE DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations, those of Canada, Australia, EU Member States and Japan.

SECTION 14 - TRANSPORTATION INFORMATION

THIS PRODUCT IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.
PROPER SHIPPING NAME: Diesel Fuel, Combustible Liquid
HAZARD CLASS NUMBER and DESCRIPTION: Class 3, Combustible Liquid with a flash point greater than 100°F
UN IDENTIFICATION NUMBER: NA 1993
PACKING GROUP: PGIII
DOT LABEL(S) REQUIRED: Class 3 Flammable
NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2004): 128
MARINE POLLUTANT: Product or ingredients are not classified by the DOT as a Marine Pollutant (as defined by 49 CFR 172.101, Appendix B)
U.S. DEPARTMENT OF TRANSPORTATION (DOT) SHIPPING REGULATIONS:
This product is classified as dangerous goods, per U.S. DOT regulations, under 49 CFR 172.101.
TRANSPORT CANADA, TRANSPORTATION OF DANGEROUS GOODS REGULATIONS:
This product is classified as Dangerous Goods, per regulations of Transport Canada.
INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA):
This product is classified as Dangerous Goods, by rules of IATA
INTERNATIONAL MARITIME ORGANIZATION (IMO) DESIGNATION:
This product is classified as Dangerous Goods by the International Maritime Organization.
EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR):
This product is classified by the United Nations Economic Commission for Europe to be dangerous goods.

SECTION 15 - REGULATORY INFORMATION

UNITED STATES REGULATIONS:
SARA REPORTING REQUIREMENTS: This product is subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act (SARA) as follows:
SARA 313 Reporting Naphthalene CAS# 91-20-3 <2%, Ethylbenzene CAS# 100-41-4 <0.9%
TSCA: All components in this product are listed on the US Toxic Substances Control Act (TSCA) inventory of chemicals.
SARA 311/312:
Acute Health: Yes Chronic Health: No Fire: Yes Reactivity: No
U.S. CERCLA REPORTABLE QUANTITY (RQ): CERCLA petroleum exemption applies.
CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): This product does contain ingredient(s) are on the California Proposition 65 lists.
WARNING! This product contains ingredients that are known to the State of California to cause cancer or Reproductive harm.
CANADIAN REGULATIONS:
CANADIAN DSL/NDSL INVENTORY STATUS: All of the components of this product are on the DSL Inventory
CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS: No component of this product is on the CEPA First Priorities Substance lists.
CANADIAN WHMIS CLASSIFICATION and SYMBOLS: This product is categorized as "Not Controlled" as per the Controlled Product regulations
EUROPEAN ECONOMIC COMMUNITY INFORMATION:
EU LABELING AND CLASSIFICATION:
Classification of the mixture according to Regulation (EC) No1272/2008. See section 2 for details.
AUSTRALIAN INFORMATION FOR PRODUCT:
AUSTRALIAN INVENTORY OF CHEMICAL SUBSTANCES (AICS) STATUS: All components of this product are listed

on the AICS.

STANDARD FOR THE UNIFORM SCHEDULING OF DRUGS AND POISONS: Not applicable.

JAPANESE INFORMATION FOR PRODUCT:

JAPANESE MINISTER OF INTERNATIONAL TRADE AND INDUSTRY (MITI) STATUS: The components of this product are not listed as Class I Specified Chemical Substances, Class II Specified Chemical Substances, or Designated Chemical Substances by the Japanese MITI.

INTERNATIONAL CHEMICAL INVENTORIES:

Listing of the components on individual country Chemical Inventories is as follows:

Asia-Pac:	Listed
Australian Inventory of Chemical Substances (AICS):	Listed
Korean Existing Chemicals List (ECL):	Listed
Japanese Existing National Inventory of Chemical Substances (ENCS):	Listed
Philippines Inventory if Chemicals and Chemical Substances (PICCS):	Listed
Swiss Giftliste List of Toxic Substances:	Listed
U.S. TSCA:	Listed

SECTION 16 - OTHER INFORMATION

PREPARED BY: Paul Eigbrett MSDS Authoring PLUS

Disclaimer: To the best of NGL Crude Logistics LLC's knowledge, the information contained herein is reliable and accurate as of this date; however, NGL Crude Logistics, LLC assumes no liability for the reliability or accuracy of the information contained herein and no warranties of any type either express or implied are provided. Final determination of suitability of any material is the sole responsibility of the user. The information contained herein relates only to this specific product.

Safety Data Sheets: Primer Paint; Tuf Coat Paint

Waste Stream: Paint/Paint Consumables

EPA Waste Profile Sheet Number: 20140506-028

Safety Data Sheet
Tuff Coat Primer

SECTION I - IDENTIFICATION

TUF-COAT
MARINE AND INDUSTRIAL COATINGS

Lafeyette Paint & Supply, Inc.
150 Commercial Parkway
Broussard, LA 70518
(337) 837-5517
CHEMTREC (CCN16851) :..... (800) 424-9300

Product Number	LPS74
Product Name	Tuff Coat Primer
Chemical Family	
CAS Number	Multiple
Date Prepared	6/1/2015
Revision Number	9/14/2015

SECTION II - HAZARDOUS IDENTIFICATION

GHS CLASSIFICATION:

Classification

Flammable Liquids	Category 3
Skin Corrosion/Irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2B
Acute Toxicity, Inhalation	Category 4
Specific target organ toxicity, single exposure, R	Category 3
Germ Cell Mutagenicity	Category 2
Carcinogenicity	Category 1A, 1B
Reproductive Toxicity	Category 2
Specific target organ toxicity, repeated exposure	Category 2

DANGER!

GHS LABEL:

Hazard Statements

H226	Flammable liquid and vapor
H315	Causes skin irritation
H320	Causes eye irritation
H332	Harmful if inhaled
H335	May cause respiratory irritation
H341	Suspected of causing genetic defects
H350	May cause cancer

H361	Suspected of damaging fertility or the unborn child
H373	Causes damage to organs through prolonged or repeated exposure

Precautionary Statements

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P210	Keep away from heat/sparks/open flames/hot surface - No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ventilating/light/equipment, etc.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P260	Do not breathe dust/fume/gas/mist/vapours/spray.
P261	Avoid breathing dust/fume/gas/mist/vapours/spray.
P264	Wash hands thoroughly after handling.
P271	Use only outdoors or in a well-ventilated are.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P281	Use personal protective equipment as required.
P302+352	IF ON SKIN: Wash with soap and water.
P303+361+353	IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
p304+340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305+351+338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do so - continue rinsing.
P308+313	IF exposed or concerned: get medical advice/attention.
P312	Call a POISON CENTER or a doctor/physician if you feel unwell.
P314	Get medical advice/attention if you feel unwell.
P332+313	If skin irritation occurs: get medical advice/attention.
P337+313	If eye irritation persists get medical advice/attention.
P362	Take off contaminated clothing and wash before reuse.
P370+378	In case of fire: Usedry sand, dry chemical, or alcohol-resistant foam for extinction.
P403+233	Store in a well ventilated place. Keep container tightly closed.
P403+235	Store in a well ventilated place. Keep cool.

P405 Store locked up.

P501 Dispose of contents/container to an approved waste disposal plant.

SECTION III - COMPOSITION/INFORMATION ON INGREDIENTS

The precise composition of this product is proprietary information. In the event of a medical emergency, a complete disclosure will be provided to medical personnel.

Component Name	CAS #	Component%	OSHA PEL	ACGIH TLV
Ferric Oxide	1309-37-1	20-25	10 mg/m3	5 mg/m3
Dimethylbenzene	1330-20-7	40-45	100 ppm	100 ppm
Stoddard Solvent	8052-41-3	0-5	500 ppm	100 ppm
Light Aromatic Solvent Naphtha	64742-95-6	<1	300 ppm	300 ppm

SECTION IV - FIRST AID MEASURES

Contact with eyes: Flush IMMEDIATELY with copious amounts of running water for at least 15 minutes. Take to physician for definitive medical treatment.

Skin contact: Wash exposed areas with water and mild soap. Remove contaminated clothing immediately and launder before reuse. If irritations persist, consult a physician.

Inhalation: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

Ingestion: If swallowed. Do not induce vomiting. Seek immediate medical attetntion.

SECTION V - FIREFIGHTING MEASURES

Suitable Extinguishing Media: Water fog, foam, dry chemical, or carbon dioxide extinguisher.

Special Fire Fighting Procedures Use self-contained breathing apparatus and full bunker gear in fire areas. Evacuate all unprotected personnel from area. Keep containers cool with water fog to minimize swelling taking care not to spread flames with water used for cooling.

Unusual Fire Fighting Hazards: Vapor accumulation will flash and/or explode, if ignited. Containers may burst explosively if overheated in fire. Cool with water spray or fog. Empty containers also present fire explosion hazard due to residual vapors. Keep containers tightly closed. During emergency situations, over-exposure to decomposition products may cause a health hazard with no symptoms immediately apparent. Obtain medical attention.

SECTION VI - ACCIDENTAL RELEASE MEASURES

Personal Precautions: Keep all sources of ignition and hot metal surfaces away from spill or release.

Environmental Precautions: Contain spill if it can be done with minimal risk. Prevent liquid from entering drains, sewers or waterways. Notify proper authorities if spill is in excess of the reportable quantity.

Methods for Cleaning Up: Using only non-sparking tools and explosion proof equipment, collect spill on absorbent material and put into approved container. Call Chemtrec at 1-800-424-9300 (CCN16851) for additional information.

SECTION VII - HANDLING AND STORAGE

Handling and Storage:

- "Empty" containers retain residue and/or vapor and may be dangerous. Do not cut, weld, braze solder, drill, grind or expose such containers to heat, flames, sparks, or other ignition sources.
- Keep containers tightly closed when not in use.
- Store out of direct sunlight and in a cool, well-ventilated area.

SECTION VIII - PRECAUTIONS TO CONTROL EXPOSURE / PERSONAL PROTECTION

EXPOSURE LIMITS:

Component Name	CAS #	OSHA PEL	ACGIH TLV
Ferric Oxide	1309-37-1	10 mg/m3	5 mg/m3
Dimethylbenzene	1330-20-7	100 ppm	100 ppm
Stoddard Solvent	8052-41-3	500 ppm	100 ppm
Light Aromatic Solvent Naphtha	64742-95-6	300 ppm	300 ppm

Engineering Controls: Adequate local or mechanical to reduce vapor or mist to below the PEL or TLV.

Monitoring: Follow accepted work practices for handling a flammable material.

Personal Protective Equipment (PPE)

Eye Protection: Goggles or approved OSHA device with side shields; do not wear contact lenses when handling this product.

Skin Protection: Impervious solvent resistent gloves. Impervious apron and work boots recommend where splashing may occur.

Respiratory Protection: Use NIOSH/MSHA TC23C Chemical/Mechanical type filter system to remove a combination of particles, gas & vapors or air supplied respirator if necessary in areas where the chemical exposure is unknown or above the OSHA PEL or ACGIH TLV.

SECTION IX - PHYSICAL AND CHEMICAL PROPERTIES

Appearance	All Colors
Odor	Mild
pH@25°C	N/A
Melting/Freezing Point	N/A
Flashpoint	80°F
Specific Gravity	1.34
Soluability	None
Auto-Ignition Temperature	No Data
Decomposition Temperature	No Data
VOC Content	4.55
Odor Threshold	No Data
Boiling Range	281°F
Evaporation Point	Slower Than Ether
Flammable Limits - Upper	7%
Flammable Limits - Lower	1%
Vapor Pressure	2.31mmHg@68°F
Vapor Density (Air=1)	>1
Viscosity	No Data

SECTION X - STABILITY AND REACTIVITY

Stability: Stable, under normal conditions of storage and handling.

Conditions to Avoid: Heat, open flames, ignition sources, electrical or static discharge.

Hazardous Decomposition/Byproducts: CO2 and possibly CO and carbon smoke.

Hazardous Polymerization: Will not occur.

Polymerization Conditions to Avoid: None.

Incompatibilities: None known.

SECTION XI - TOXICOLOGICAL INFORMATION

Likely Route of Exposure: Inhalation, eye contact, skin contact, ingestion .

Inhalation: Anesthetic. Irritation of respiratory tract or acute nervous system depression. Overexposure may result in headaches and nausea possibly followed by loss of consciousness.

Eye Contact: High vapor concentrations are irritating to the eyes.

Skin Contact: Liquids can be absorbed through the skin resulting in symptoms similar to the inhalation effects above.

Ingestion: Gastrointestinal irritation including vomiting can occur. Aspiration of material into lungs may result in chemical pneumonitis, which can be fatal.

Toxicity:

Component Name	LD50	LC50
Ferric Oxide	IPR-Rat 5500 mg/kg; IPR-Mus 5400 mg/kg	
Ferric Oxide	IPR-Rat 5500 mg/kg IPR-Mus 5400 mg/kg	
Dimethylbenzene	Oral - rat - 2,840 mg/kg; Dermal - rabbit - 4,500 mg/kg	Inhalation - rat - 4H/6,350 mg/l
Stoddard Solvent	Not Established	Not Established
Light Aromatic Solvent Naphtha	Not Established	Not Established

Reproductive Effects	Teratogenicity	Mutagenicity	Embryotoxicity	Sensitization to Product	Synergistic Products
Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

SECTION XII - ECOLOGICAL INFORMATION

Ecotoxicity: Information not available.

Mobility: Information not available.

Degradability: Information not available.

BioAccumulation: Information not available.

SECTION XIII - WASTE DISPOSAL CONSIDERATIONS

Do not discharge into drains, surface water, or groundwater. Empty containers can retain product residue and vapor. Observe all precautions even when containers are empty. The use and processing of this product, or addition of other constituents, may cuase it to be considered a hazardous waste. It is the waste generators responsibility to determine if a particular waste is hazardous under RCRA. Dispose of or incinerate in accordance with all applicable local, state, and federal regulations at a RCRA licensed facility.

SECTION XIV - TRANSPORT INFORMATION

DOT SHIPPING INFORMATION

Proper Shipping Name: PAINT
Contains: See Section III - Composition/
Hazard Class and Label: 3 FLAMMABLE LIQUID
Identification Number: UN1263
Packaging Group: II

SECTION XV - REGULATORY INFORMATION

TSCA STATUS:.....

SARA TITLE III SECTION 302/304 EXTREMELY HAZARDOUS SUBSTANCE:

No chemicals in this material are subject to the reporting requirements.

SARA TITLE III SECTION 311/312 HAZARD CATEGORIZATION:

Acute	Chronic	Fire	Pressure	Reactive
X	X	X	N/A	N/A

SARA TITLE III SECTION 313 SUPPLIER INFORMATION:

Component Name	CAS #	% by wt.
Dimethylbenzene	1330-20-7	40-45

CERCLA SECTION 102(a) HAZARDOUS SUBSTANCE:

Component Name	CAS #	% by wt.	RQ (lbs.)
Dimethylbenzene	1330-20-7	40-45	100

CALIFORNIA PROPOSITION 65:

No chemicals in this material are subject to the reporting requirements.

SECTION XVI - OTHER INFORMATION

HMIS Health: 2
HMIS Flammability: 3
HMIS Reactivity: 0

Additional: DISCLAIMER: WARNING! KEEP THIS AND ALL PAINT RELATED PRODUCTS OUT OF THE REACH OF CHILDREN! The information contained in this SDS is based on data from sources considered to be reliable but we do not guarantee the accuracy or completeness thereof. We urge each customer or recipient of this SDS to study it carefully to become aware of and understand the hazards associated with this product. The reader should consider consulting reference works or individuals who are experts in ventilation, toxicology, or fire prevention as necessary or appropriate to use and understand the data in this SDS.

Safety Data Sheet
Tuff Coat Enamel

SECTION I - IDENTIFICATION

TUF-COAT
MARINE AND INDUSTRIAL COATINGS

Lafeyette Paint & Supply, Inc.
150 Commercial Parkway
Broussard, LA 70518
(337) 837-5517
CHEMTREC (CCN16851) :..... (800) 424-9300

Product Number	LPS 100 Series
Product Name	Tuff Coat Enamel
Chemical Family	
CAS Number	Multiple
Date Prepared	6/1/2015
Revision Number	9/14/2015

SECTION II - HAZARDOUS IDENTIFICATION

GHS CLASSIFICATION:

Classification

Flammable Liquids	Category 3
Skin Corrosion/Irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2B
Acute Toxicity, Inhalation	Category 4
Specific target organ toxicity, single exposure, R	Category 3
Germ Cell Mutagenicity	Category 2
Carcinogenicity	Category 1A, 1B
Reproductive Toxicity	Category 2
Specific target organ toxicity, repeated exposure	Category 2

DANGER!

GHS LABEL:

Hazard Statements

H226	Flammable liquid and vapor
H315	Causes skin irritation
H320	Causes eye irritation
H332	Harmful if inhaled
H335	May cause respiratory irritation
H341	Suspected of causing genetic defects
H350	May cause cancer

H361	Suspected of damaging fertility or the unborn child
H373	Causes damage to organs through prolonged or repeated exposure

Precautionary Statements

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P210	Keep away from heat/sparks/open flames/hot surface - No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ventilating/light/equipment, etc.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P260	Do not breathe dust/fume/gas/mist/vapours/spray.
P261	Avoid breathing dust/fume/gas/mist/vapours/spray.
P264	Wash hands thoroughly after handling.
P271	Use only outdoors or in a well-ventilated are.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P281	Use personal protective equipment as required.
P302+352	IF ON SKIN: Wash with soap and water.
P303+361+353	IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
p304+340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305+351+338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do so - continue rinsing.
P308+313	IF exposed or concerned: get medical advice/attention.
P312	Call a POISON CENTER or a doctor/physician if you feel unwell.
P314	Get medical advice/attention if you feel unwell.
P332+313	If skin irritation occurs: get medical advice/attention.
P337+313	If eye irritation persists get medical advice/attention.
P362	Take off contaminated clothing and wash before reuse.
P370+378	In case of fire: Usedry sand, dry chemical, or alcohol-resistant foam for extinction.
P403+233	Store in a well ventilated place. Keep container tightly closed.
P403+235	Store in a well ventilated place. Keep cool.

P405 Store locked up.

P501 Dispose of contents/container to an approved waste disposal plant.

SECTION III - COMPOSITION/INFORMATION ON INGREDIENTS

The precise composition of this product is proprietary information. In the event of a medical emergency, a complete disclosure will be provided to medical personnel.

Component Name	CAS #	Component%	OSHA PEL	ACGIH TLV
Dimethylbenzene	1330-20-7	5-10	100 ppm	100 ppm
Stoddard Solvent	8052-41-3	15-20	500 ppm	100 ppm

SECTION IV - FIRST AID MEASURES

Contact with eyes: Flush IMMEDIATELY with copious amounts of running water for at least 15 minutes. Take to physician for definitive medical treatment.

Skin contact: Wash exposed areas with water and mild soap. Remove contaminated clothing immediately and launder before reuse. If irritations persist, consult a physician.

Inhalation: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

Ingestion: If swallowed. Do not induce vomiting. Seek immediate medical attetntion.

SECTION V - FIREFIGHTING MEASURES

Suitable Extinguishing Media: Water fog, foam, dry chemical, or carbon dioxide extinguisher.

Special Fire Fighting Procedures Use self-contained breathing apparatus and full bunker gear in fire areas. Evacuate all unprotected personnel from area. Keep containers cool with water fog to minimize swelling taking care not to spread flames with water used for cooling.

Unusual Fire Fighting Hazards: Vapor accumulation will flash and/or explode, if ignited. Containers may burst explosively if overheated in fire. Cool with water spray or fog. Empty containers also present fire explosion hazard due to residual vapors. Keep containers tightly closed. During emergency situations, over-exposure to decomposition products may cause a health hazard with no symptoms immediately apparent. Obtain medical attention.

SECTION VI - ACCIDENTAL RELEASE MEASURES

Personal Precautions: Keep all sources of ignition and hot metal surfaces away from spill or release.

Environmental Precautions: Contain spill if it can be done with minimal risk. Prevent liquid from entering drains, sewers or waterways. Notify proper authorities if spill is in excess of the reportable quantity.

Methods for Cleaning Up: Using only non-sparking tools and explosion proof equipment, collect spill on absorbent material and put into approved container. Call Chemtrec at 1-800-424-9300 (CCN16851) for additional information.

SECTION VII - HANDLING AND STORAGE

Handling and Storage:

- "Empty" containers retain residue and/or vapor and may be dangerous. Do not cut, weld, braze solder, drill, grind or expose such containers to heat, flames, sparks, or other ignition sources.
- Keep containers tightly closed when not in use.
- Store out of direct sunlight and in a cool, well-ventilated area.

SECTION VIII - PRECAUTIONS TO CONTROL EXPOSURE / PERSONAL PROTECTION

EXPOSURE LIMITS:

Component Name	CAS #	OSHA PEL	ACGIH TLV
Dimethylbenzene	1330-20-7	100 ppm	100 ppm
Stoddard Solvent	8052-41-3	500 ppm	100 ppm

Engineering Controls: Adequate local or mechanical to reduce vapor or mist to below the PEL or TLV.

Monitoring: Follow accepted work practices for handling a flammable material.

Personal Protective Equipment (PPE)

Eye Protection: Goggles or approved OSHA device with side shields; do not wear contact lenses when handling this product.

Skin Protection: Impervious solvent resistent gloves. Impervious apron and work boots recommend where splashing may occur.

Respiratory Protection: Use NIOSH/MSHA TC23C Chemical/Mechanical type filter system to remove a combination of particles, gas & vapors or air supplied respirator if necessary in areas where the chemical exposure is unknown or above the OSHA PEL or ACGIH TLV.

SECTION IX - PHYSICAL AND CHEMICAL PROPERTIES

Appearance	All Colors
Odor	Mild
pH@25°C	N/A
Melting/Freezing Point	N/A
Flashpoint	80°F
Specific Gravity	0.88
Soluability	None
Auto-Ignition Temperature	No Data
Decomposition Temperature	No Data
VOC Content	4.67
Odor Threshold	No Data
Boiling Range	149-281°F
Evaporation Point	Slower Than Ether
Flammable Limits - Upper	7%
Flammable Limits - Lower	1%
Vapor Pressure	1.54mmHg@68°F
Vapor Density (Air=1)	>1
Viscosity	No Data

SECTION X - STABILITY AND REACTIVITY

Stability: Stable, under normal conditions of storage and handling.

Conditions to Avoid: Heat, open flames, ignition sources, electrical or static discharge.

Hazardous Decomposition/Byproducts: CO2 and possibly CO and carbon smoke.

Hazardous Polymerization: Will not occur.

Polymerization Conditions to Avoid: None.

Incompatibilities: None known.

SECTION XI - TOXICOLOGICAL INFORMATION

Likely Route of Exposure: Inhalation, eye contact, skin contact, ingestion .

Inhalation: Anesthetic. Irritation of respiratory tract or acute nervous system depression. Overexposure may result in headaches and nausea possibly followed by loss of consciousness.

Eye Contact: High vapor concentrations are irritating to the eyes.

Skin Contact: Liquids can be absorbed through the skin resulting in symptoms similar to the inhalation effects above.

Ingestion: Gastrointestinal irritation including vomiting can occur. Aspiration of material into lungs may result in chemical pneumonitis, which can be fatal.

Toxicity:

Component Name	LD50	LC50
Dimethylbenzene	Oral - rat - 2,840 mg/kg; Dermal - rabbit - 4,500 mg/kg	Inhalation - rat - 4H/6,350 mg/l
Stoddard Solvent	Not Established	Not Established

Reproductive Effects	Teratogenicity	Mutagenicity	Embryotoxicity	Sensitization to Product	Synergistic Products
Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

SECTION XII - ECOLOGICAL INFORMATION

Ecotoxicity: Information not available.

Mobility: Information not available.

Degradability: Information not available.

BioAccumulation: Information not available.

SECTION XIII - WASTE DISPOSAL CONSIDERATIONS

Do not discharge into drains, surface water, or groundwater. Empty containers can retain product residue and vapor. Observe all precautions even when containers are empty. The use and processing of this product, or addition of other constituents, may cuase it to be considered a hazardous waste. It is the waste generators responsibility to determine if a particular waste is hazardous under RCRA. Dispose of or incinerate in accordance with all applicable local, state, and federal regulations at a RCRA licensed facility.

SECTION XIV - TRANSPORT INFORMATION

DOT SHIPPING INFORMATION

Proper Shipping Name: PAINT
Contains: See Section III - Composition/
Hazard Class and Label: 3 FLAMMABLE LIQUID
Identification Number: UN1263
Packaging Group: II

SECTION XV - REGULATORY INFORMATION

TSCA STATUS:.....

SARA TITLE III SECTION 302/304 EXTREMELY HAZARDOUS SUBSTANCE:

No chemicals in this material are subject to the reporting requirements.

SARA TITLE III SECTION 311/312 HAZARD CATEGORIZATION:

Acute	Chronic	Fire	Pressure	Reactive
X	X	X	N/A	N/A

SARA TITLE III SECTION 313 SUPPLIER INFORMATION:

Component Name	CAS #	% by wt.
Dimethylbenzene	1330-20-7	5-10

CERCLA SECTION 102(a) HAZARDOUS SUBSTANCE:

Component Name	CAS #	% by wt.	RQ (lbs.)
Dimethylbenzene	1330-20-7	5-10	100

CALIFORNIA PROPOSITION 65:

No chemicals in this material are subject to the reporting requirements.

SECTION XVI - OTHER INFORMATION

HMIS Health: 2
HMIS Flammability: 3
HMIS Reactivity: 0

Additional: DISCLAIMER: WARNING! KEEP THIS AND ALL PAINT RELATED PRODUCTS OUT OF THE REACH OF CHILDREN! The information contained in this SDS is based on data from sources considered to be reliable but we do not guarantee the accuracy or completeness thereof. We urge each customer or recipient of this SDS to study it carefully to become aware of and understand the hazards associated with this product. The reader should consider consulting reference works or individuals who are experts in ventilation, toxicology, or fire prevention as necessary or appropriate to use and understand the data in this SDS.

Safety Data Sheets: Shell Tellus S2; Ethylene Glycol; Monoethylene Glycol (MEG)

Waste Stream: Hydraulic Oil/Glycol

EPA Waste Sheet Profile Number: 20145060-036

Safety Data Sheet
acc. to OSHA HCS

Printing date 07/03/2017 Reviewed on 06/29/2017

1 Identification

· **Product identifier**

· **Trade name: Ethylene Glycol**

· **Article number:** 152-55-4
· **CAS Number:**
107-21-1
· **EC number:**
203-473-3
· **Index number:**
603-027-00-1

· **Details of the supplier of the safety data sheet**
· **Manufacturer/Supplier:**
OFI Testing Equipment Inc.
11302 Steeplecrest Dr.
Houston, TX 77065
(877) 837-8683

· **Information department:** techservices@ofite.com
· **Emergency telephone number:**
INFOTRAC USA - CANADA: 1-800-535-5053
INTERNATIONAL: 1-352-323-3500

2 Hazard(s) identification

· **Classification of the substance or mixture**

GHS07

Acute Tox. 4 H302 Harmful if swallowed.

· **Label elements**
· **GHS label elements** The substance is classified and labeled according to the Globally Harmonized System (GHS).
· **Hazard pictograms**

GHS07

· **Signal word** Warning
· **Hazard statements**
Harmful if swallowed.
· **Precautionary statements**
Wash thoroughly after handling.
Do not eat, drink or smoke when using this product.
IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell.
Rinse mouth.
Dispose of contents/container in accordance with local/regional/national/international regulations.
· **Classification system:**
· **NFPA ratings (scale 0 - 4)**

Health = 0
Fire = 1
Reactivity = 0

(Contd. on page 2)

Safety Data Sheet
acc. to OSHA HCS

Printing date 07/03/2017 Reviewed on 06/29/2017

Trade name: Ethylene Glycol

(Contd. of page 1)

· **HMIS-ratings (scale 0 - 4)**

HEALTH 2	Health = 2
FIRE 1	Fire = 1
REACTIVITY 0	Reactivity = 0

· **Other hazards**
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.

3 Composition/information on ingredients

· **Chemical characterization: Substances**
· **CAS No. Description**
107-21-1 Ethylene Glycol
· **Identification number(s)**
· **EC number:** 203-473-3
· **Index number:** 603-027-00-1

4 First-aid measures

· **Description of first aid measures**
· **General information:**
Symptoms of poisoning may even occur after several hours; therefore medical observation for at least 48 hours after the accident.
· **After inhalation:** Supply fresh air; consult doctor in case of complaints.
· **After skin contact:** Generally the product does not irritate the skin.
· **After eye contact:** Rinse opened eye for several minutes under running water.
· **After swallowing:** Immediately call a doctor.
· **Information for doctor:**
· **Most important symptoms and effects, both acute and delayed** No further relevant information available.
· **Indication of any immediate medical attention and special treatment needed**
No further relevant information available.

5 Fire-fighting measures

· **Extinguishing media**
· **Suitable extinguishing agents:** Use fire fighting measures that suit the environment.
· **Special hazards arising from the substance or mixture** No further relevant information available.
· **Advice for firefighters**
· **Protective equipment:** No special measures required.

6 Accidental release measures

· **Personal precautions, protective equipment and emergency procedures** Not required.
· **Environmental precautions:**
Dilute with plenty of water.
Do not allow to enter sewers/ surface or ground water.
· **Methods and material for containment and cleaning up:**
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).

(Contd. on page 3)

Safety Data Sheet
acc. to OSHA HCS

Trade name: Ethylene Glycol

(Contd. of page 2)

Dispose contaminated material as waste according to item 13.
· **Reference to other sections**
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.
· **Protective Action Criteria for Chemicals**
· **PAC-1:** 30 ppm
· **PAC-2:** 150 ppm
· **PAC-3:** 900 ppm

7 Handling and storage

· **Handling:**
· **Precautions for safe handling** No special precautions are necessary if used correctly.
· **Information about protection against explosions and fires:** No special measures required.

· **Conditions for safe storage, including any incompatibilities**
· **Storage:**
· **Requirements to be met by storerooms and receptacles:** No special requirements.
· **Information about storage in one common storage facility:** Not required.
· **Further information about storage conditions:** None.
· **Specific end use(s)** No further relevant information available.

8 Exposure controls/personal protection

· **Additional information about design of technical systems:** No further data; see item 7.

· **Control parameters**

· **Components with limit values that require monitoring at the workplace:**	
CAS: 107-21-1 Ethylene Glycol	
TLV	Short-term value: NIC-127* NIC-10** mg/m³, NIC-50* ppm Long-term value: NIC-63.5* mg/m³, NIC-25* ppm Ceiling limit value: (100) mg/m³ (H); *inh. fraction + vapor,P:**inh. fraction, H

· **Additional information:** The lists that were valid during the creation were used as basis.

· **Exposure controls**
· **Personal protective equipment:**
· **General protective and hygienic measures:**
Keep away from foodstuffs, beverages and feed.
Wash hands before breaks and at the end of work.
· **Breathing equipment:** Not required.
· **Protection of hands:**
The glove material has to be impermeable and resistant to the product/ the substance/ the preparation.
Due to missing tests no recommendation to the glove material can be given for the product/ the preparation/ the chemical mixture.
Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation
· **Material of gloves**
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer.
· **Penetration time of glove material**
The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.

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acc. to OSHA HCS

Printing date 07/03/2017 Reviewed on 06/29/2017

Trade name: Ethylene Glycol

(Contd. of page 3)

· **Eye protection:** Goggles recommended during refilling.
· **Body protection:** Protective work clothing

9 Physical and chemical properties

· **Information on basic physical and chemical properties**	
· **General Information**	
· **Appearance:**	
Form:	Liquid
Color:	Colorless
· **Odor:**	Sweetish
· **Odor threshold:**	Not determined.
· **pH-value:**	Not determined.
· **Change in condition**	
Melting point/Melting range:	-12.4 °C (10 °F)
Boiling point/Boiling range:	197 °C (387 °F)
· **Flash point:**	111 °C (232 °F)
· **Flammability (solid, gaseous):**	Not applicable.
· **Ignition temperature:**	410 °C (770 °F)
· **Decomposition temperature:**	Not determined.
· **Auto igniting:**	Not determined.
· **Danger of explosion:**	Product does not present an explosion hazard.
· **Explosion limits:**	
Lower:	3.2 Vol %
Upper:	53 Vol %
· **Vapor pressure at 20 °C (68 °F):**	0.08 hPa
· **Density at 20 °C (68 °F):**	1.11 g/cm³ (9.263 lbs/gal)
· **Relative density**	Not determined.
· **Vapor density**	Not determined.
· **Evaporation rate**	Not determined.
· **Solubility in / Miscibility with**	
Water at 20 °C (68 °F):	1 g/l
· **Partition coefficient (n-octanol/water):**	Not determined.
· **Viscosity:**	
Dynamic at 20 °C (68 °F):	21 mPas
Kinematic:	Not determined.
· **Other information**	No further relevant information available.

10 Stability and reactivity

· **Reactivity** No further relevant information available.
· **Chemical stability**
· **Thermal decomposition / conditions to be avoided:** No decomposition if used according to specifications.
· **Possibility of hazardous reactions** No dangerous reactions known.

(Contd. on page 5)

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acc. to OSHA HCS

Trade name: Ethylene Glycol

(Contd. of page 4)

· **Conditions to avoid** No further relevant information available.
· **Incompatible materials:** No further relevant information available.
· **Hazardous decomposition products:** No dangerous decomposition products known.

11 Toxicological information

· **Information on toxicological effects**
· **Acute toxicity:**

· **LD/LC50 values that are relevant for classification:**		
Oral	LD50	5840 mg/kg (rat)
Dermal	LD50	9530 mg/kg (rabbit)

· **Primary irritant effect:**
· **on the skin:** No irritant effect.
· **on the eye:** No irritating effect.
· **Sensitization:** No sensitizing effects known.
· **Additional toxicological information:**

· **Carcinogenic categories**
· **IARC (International Agency for Research on Cancer)** Substance is not listed.
· **NTP (National Toxicology Program)** Substance is not listed.
· **OSHA-Ca (Occupational Safety & Health Administration)** Substance is not listed.

12 Ecological information

· **Toxicity**
· **Aquatic toxicity:** No further relevant information available.
· **Persistence and degradability** No further relevant information available.
· **Behavior in environmental systems:**
· **Bioaccumulative potential** No further relevant information available.
· **Mobility in soil** No further relevant information available.
· **Additional ecological information:**
· **General notes:**
Water hazard class 1 (Assessment by list): slightly hazardous for water
Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.
· **Other adverse effects** No further relevant information available.

13 Disposal considerations

· **Waste treatment methods**
· **Recommendation:**
Must not be disposed of together with household garbage. Do not allow product to reach sewage system.

· **Uncleaned packagings:**
· **Recommendation:** Disposal must be made according to official regulations.
· **Recommended cleansing agent:** Water, if necessary with cleansing agents.

US

(Contd. on page 6)

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acc. to OSHA HCS

Printing date 07/03/2017 Reviewed on 06/29/2017

Trade name: Ethylene Glycol

(Contd. of page 5)

14 Transport information

· **UN-Number**	
· **DOT, ADN, IMDG, IATA**	Not regulated
· **UN proper shipping name**	
· **DOT, ADN, IMDG, IATA**	Not regulated
· **Transport hazard class(es)**	
· **DOT, ADN, IMDG, IATA**	
· **Class**	Not regulated
· **Packing group**	
· **DOT, IMDG, IATA**	Not regulated
· **Environmental hazards:**	
· **Marine pollutant:**	No
· **Special precautions for user**	Not applicable.
· **Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code**	Not applicable.
· **Transport/Additional information:**	
· **DOT**	
· **Hazardous substance:**	5000 lbs, 2270 kg
· **UN "Model Regulation":**	Not regulated

15 Regulatory information

· **Safety, health and environmental regulations/legislation specific for the substance or mixture**
· **Sara**
· **Section 355 (extremely hazardous substances):** Substance is not listed.
· **Section 313 (Specific toxic chemical listings):** Substance is listed.
· **TSCA (Toxic Substances Control Act):** Substance is listed.
· **Proposition 65**
· **Chemicals known to cause cancer:** Substance is not listed.
· **Chemicals known to cause reproductive toxicity for females:** Substance is not listed.
· **Chemicals known to cause reproductive toxicity for males:** Substance is not listed.
· **Chemicals known to cause developmental toxicity:** Substance is listed.

· **Carcinogenic categories**
· **EPA (Environmental Protection Agency)** Substance is not listed.
· **TLV (Threshold Limit Value established by ACGIH)** A4
· **NIOSH-Ca (National Institute for Occupational Safety and Health)** Substance is not listed.
· **GHS label elements** The substance is classified and labeled according to the Globally Harmonized System (GHS).
· **Hazard pictograms**

GHS07

· **Signal word** Warning

(Contd. on page 7)

Safety Data Sheet
acc. to OSHA HCS

Trade name: Ethylene Glycol

(Contd. of page 6)

· **Hazard statements**
Harmful if swallowed.
· **Precautionary statements**
Wash thoroughly after handling.
Do not eat, drink or smoke when using this product.
IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell.
Rinse mouth.
Dispose of contents/container in accordance with local/regional/national/international regulations.
· **Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

· **Department issuing SDS:** Environment protection department.
· **Contact:**
· **Date of preparation / last revision**
Revision 0.1, 5-01-2015: revised to correct emergency contact and information dept. . STN
Creation date for SDS 10-02-2014. STN
Revision 0.2, 07-03-2017: Reviewed SDS. STN
07/03/2017 / -
· **Abbreviations and acronyms:**
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
ACGIH: American Conference of Governmental Industrial Hygienists
EINECS: European Inventory of Existing Commercial Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
PBT: Persistent, Bioaccumulative and Toxic
vPvB: very Persistent and very Bioaccumulative
NIOSH: National Institute for Occupational Safety
OSHA: Occupational Safety & Health
TLV: Threshold Limit Value
PEL: Permissible Exposure Limit
REL: Recommended Exposure Limit
Acute Tox. 4: Acute toxicity – Category 4

SDS no. PID1081
Version 10
Revision date 19-Mar-2018
Supersedes Date: 17-Dec-2014

Safety Data Sheet
MONOETHYLENE GLYCOL (MEG)

1. Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Product name	MONOETHYLENE GLYCOL (MEG)
Product code	PID1081
Country Limitations	This SDS is not for use in the European Union (EU).
Synonyms	MONOETHYLENE GLYCOL 100%, MEG 100%
Molecular weight	62.06 g/mol

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use	Commercial chemical
Uses advised against	None known.

1.3 Details of the supplier of the safety data sheet

Supplier
SMI Oilfield Technology & Products FZE
P.O Box 17120
Jebel Ali
Dubai
UAE
+97 14 8833100
+97 14 8837197

SDS@slb.com

1.4 Emergency Telephone Number

Emergency telephone - (24 Hour) Australia +61 2801 44558, Asia Pacific +65 3158 1074, China +86 10 5100 3039, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, New Zealand +64 9929 1483, USA 001 281 561 1600

2. Hazards Identification

2.1 Classification of the substance or mixture

GHS Classification

Health hazards

Acute toxicity - Oral	Category 4
Specific target organ toxicity - Repeated exposure	Category 2

Environmental hazards Not classified

Physical Hazards Not classified

2.2 Label elements

Signal word
WARNING

Hazard Statements
H302 - Harmful if swallowed
H373 - May cause damage to organs through prolonged or repeated exposure

Precautionary statements
P260 - Do not breathe dust/fume/gas/mist/vapors/spray
P264 - Wash face, hands and any exposed skin thoroughly after handling
P270 - Do not eat, drink or smoke when using this product
P301 + P312 - IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
P330 - Rinse mouth
P314 - Get medical advice/attention if you feel unwell
P501 - Dispose of contents/container in accordance with local, regional, national, and international regulations as applicable

-

Contains
Ethylene Glycol

2.3 Other hazards

Not classified as PBT/vPvB by current EU criteria

3. Composition/information on ingredients

3.1 Substances

Chemical Name	EC No	CAS No	Weight-%
Ethylene Glycol	203-473-3	107-21-1	60-100

3.2 Mixtures

Not applicable

4. First Aid Measures

4.1 First aid measures

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Seek medical attention if irritation occurs.

Skin contact	Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention immediately if symptoms occur.
Eye Contact	Remove contact lenses, if worn. Promptly wash eyes with lots of water while lifting eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed

General advice	The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.
Symptoms	
Inhalation	Please see Section 11. Toxicological Information for further information.
Ingestion	Please see Section 11. Toxicological Information for further information.
Skin contact	Please see Section 11. Toxicological Information for further information.
Eye contact	Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician Treat symptomatically.

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Extinguishing media - small fires, Dry powder,
, Extinguishing media - large fires, Water spray, fog or regular foam.

Extinguishing media which must not be used for safety reasons
None known.

5.2. Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
None known.

Hazardous combustion products
Fire or high temperatures create: Carbon oxides (COx).

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. See also section 8.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Dike far ahead of liquid spill for later disposal.

Methods for cleaning up
Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and Storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Do not breathe vapors or spray mist. Avoid spills and splashing during use.

Hygiene Measures
Use good work and personal hygiene practices to avoid exposure. When using do not smoke, eat or drink. Wash hands and face before breaks and immediately after handling the product Remove contaminated clothing.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions	Ensure adequate ventilation. Keep airborne concentrations below exposure limits.
Storage precautions	Keep containers tightly closed in a dry, cool and well-ventilated place. Avoid excessive heat for prolonged periods of time. Avoid contact with: Oxidizing agents
Storage class	Chemical storage.
Packaging materials	Use specially constructed containers only.

8. Exposure controls/personal protection

8.1 Control parameters

Component Information

Chemical Name	Arabic	Australia	Egypt
Ethylene Glycol	Not determined	40ppmSTELvapour 104mg/m³STELvapour 10mg/m³TWAparticulate 20ppmTWAvapour 52mg/m³TWAvapour	39.4 ppm Ceiling 100 mg/m³ Ceiling
Chemical Name	**India**	**Indonesian**	**Japan**
Ethylene Glycol	Not determined	100 mg/m³ STEL	Not determined

Chemical Name	Kazakhstan	Kuwait	New Zealand
Ethylene Glycol	5 mg/m³ MAC	100 mg/m³ STEL	50 ppm Ceiling mist and vapour 127 mg/m³ Ceiling mist and vapour
Chemical Name	**Malaysia**	**Philippines**	**Russia**
Ethylene Glycol	39.4 ppm Ceiling aerosol 100 mg/m³ Ceiling aerosol	Not determined	10 mg/m³ STEL 5 mg/m³ TWA
Chemical Name	**Thailand**	**Vietnam**	**Turkey**
Ethylene Glycol	Not determined	10 mg/m³ TWA 60 mg/m³ TWA 20 mg/m³ STEL 125 mg/m³ STEL	40 ppm STEL 104 mg/m³ STEL Skin 20 ppm TWA 52 mg/m³ TWA

8.2 Exposure controls

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering Controls
Ensure adequate ventilation

Personal protective equipment

Eye protection Use eye protection according to EN 166, designed to protect against liquid splashes Tightly fitting safety goggles Safety glasses with side-shields

Hand protection Wear chemically resistant gloves (tested to EN 374) in combination with 'basic' employee training
Use protective gloves made of: Nitrile Neoprene Butyl rubber
Break through time >480 minutes
Glove thickness 0.4 mm
Be aware that liquid may penetrate the gloves. Frequent change is advisable.

Respiratory protection No personal respiratory protective equipment normally required In case of insufficient ventilation wear suitable respiratory equipment Use respirator with organic vapor protection (A, brown) At work in confined or poorly ventilated spaces, respiratory protection with air supply must be used.

Skin and body protection Wear suitable protective clothing Eye wash and emergency shower must be available at the work place.

Hygiene Measures Wash hands before eating, drinking or smoking Remove and wash contaminated clothing before re-use

8.2.3 Environmental exposure controls

Environmental exposure Use appropriate containment to avoid environmental contamination See section 6 for more information

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state Liquid

Appearance	Clear
Odor	Mild
Color	Colorless
Odor threshold	Not applicable

Property	Values	Remarks
pH	No information available	
pH @ dilution	6 - 7.5	@ 10%
Melting / freezing point	< -12 °C / 10.4 °F	
Boiling point/range	196 - 199 °C / 384.8 - 390.2 °F	
Flash point	111 °C / 231.8 °F	Closed cup
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not applicable	
Flammability Limit in Air		
Upper flammability limit	28 %	
Lower flammability limit	3.2 %	
Vapor pressure	0.007 kPa	@ 20 °C
Vapor density	No information available	
Specific gravity	No information available	
Bulk density	No information available	
Relative density	No information available	
Water solubility	Soluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	410 °C / 770 °F	
Decomposition temperature	No information available	
Kinematic viscosity	21 mPas	@ 20 °C
Dynamic viscosity	No information available	
log Pow	-1.36	

Explosive properties	Not applicable
Oxidizing properties	None known.

9.2 Other information

Pour point	No information available
Molecular weight	62.06 g/mol
VOC content(%)	None
Density	1.11 ± 0.03 g/ml @ 25°C

Comments
The data listed above are typical physical and chemical properties and should not be construed as product specification.

10. Stability and Reactivity

10.1 Reactivity

No specific reactivity hazards associated with this product.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Avoid excessive heat for prolonged periods of time.

10.5 Incompatible materials

Oxidizing agents.

10.6 Hazardous decomposition products

See Section 5.2.

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation Vapors may irritate throat and respiratory system. May cause additional affects as listed under "Ingestion".

Eye contact Contact with eyes may cause irritation.

Skin contact May be absorbed through the skin in harmful amounts. Prolonged contact may cause redness and irritation.

Ingestion Harmful if swallowed. May cause damage to organs through prolonged or repeated exposure.

Unknown acute toxicity Not applicable.

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Ethylene Glycol	= 7712 mg/kg (Rat) ECHA Data	> 3500 mg/kg (Mouse) ECHA Data	> 2.5 mg/l (Rat) 6 hour ECHA Data

Sensitization This product does not contain any components suspected to be sensitizing.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity This product does not contain any known or suspected carcinogens.

Reproductive toxicity This product does not contain any known or suspected reproductive hazards.

Routes of exposure Skin contact. Ingestion. Inhalation.

Routes of entry Skin contact. Skin absorption. Ingestion.

Specific target organ toxicity - Single exposure Not classified

Specific target organ toxicity - Repeated exposure Category 2.

Target organ effects Kidney.

Aspiration hazard Not applicable.

Other information Key literature references and sources for data. See Section 16 for more information.

12. Ecological Information

12.1 Toxicity

Listed on PLONOR list of OSPAR
The product component(s) are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Toxicity to algae
See component information below.

Toxicity to fish
See component information below.

Toxicity to daphnia and other aquatic invertebrates
See component information below.

Toxicology data for the components

Chemical Name	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Ethylene Glycol	40000 - 60000 mg/L LC50 (Pimephales promelas) = 96 h 40761 mg/L LC50 (Oncorhynchus mykiss) = 96 h 27540 mg/L LC50 (Lepomis macrochirus) = 96 h 14 - 18 mL/L LC50 (Oncorhynchus mykiss) = 96 h 16000 mg/L LC50 (Poecilia reticulata) = 96 h 41000 mg/L LC50 (Oncorhynchus mykiss) = 96 h	6500 - 13000 mg/L EC50 (Pseudokirchneriella subcapitata) = 96 h	46300 mg/L EC50 (Daphnia magna) = 48 h

12.2 Persistence and degradability

See component information below.

Chemical Name	Persistence and degradability
Ethylene Glycol	Readily biodegradable

12.3 Bioaccumulative potential

See component information below.

Chemical Name	Bioaccumulation
Ethylene Glycol	log Pow -1.36(Calculated) Not likely to bioaccumulate

log Pow
-1.36

12.4 Mobility

Mobility
Soluble in water.

Mobility in soil
No information available.

12.5 Results of PBT and vPvB assessment

Not classified as PBT/vPvB by current EU criteria.

12.6 Other adverse effects.

None known.

12.7 Other information
Key literature references and sources for data. See Section 16 for more information.

13. Disposal considerations

13.1 Waste treatment methods

Waste from residues / unused products	Dispose of in accordance with local regulations.
Contaminated packaging	Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1. UN number
Not regulated

14.2. UN proper shipping name
The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG/ANTAQ Hazard class	Not regulated
ICAO/ANAC Hazard class/division	Not regulated

14.4 Packing group

ADR/RID/ADN/ADG Packing group	Not regulated
IMDG/ANTAQ Packing group	Not regulated
ICAO/ANAC Packing group	Not regulated

14.5 Environmental hazard
No

14.6 Special precautions
Not applicable

14.7 Transport in bulk according to Annex I/II of MARPOL 73/78 and the IBC Code
The product has been assessed and contained in Chapters 17/18 of the IBC Code and the latest MEPC.2/Circular and is permitted to be carried under Annex II of MARPOL and resolution A.673 (16) Offshore Supply Vessel Code.
Proper Shipping Name: Ethylene glycol. Ship Type:- 3. Pollution Category:- Y.

Please contact SDS@slb.com for info regarding transport in Bulk.

15. Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

The Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

Australian Standard for the Uniform Scheduling of Drugs and Poisons
Australian Standard for the Uniform Scheduling of Drugs and Poisons
Ethylene Glycol
Schedule 6
Schedule 5

International inventories

USA (TSCA)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Complies
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

This SDS is not for use in the European Union (EU).

16. Other Information

Prepared by	Global Regulatory Compliance - Chemicals (GRC - Chemicals) , Sandra McWilliam
Supersedes Date:	17-Dec-2014
Revision date	19-Mar-2018
Version	10
This SDS has been revised in the following section(s)	All sections No changes with regard to classification have been made.

Key literature references and sources for data
www.ChemADVISOR.com
Supplier
National Chemical Inventories
National regulatory information
National occupational exposure limits

Training Advice
Follow general hygiene considerations recognized as common good workplace practices

Disclaimer
The information contained herein is considered in good faith as reliable of the date issued and is based upon on measurements, tests or data derived from supplier's own study or furnished by others. In providing this SDS information, Supplier makes no express or implied warranties as to the information or product; merchantability or fitness of purpose; any express or implied warranty; or non-infringement of intellectual property rights; and supplier assumes no responsibility for any direct, special or consequential damages, results obtained, or the activities of others. To the maximum extent permitted by law, supplier's warranty obligations and buyer's sole remedies are as stated in separate agreement between the parties.

Safety Data Sheet (SDS)

Effective Date: November 1, 2017

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

Material Name : SHELL TELLUS S2 M 22,32,46,68
Recommended Use : Hydraulic oil.
Restricted Use : Other than those above.
Manufacturer/Supplier : Shell Lubricants Japan K.K.
3-2, Daiba 2-chome, Minato-ku, Tokyo, 135-8074, Japan
Telephone/Fax : Refer to end of this document.
Emergency Telephone Number : Refer to end of this document. (Japanese office hours only)
Quality Assurance Division
SDS Code : 463030

2. HAZARDS IDENTIFICATION

GHS Classification : NOT HAZARDOUS
GHS Label Elements
Symbol(s) : No symbol
Signal Words : No signal word
Hazard Statement : Not classified under GHS criteria.
GHS Precautionary Statements
Prevention : No precautionary phrases.
Response : No precautionary phrases.
Storage : No precautionary phrases.
Disposal : No precautionary phrases.
Unclassified Hazard Information : Please see Section 4 - 8 before use for Prevention/Response/Storage/Disposal.
Used oil may contain harmful impurities.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance or Mixture : Mixture
Chemical Description : Lubricating oil.
Component Information : Lubricant base oil ≥97%
Additives ≤3%
Chemical Formula : Not possible to define.
CAS registry number : Trade secret
Additional Information : The highly refined mineral oil contains <3% DMSO-extract, according to IP346.
Pollutant Release and Transfer Register (PRTR) Law : Not applicable
Industrial Safety and Health Law : Labeling(Delivery of Documents): Mineral oil 90-100%
Poisonous and Deleterious Substance Control Law : Not applicable
Classification of components according to GHS : [Chemical Identity/Hazard Class (category)/Hazard Statement/Conc.]
No hazardous information.
The specific chemical identities and percentages of composition have been withheld as trade secrets.

4. FIRST AID MEASURES

General Information : Not expected to be a health hazard when used under normal conditions.
Inhalation : Remove casualty to fresh air and keep at rest in a position comfortable for breathing. Cover with blanket to keep warm and rest in a quiet surrounding. Seek immediate medical advice and attention.
Skin Contact : Wash skin with large amount of water using soap.
Eye Contact : Rinse cautiously with clean water for several minutes. Remove contact lenses, if present and easy to do, and continue rinsing. After rinsing for a minimum of 15 minutes, seek medical advice and attention.
Ingestion : Without inducing vomiting, call a doctor for treatment. If mouth has been dirtied, clean with water.
Most Important Symptoms/Effects, Acute & Delayed : If swallowed, may irritate mucous membrane of stomach and induce vomiting. Inhalation if mist may cause feeling ill. Skin contact and eye contact may cause irritation.
Immediate Medical Attention, Special Treatment : Treat symptomatically. Call a doctor or poison control center for guidance.

5. FIRE FIGHTING MEASURES

Clear fire area of all non-emergency personnel.
Suitable Extinguishing Media : Concentrated strong liquid in mist and powder forms, carbon dioxide and foam. Use powder and carbon dioxide may be used small fires only. Effective to use foam to shutdown the air in a large fires.

Unsuitable Extinguishing Media	:	Do not use water in a jet.
Specific Hazards Arising from Chemicals	:	Hazardous combustion products may include: A complex mixture of airborne solid and liquid particulates and gases (smoke). Carbon monoxide. Unidentified organic and inorganic compounds
Fire fighting instructions	:	Water the surrounding equipment to cool them down. Cordon off the affected place and its vicinity to all, except the concerned parties.
Protective Equipment & Precautions for Fighters	:	Ensure to wear protective equipment and approach from windward.

6. ACCIDENTAL RELEASE MEASURES

Avoid contact with spilled or released material. For guidance on selection of personal protective equipment see Section 8 of this SDS. See Section 13 for information on disposal. Observe the relevant local and international regulations.

Personal Precautions, Protective Equipment and Emergency Procedures	:	Avoid contact with skin and eyes. Prepare suitable equipment and materials.
Environmental Precautions	:	Use appropriate containment to avoid environmental contamination. Prevent from spreading or entering drains, ditches or rivers by using sand, earth, or other appropriate barriers. In event of entering in the sea, extend oil fences to prevent from spreading, and sop up with absorbent materials. Use chemicals and/or detergents, they must satisfy technical standards as set by the Ministry of Land, Infrastructure and Transport / Ministry of the Environment.
Methods and Material for Containment and Clean Up	:	Promptly remove all ignition sources and stop leakages. In a small leakage, absorb and recover by use of soil, sand, sawdust and waste clothes. In a large leakage, cordon off the danger zone, prevent from entering and enclose it with sand bank and stop outflow. Cover liquid surface with foam, and recover liquid into containers.
Additional Advice	:	Local authorities should be advised if significant spillages cannot be contained.

7. HANDLING AND STORAGE

HANDLING

Technical Measures	:	In handling this material over the allocated volume, ensure approval to meet requires of the laws. Keep away from heat, sparks, open flames, hot objects. No smoking. Take measures against static discharge. Ensure to wear clothing and shoes made of conductive materials. When fixing or processing machine, it carries out after removing dangerous objects completely. NEVER suck up (siphoning) this material by mouth. Wear suitable protect equipment if skin or eye contact may cause. Seal containers hermetically without handling in violent such as falling, dropping, or jolting.
Ventilation Precautions	:	see Section 8
Precautions for Safe Handling	:	Use under normal temperature. Prevent from mixing water and impurity. Avoid contact with halogens, strong acids, alkali and oxidizing materials.

STRAGE

Conditions for Safe Storage	:	Keep containers tightly closed and in a cool, well-ventilated place away from direct sunlight. It is recommended to lock up storage area. Use properly labelled and closeable containers. Avoid heat, sparks, open flame and static accumulation.
Technical Measures	:	All electrical appliances shall be explosion-proof types, and they all must be earthed.
Precautions for Safe Stroage	:	Avoid contact and storage in same place with halogens, strong acids, alkali and oxidizing materials.
Recommended Materials	:	Storage in original containers. Do not pressurize empty containers. May cause rupture. Do not weld, heat up, drill or cut containers. May ignite the residue and cause explosion.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

If the American Conference of Governmental Industrial Hygienists (ACGIH) value is provided on this document, it is provided for information only.

Equipment	:	Seal or install ventilations for mist occurs. Install eye shower and body shower near working site.
Standard Concentration Control	:	Not specified
OSHA, Permissible Exposure Limits (PEL)	:	5mg/m^3 (Oil mist, mineral)
Occupational Exposure Limits	:	Japan Society for Occupational Health(2012)[(1)] 3mg/m^3 (Oil mist, mineral) ACGIH(2012) TWA[Inhalable fraction.][(2)] 5mg/m^3 (Oil mist, mineral)
Protective Equipment	:	Skin protection not ordinarily required beyond standard issue work clothes.
Respiratory Protection	:	No respiratory protection is ordinarily required under normal conditions of use. Use appropriate equipment in response to the circumstances.
Hand Protection	:	Use oil-proof protective hand gloves under prolonged or repeated skin contact.
Eye Protection	:	Wear safety glasses or full face shield if splashes are likely to occur.

Skin and Body Protection : Use oil-proof/long sleeved clothing under prolonged usage.

Appropriate Sanitary Measures: : Remove immediately all contaminated clothing. Contaminated clothing must be laundered before reuse.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state	: Liquid at room temperature.
Colour	: Light yellow.
Odour	: Characteristic mineral oil.
Odour threshold	: Data not available.
pH	: Not applicable.
Pour point	: <-20°C
Initial Boiling Point	: Expected >250°C
Flash point	: ≥ 200°C (COC)
Evaporation rate	: Data not available.
Flammability (solid, gas)	: Not applicable.
Upper / lower Flammability or Explosion limits	: Typical 1 - 7 %(V) (based on mineral oil)
Vapour pressure	: Data not available.
Vapour density	: Data not available. Expected >1
Density	: Approx. 0.87g/cm^3 (15°C)
Solubility	: **Water**: Negligible.
n-octanol/water partition coefficient (log Pow)	: Data not available.
Auto-ignition temperature	: Data not available. Expected >320°C
Decomposition Temperature	: Data not available.

10. STABILITY AND REACTIVITY

Chemical Stability	: Stable under normal condition.
Hazardous Reactivity	: Avoid contact with strong oxidizing agent.
Conditions to Avoid	: Avoid contact with halogens, strong acids, alkalis, and oxidizing materials.
Incompatible Materials	: Data not available.
Hazardous Decomposition Products	: Hazardous decomposition products are not expected to form during normal storage. Generates smoke, carbon monoxide, sulfurous acid gas etc. during combustion.

11. TOXICOLOGICAL INFORMATION

Basis for Assessment Information given is based on data on the components and the toxicology of similar products.
Unless indicated otherwise, the data presented is representative of the main component of a whole product, rather than for individual component(s). Individual components contained above cut-off value is described on Section 3.

Acute Toxicity

1	Oral	Expected to be of low toxicity: LD_{50} > 5000 mg/kg , Rat[3]
2	Dermal	Expected to be of low toxicity: LD_{50} > 5000 mg/kg , Rabbit[3]
3	Inhalation(Vapour)	Data not available
4	Inhalation(Mist)	Low toxicity: LC_{50} > 5 mg/l , 4h, Rat[3]

Skin Corrosion/Irritation : Not classified as a skin irritation (rabbit test).[3] Prolonged/repeated contact may cause defatting of the skin which can lead to dermatitis.

Serious Eye Damage/Irritation : Not classified as an eye irritation (rabbit test).[3]

Respiratory or Skin Sensitisation : No data available concerning respiratory sensitisation.
Not classified as a skin sensitisation (Buehler test; guinea pig).[3]

Germ Cell Mutagenicity : The mutagenic potential of the product category 'other lubricant base oils' has been extensively studied in a range of "in vivo" and "in vitro" assays. The majority of the studies showed no evidence of mutagenic activity.[3]

Carcinogenicity : Product contains mineral oils of types shown to be noncarcinogenic in animal skin-painting studies.[3]
Highly refined mineral oils are not classified as carcinogenic by the International Agency for Research on Cancer (IARC monographs: Group 3)[4], ACGIH[5] and EU Directives.[6]

Reproductive and Developmental Toxicity : Results of developmental and reproductive toxicity studies showed no evidence of developmental or reproductive toxicity in rats.[3]

Specific target organ toxicity - single exposure : Acute studies do not indicate any specific organ toxicity following single exposure.[3]

Specific target organ toxicity - repeated exposure : The repeat dose toxicity has been investigated by dermal and inhalation routes for periods between 4 weeks and up to 2 years. No systemic effects showed.[3]

Aspiration Hazard : Not classified as a hydrocarbon with kinetic viscosity ≤ 20.5mm2/s measured at 40°C. Not considered an aspiration hazard.

12. ECOLOGICAL INFORMATION

Basis for Assessment Ecotoxicological data have not been determined specifically for this product. Information given is based on a knowledge of the components and the ecotoxicology of similar products.
Unless indicated otherwise, the data presented is representative of the main component of a whole product, rather than for individual component(s). Individual components contained above cut-off value is described on Section 3.

Caution : Poorly soluble mixture. May cause physical fouling of aquatic organisms.
The Water Accommodated Fraction (WAF) is applied following tests..

Toxicity

:	Fish(Fathead minnow, 96h)	LL_{50}	>100mg/L[(3)]
:	Fish(Fathead minnow, 14d)	NOEL	>100mg/L[(3)]
:	Crustacea (Daphnia magna, 48h)	EL_{50}/NOEL	>10,000mg/L[(3)]
:	Crustacea (Daphnia magna, 21d)	NOEL	>10mg/L[(3)]
:	Algae(Pseudokirchneriella subcapitata)	NOEL	>100mg/L[(3)]

: In a static 4-day microorganism luminescence inhibition study, no significant luminescence inhibition was observed.[(3)]

Acute Aquatic Toxicity : Not expected to be a hazard.
Chronic Aquatic Toxicity : Not expected to be a hazard.
Mobility : Generally floats on water.
: Lubricating oil components have estimated log Koc >3, indicating these components are likely to be adsorbed onto soil and sediment and are not likely to leach to ground water.
Persistence/degradability : Another lubricant base oil was determined to be inherently biodegradable but not readily biodegradable, with a mean degradation of 31% by day 28.
Bioaccumulative Potential : Not available as highly refined base oil.
Hazardous to ozone layer : Not classified because this product not contained substances listed on Montreal Protocol and Ozone Layer Protection Law.

13. DISPOSAL CONSIDERATIONS

Material Disposal
1 Waste disposal yourself or entrust the industrial waste treatment company who obtained the prefectural governor's permission or municipal corporation. Disposal should be in accordance with applicable regional, national, and local laws and regulations.
2 Do not dispose into the environment, in drains or in water courses.
3 For landfill disposal, destroy by fire and confirm cinders agreed to Waste Disposal Law.
4 In event of burning this material, ensure to carryout work in safe place with guards in position, and select a method that would not cause any harm or damage to others during combustion or explosion.

Container Disposal : Purify and recycle or performs suitable disposal in accordance with the standard of related laws and regulations. Disposal with remove content completely.

14. TRANSPORT INFORMATION

International Restriction

UN Class, Shipping Name : Not Dangerous Goods.
UN Number : Not applicable.
Marine Pollutant : Yes.
Domestic Restriction : Since domestic laws and regulations shown below are applicable, containers and transportation methods shall be required to follow each and every regulation.

Land **Fire Service Law:** Dangerous goods. Group 4 (flammable liquid), Class 4 petroleum, Danger grade III
Container: If product classified as dangerous goods, use containers (other than tanker, tank car and tank truck) for transportation usage, shall meet the Clause 2, Notice Attachment 3, concerning dangerous materials.

Sea : Ship Safety Law: Not Dangerous Goods.
Air : Civil Aeronautics Act: Not Dangerous Goods.

Specific safety measures and conditions for transportation
1 Caution: Flammable.
2 Transport remarkably with containers may not cause friction or agitation.
3 Display signage on vehicle and provide with fire fighting equipment, if and when required to transport more than the specified quantity. Total piled height of vehicle shall be less than 3 meters.
4 Consolidation of this material with dangerous goods belonging to the 1st and 6th Classification is prohibited.
5 Abide by other laws and regulations that are applicable.

15. REGULATORY INFORMATION

International Information

EINECS/ELINCS (EC) : All components listed or polymer exempt.
TSCA (USA) : All components listed or in compliance.

METI (JAPAN)	:	All components listed or in compliance.
Domestic Information		
Fire Service Law	:	Dangerous goods. Group 4 (flammable liquid), Class 4 petroleum, Danger grade III
Pollutant Release and Transfer Register (PRTR) Law	:	Not applicable
Industrial Safety and Health Law	:	Labeling(Delivery of Documents): Mineral oil 90-100%
Poisonous and Deleterious Substance Control Law	:	Not applicable
Marine Pollution Protection Law	:	Waste Oil Regulation.
Sewage Control Law	:	Mineral Oil Disposal Regulation. (5mg/L)
Water Pollution Prevention Law	:	Oil Disposal Regulation. (5mg/L)
Waste Disposal and Public Cleaning Law	:	Industrial Waste Regulation.

16. OTHER INFORMATION

- Subscribe "%" in this document means weight percentage.

[Quotation]

1. Recommendation of Occupational Exposure Limits (2012), Japanese Society of Occupational Health
2. Thresholds limit values for chemical substances and physical agents and biological exposure indices, ACGIH (2012)
3. ECHA (European Chemicals Agency), website "ECHA CHEM", Information on Registered Substances (2011). SDS of EU suppliers (2011)
4. IARC Monographs Programme on the Evaluation of Carcinogenic Risk to Humans (2006)
5. ACGIH documentation (2006)
6. EC Directive 67/548/EEC Annex I, EU CLP Regulation(EC) No.1272/2008 Annex VI Table3.1,Table3.2

[Reference]

- Globally Harmonized System of Classification and Labelling of Chemicals (GHS) 4th revised edition, UNITED NATIONS(2011)
- Japanese Standards Association (JSA), JIS Z 7253:2012, JIS Z 7252:2014
- National Institute of Technology and Evaluation (nite), "GHS Information"
- Ministry of Economy, Trade and Industry, Chemical Management site.
- Ministry of Health, Labour and Welfare, "Label and SDS information for GHS model"

Safety Data Sheet (SDS) about hazardous chemical is provided for a entrepreneur as reference information for safety handling. Refer to this document and perform suitable handling. Nothing in this document shall reduce the user's responsibility to satisfy itself as to the suitability, accuracy, reliability, and completeness of such information for its particular use. There is no warranty against intellectual property infringement. The information contained in this document is based upon data believed to be reliable through our supply chain at the time. So, we could not guarantee all about the contents. This document is based on JIS Z7253:2012, and is not a guarantee of safety.
Contents of SDS updated periodically. SDS compliance is required as a rule to all business enterprises engaged in transaction of chemicals (including products containing them) with other businesses. Retailer/ Wholesaler must provide newest SDS to customers.

[Technical contact] Shell Lubricants Japan K.K. / Lubricant Customer Service Center
TEL.0120-064-315 (Japanese domestic only) / csc@shell-lubes.co.jp

[SDS Author] Shell Lubricants Japan K.K. / Quality Assurance Division
TEL.+81-3-5531-5770, FAX.+81-3-5531-5757

[SDS Request] As a rule, the direct delivery entrepreneur must provide the newest SDS to customer.
Please contact not directly manufacturer but your supply chain company.

Safety Data Sheet: Mineral Oil

Waste Stream: Waste Mineral Oil

EPA Waste Sheet Profile Number: 20145060-038

HALLIBURTON

SAFETY DATA SHEET

Product Trade Name: **GASSTOP EXP**

Revision Date: 02-Jun-2015 **Revision Number:** 18

1. Identification

1.1. Product Identifier

Product Trade Name: GASSTOP EXP
Synonyms: None
Chemical Family: Blend
Internal ID Code HM004586

1.2 Recommended use and restrictions on use

Application: Fluid Loss Additive

Uses Advised Against No information available

1.3 Manufacturer's Name and Contact Details

Manufacturer/Supplier Halliburton Energy Services Inc.
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By Chemical Stewardship
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

1.4. Emergency telephone number

Emergency Telephone Number (281) 575-5000

2. Hazard(s) Identification

2.1 Classification in accordance with paragraph (d) of §1910.1200

As adopted by the competent authority, this product does not require an SDS or hazard warning label.

Not classified

2.2. Label Elements

Hazard Pictograms

Signal Word Not Classified

Hazard Statements Not Hazardous

Precautionary Statements

Prevention None

Response None

Storage None

Disposal None

Contains

Substances	**CAS Number**
Highly refined mineral oil	Proprietary

2.3 Hazards not otherwise classified

None known

3. Composition/information on Ingredients

Substances	CAS Number	PERCENT (w/w)	GHS Classification - US
Highly refined mineral oil	Proprietary	30 - 60%	Asp. Tox. 1 (H304) Aquatic Chronic 4 (H413)

The exact percentage (concentration) of the composition has been withheld as proprietary.

4. First-Aid Measures

4.1. Description of first aid measures

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult. Not a hazard under normal use conditions.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Skin Wash with soap and water. Get medical attention if irritation persists. Remove contaminated clothing and discard.

Ingestion Get medical attention! If vomiting occurs, keep head lower than hips to prevent aspiration.

4.2 Most important symptoms/effects, acute and delayed

No significant hazards expected.

4.3. Indication of any immediate medical attention and special treatment needed

Notes to Physician Treat symptomatically.

5. Fire-fighting measures

5.1. Extinguishing media

Suitable Extinguishing Media

Water fog, carbon dioxide, foam, dry chemical.

Extinguishing media which must not be used for safety reasons

Do NOT spray pool fires directly with water. A solid stream of water directed into hot burning liquid can cause splattering.

5.2 Specific hazards arising from the substance or mixture

Special Exposure Hazards

Use water spray to cool fire exposed surfaces. Closed containers may explode in fire. Decomposition in fire may produce toxic gases.

5.3 Special protective equipment and precautions for fire-fighters

Special Protective Equipment for Fire-Fighters
Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures
Use appropriate protective equipment.
See Section 8 for additional information

6.2. Environmental precautions
Prevent from entering sewers, waterways, or low areas.

6.3. Methods and material for containment and cleaning up
Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Scoop up and remove.

7. Handling and storage

7.1. Precautions for Safe Handling
Handling Precautions
Avoid contact with eyes, skin, or clothing. Avoid breathing vapors.
Hygiene Measures
Handle in accordance with good industrial hygiene and safety practice.

7.2. Conditions for safe storage, including any incompatibilities
Storage Information
Store away from oxidizers. Keep container closed when not in use. Store in a well ventilated area. Store between 40.5 F (4.7 C) and 120.5 F (49 C).

8. Exposure Controls/Personal Protection

8.1 Occupational Exposure Limits

Substances	CAS Number	OSHA PEL-TWA	ACGIH TLV-TWA
Highly refined mineral oil	Proprietary	5 mg/m^3	TWA: 5 mg/m^3

8.2 Appropriate engineering controls
Engineering Controls Use in a well ventilated area.

8.3 Individual protection measures, such as personal protective equipment
Personal Protective Equipment If engineering controls and work practices cannot prevent excessive exposures, the selection and proper use of personal protective equipment should be determined by an industrial hygienist or other qualified professional based on the specific application of this product.
Respiratory Protection Not normally needed. But if significant exposures are possible then the following respirator is recommended:
Dust/mist respirator. (N95, P2/P3)
Hand Protection Chemical-resistant protective gloves (EN 374)
Skin Protection Rubber apron.
Eye Protection Chemical goggles; also wear a face shield if splashing hazard exists.
Other Precautions None known.

9. Physical and Chemical Properties

9.1. Information on basic physical and chemical properties

Physical State:	Liquid	**Color:**	Yellowish
Odor:	Mild	**Odor Threshold:**	No information available

Property Remarks/ - Method	Values
pH:	No data available
Freezing Point/Range	< -9 °C / < 15 °F
Melting Point/Range	No data available
Boiling Point/Range	301 - 427 °C
Flash Point	185 °C / 365 °F ASTM D 92
Flammability (solid, gas)	No data available
upper flammability limit	7%
lower flammability limit	1%
Evaporation rate	No data available
Vapor Pressure	< 0.1 mmHg
Vapor Density	> 10 (air = 1)
Specific Gravity	1.057
Water Solubility	Insoluble in water
Solubility in other solvents	No data available
Partition coefficient: n-octanol/water	No data available
Autoignition Temperature	360 °C / 680 °F
Decomposition Temperature	No data available
Viscosity	No data available
Explosive Properties	No information available
Oxidizing Properties	No information available

9.2. Other information

VOC Content (%) No data available

10. Stability and Reactivity

10.1. Reactivity

Not expected to be reactive.

10.2. Chemical Stability

Stable

10.3. Possibility of Hazardous Reactions

Will Not Occur

10.4. Conditions to Avoid

None anticipated

10.5. Incompatible Materials

Strong oxidizers.

10.6. Hazardous Decomposition Products

Carbon monoxide and carbon dioxide.

11. Toxicological Information

11.1 Information on likely routes of exposure

Principle Route of Exposure Eye or skin contact, inhalation. Ingestion.

11.2 Symptoms related to the physical, chemical and toxicological characteristics

Acute Toxicity

Product Information Under certain conditions of use, some of the product ingredients may cause the following:

Inhalation May cause mild respiratory irritation.

Eye Contact May cause mild eye irritation.

Skin Contact May cause mild skin irritation.

Ingestion Aspiration into the lungs may cause chemical pneumonitis including coughing, difficulty breathing, wheezing, coughing up blood and pneumonia, which can be fatal.

Chronic Effects/Carcinogenicity No data available to indicate product or components present at greater than 0.1% are chronic health hazards.

11.3 Toxicity data

Toxicology data for the components

Substances	CAS Number	LD50 Oral	LD50 Dermal	LC50 Inhalation
Highly refined mineral oil	Proprietary	> 2000 mg/kg (Rat) >5000 mg/kg (Rat) (similar substance)	> 15000 mg/kg (Rodent) > 2000 mg/kg (Rabbit) (similar substance)	> 0.210 mg/L (Rat) (similar substance)

Substances	CAS Number	Skin corrosion/irritation
Highly refined mineral oil		Non-irritating to the skin (similar substances)

Substances	CAS Number	Eye damage/irritation
Highly refined mineral oil		Non-irritating to the eye (similar substances)

Substances	CAS Number	Skin Sensitization
Highly refined mineral oil		Not confirmed to cause skin or respiratory sensitization. (similar substances)

Substances	CAS Number	Respiratory Sensitization
Highly refined mineral oil		No information available

Substances	CAS Number	Mutagenic Effects
Highly refined mineral oil		In vitro tests did not show mutagenic effects (similar substances)

Substances	CAS Number	Carcinogenic Effects
Highly refined mineral oil		Did not show carcinogenic effects in animal experiments (similar substances)

Substances	CAS Number	Reproductive toxicity
Highly refined mineral oil		No information available

Substances	CAS Number	STOT - single exposure
Highly refined mineral oil		No significant toxicity observed in animal studies at concentration requiring classification. (similar substances)

Substances	CAS Number	STOT - repeated exposure
Highly refined mineral oil		No significant toxicity observed in animal studies at concentration requiring classification. (similar substances)

Substances	CAS Number	Aspiration hazard
Highly refined mineral oil		Aspiration into the lungs may cause chemical pneumonitis including coughing, difficulty breathing, wheezing, coughing up blood and pneumonia, which can be fatal.

12. Ecological Information

12.1. Toxicity

Ecotoxicity Effects

Product Ecotoxicity Data

No data available

Substance Ecotoxicity Data

Substances	CAS Number	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Toxicity to Invertebrates
Highly refined mineral oil	Proprietary	No information available	LC50 (96h) >1000 mg/L (Oncorhynchus mykiss) LC50 (96h) > 100 mg/L (Lepomis macrochirus)	No information available	No information available

12.2. Persistence and degradability

Substances	CAS Number	Persistence and Degradability
Highly refined mineral oil	Proprietary	(15 - 35% @ 28d)

12.3. Bioaccumulative potential

Substances	CAS Number	Log Pow
Highly refined mineral oil	Proprietary	5.71

12.4. Mobility in soil

Substances	CAS Number	Mobility
Highly refined mineral oil	Proprietary	KOC > 3

12.5 Other adverse effects

No information available

13. Disposal Considerations

13.1. Waste treatment methods

Disposal Method Disposal should be made in accordance with federal, state, and local regulations. Incineration recommended in approved incinerator according to federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations. Contaminated packaging may be disposed of by: rendering packaging incapable of containing any substance, or treating packaging to remove residual contents, or treating packaging to make sure the residual contents are no longer hazardous, or by disposing of packaging into commercial waste collection.

14. Transport Information

US DOT

UN Number: Not restricted
UN Proper Shipping Name: Not restricted
Transport Hazard Class(es): Not applicable
Packing Group: Not applicable
Environmental Hazards: Not applicable

US DOT Bulk

DOT (Bulk) Not applicable

Canadian TDG

UN Number: Not restricted
UN Proper Shipping Name: Not restricted
Transport Hazard Class(es): Not applicable
Packing Group: Not applicable
Environmental Hazards: Not applicable

IMDG/IMO

UN Number: Not restricted
UN Proper Shipping Name: Not restricted
Transport Hazard Class(es): Not applicable
Packing Group: Not applicable
Environmental Hazards: Not applicable

IATA/ICAO

UN Number: Not restricted
UN Proper Shipping Name: Not restricted
Transport Hazard Class(es): Not applicable
Packing Group: Not applicable
Environmental Hazards: Not applicable

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code: Not applicable
Special Precautions for User: None

15. Regulatory Information

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	None
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	Does not apply.

Canadian Regulations

Canadian DSL Inventory All components listed on inventory or are exempt.

16. Other information

Preparation Information

Prepared By
Chemical Stewardship
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

Revision Date: 02-Jun-2015

Reason for Revision SDS sections updated:
2

Additional information
For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Safety Data Sheet for this or other Halliburton products, contact Chemical Stewardship at 1-580-251-4335.

Key or legend to abbreviations and acronyms
bw – body weight
CAS – Chemical Abstracts Service
EC50 – Effective Concentration 50%
ErC50 – Effective Concentration growth rate 50%
LC50 – Lethal Concentration 50%
LD50 – Lethal Dose 50%
LL50 – Lethal Loading 50%
mg/kg – milligram/kilogram
mg/L – milligram/liter
NIOSH – National Institute for Occupational Safety and Health
NTP – National Toxicology Program
OEL – Occupational Exposure Limit
PEL – Permissible Exposure Limit
ppm – parts per million
STEL – Short Term Exposure Limit
TWA – Time-Weighted Average
UN – United Nations
h - hour
mg/m^3 - milligram/cubic meter
mm - millimeter
mmHg - millimeter mercury
w/w - weight/weight
d - day

Key literature references and sources for data
www.ChemADVISOR.com/
NZ CCID
BIBRA
OSHA
SIDS

Disclaimer Statement

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End of Safety Data Sheet

Safety Data Sheet: Freon R134A

Waste Stream: Refrigerant

EPA Waste Sheet Profile Number: 20145060-039

SAFETY DATA SHEET
REFRIGERANT R134A

SECTION 1: IDENTIFICATION OF THE SUBSTANCE / PREPARATION AND OF THE COMPANY / UNDERTAKING

1.1. Product Identifier

Product Name: REFRIGERANT R134a

Synonyms: 1,1,1,2 Tetrafluoroethane

HFC-134a

Norflurane

EC Number: 212-337-0

CAS Number: 811-97-2

REACH Registration Number: 01-2119459374-33-0002

If REACH registration numbers do not appear the substance is either exempt from registration, does not meet the minimum volume threshold for registration or the registration has not yet come due.

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use: Refrigerant
Advised Against: No specific uses advised again have been identified, other than restrictions in the F-Gas Regulations.

1.3. Details of the supplier of the safety data sheet

Company name:

National Refrigerants Ltd.
4 Watling Close
Sketchley Meadows Business Park
Hinckley LE10 3EZ
Tel: +44(0)1455 630790
Fax: +44(0) 1455 630791
Email: sds@nationalref.com

1.4. Emergency telephone number

Emergency Tel: +44(0) 1865 407333

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance of mixture

Regulation (EC) No. 1272/2008

Warning

H280 Contains gas under pressure; may explode if heated
P410+P403 Protect from sunlight. Store in a well-ventilated place.

Directives 67/458/EEC or This substance is not classified as dangerous according to Directive 67/548/EEC.

1999/45/EC:
Most important adverse effect: Rapid evaporation of the liquid may cause frostbite.
Vapour is heavier than air and can cause suffocation.

2.2. Label elements

Label elements under CHIP:
Risk phrases R58: May cause long-term adverse effects in the environment
Safety phrases None

2.3. Other hazards

Directives 67/548/EEC or 1999/45/EC: Not a hazardous substance according to EC directives 67/548/EEC or 1999/45/EC.
Special labelling of certain mixtures: Contains fluorinated greenhouse gases covered by the Kyoto Protocol

SECTION 3: COMPOSITION / INFORMATION ON INGREDIENTS

3.1. Substances

Hazardous Ingredients: 1,1,1,2-tetrafluoroethane 99.9%

3.2 Mixtures

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

Skin contact: Rapid evaporation of liquid may cause frostbite. Take off all contaminated clothing immediately if not stuck to the skin. Flush area with lukewarm water. Do not use hot water. If frostbite has occurred call a physician.

Eye contact: Rapid evaporation of liquid in contact with the eye will damage it. Hold eyelids apart and flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Ingestion: This is not considered a potential route of exposure.

Inhalation: Remove from exposure, move to fresh air, and lie down. Keep patient warm and at rest. Artificial respiration and/or oxygen may be necessary. Consult a physician.

4. 2. Most important symptoms and effects, both acute and delayed

Skin contact: Low exposure to liquid will cause redness and pain. High exposure to liquid will cause frostbite, blisters and severe pain.

Eye contact: Exposure to liquid will cause severe pain and cornea damage.

Ingestion: Not a route of exposure.

Inhalation: High vapour concentrations cause severe headache, dizziness and unconsciousness.

Delayed/immediate effects: May cause cardiac arrhythmia.

4.3. Indication of any immediate medical attention and special treatment needed

Immediate/special treatment: Burns pack should be available on the premises.

SECTION 5: FIRE-FIGHTING MEASURES

5.1. Extinguishing media

Extinguishing media: This product is not flammable. (ASHRAE 34) All extinguishing agents are suitable. Use measures that are appropriate to local and surrounding environment. Cool cylinders/tanks with water spray.

5.2. Special hazards arising from the substance or mixture

Special hazards arising from the mixture Pressure build-up in cylinders/tanks.
Hazardous thermal decomposition products: carbon oxides, hydrogen fluoride, carbonyl fluoride.

5.3. Advice for fire-fighters

Advice for fire-fighters: In the event of fire wear self-contained breathing apparatus.
Wear neoprene gloves during cleaning work after a fire.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions: Evacuate personnel to safe areas.
Ventilate the area.

6.2. Environmental precautions

Environmental precautions: Should not be released into the atmosphere.

6.3. Methods and material for containment and cleaning up

Clean-up procedures: Material evaporates.

6.4. Reference to other sections

Reference to other sections: For handling and protection measures refer to Section 7 of SDS. Refer to Section 8 of SDS.
For disposal methods refer to Section 13.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Handling requirements: *Advice on handling:*
Avoid breathing vapours or mist.
Avoid liquid contact with skin and clothing.
Provide sufficient air exchange and/or exhaust in work rooms.
Advice on protection against fire and explosion:
No special measures against fire required.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions: Keep valves tightly closed.
Store in cool, dry well ventilated place.
Temperature not to exceed 45^{o}C.

Suitable packaging: Store in original cylinder only.
Protect from contamination.

7.3. Specific end use(s)

Specific end use(s) No data available.

SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1. Control parameters

Hazardous ingredients:
1,1,1,2-TETRAFLUOROETHANE (HFC134a)
Workplace exposure limits

State	8 hour TWA	15 min. STEL
UK	1000 ppm (4240 mg/m^3)	-

8.2. Derived No Effect Level (DNEL)

1,1,1,2-Tetrafluoroethane:

Type of Application (Use): Workers
Exposure Routes: Inhalation
Health Effects: Chronic effects, Systemic toxicity.
Value: 2476 mg/m^3

Type of Application (Use): Consumers
Exposure Routes: Inhalation
Health Effects: Chronic effects, Systemic toxicity.
Value: 2476 mg/m^3

8.3 Predicted No Effect Concentration

1,1,1,2-tetrafluoroethane:

Value: 0.1 mg/l
Compartment: Fresh water.

Value: 0.01 mg/l
Compartment: Marine water.

Value: 1 mg/l
Compartment: Water
Remarks: Intermittent use/release.

Value: 0.75 mg/l
Compartment: Fresh water sediment.

Value: 73 mg/l
Compartment: Water
Remarks: Sewage treatment plants.

8.4. Exposure Controls

Engineering measures: Ensure adequate ventilation, especially in confined areas.
Respiratory protection: For rescue and maintenance work in storage tanks use self-contained breathing apparatus. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.
Hand protection: Heat insulating gloves
Eye protection: Safety glasses with side shields. Wear a face shield in addition where the possibility exists for face contact due to splashing, spraying or airborne contact with this material.
Skin protection: Wear clothing that covers legs and arms.
Environmental: Gas escapes to be kept to the minimum by engineering processes and operating methods.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

State: Liquefied gas under pressure.
Colour: Clear colourless liquid and vapour.
Odour: Slight, ether like.
Molecular weight: 102.02 g/mol
Boiling Point/range: -26.2°C

Flash Point:	Non-flammable
Ignition Temperature:	n/a Non flammable
Upper explosive limit/upper flammability limit:	n/a Non flammable
Vapour pressure:	4.909 Bar (4909 hPa) at 21°C
Liquid Density:	1200 kg/m^3 at 25°C
Vapour Density:	5.368 kg/m^3 at 21°C
Water solubility:	1.5 g/l
Vapour Density (Air = 1)	3.5

SECTION 10. STABILITY AND REACTIVITY

10.1. Reactivity

Reactivity: Stable under recommended storage and transport conditions.

10.2. Chemical stability

Chemical stability: Stable under normal conditions.

10.3. Possibility of hazardous reactions

Hazardous reactions: Hazardous reactions will not occur under recommended storage and transport conditions.
May react with aluminium.

10.4. Conditions to avoid

Conditions to avoid: Heat, hot surfaces, flames.

10.5. Incompatible material

Materials to avoid: Alkali metals, alkaline earth metals, powdered metals, powdered metal salts.

10.6. Hazardous decomposition products

Hazardous decomposition products Thermal decomposition yields toxic products which can be corrosive in the presence of moisture.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1 Information on Toxicological effects

Acute Oral Toxicity:
1,1,2-Tetrafluoroethane
Not Applicable.

Acute inhalation toxicity:
1,1,1,2-Tetrafluoroethane
LC_{50}/rat: 567000 ppm
/dog: Cardiac sensitization.

Acute Dermal toxicity:
1,1,1,2-Tetrafluoroethane
Not Applicable

Skin Irritation:
1,1,1,2-Tetrafluoroethane
Rabbit
Classification: Not classified as irritant.
Result: Slight irritation.

Eye Irritation:
1,1,1,2-Tetrafluoroethane
Rabbit
Classification: Not classified as an irritant.
Result: Slight irritation
Not expected to cause eye irritation based on expert review of the properties of the substance.

Human
Classification: Not classified as irritant.
Result: No eye irritation.

Sensitization:
1,1,1,2-Tetrafluoroethane
Guinea pig
Classification: Not a skin sensitized.
Result: Did not cause sensitization on laboratory animals.
Not expected to cause sensitization based on expert review of the properties of the substance.

Did not cause sensitization on laboratory animals. There are on reports of human respiratory sensitization.

Repeated Dose Toxicity:
1,1,1,2-Tetrafluoroethane
Inhalation rat
No toxicologically significant effects were found.

Mutagenicity Assessment
1,1,1,2-Tetrafluoroethane
Animal testing did not show any mutagenic effects, Tests on bacterial or mammalian cell cultures did not show mutagenic effects.

Carcinogenicity Assessment:
1,1,1,2-Tetrafluoroethane
Not classified as a human carcinogen.

Toxicity to reproduction Assessment:
1,1,1,2-Tetrafluoroethane
No toxicity to reproduction.

Human Experience:
Excessive exposure may affect human health as follows:

Inhalation
Severe shortness of breath, narcosis, irregular cardiac activity.

Other information:
May cause cardiac arrhythmia. Rapid evaporation of the liquid may cause frostbite. Inhalation of decomposition products in high concentration may cause shortness of breath (lung oedema).

SECTION 12. ECOLOGICAL INFORMATION

Where sections are blank no data is available

12.1. Toxicity

Toxicity to fish:
1,1,1,2-Tetrafluoroethane
LC_{50}/96 h/Oncorhynchus mykiss (rainbow trout): 450 mg/l

Toxicity to Aquatic plants:
1,1,1,2-Tetrafluoroethane
EC_{50}/72 h/Algae: >118 mg/l
Information given is based on data obtained from similar substances.

Acute Toxicity to aquatic Invertebrates:
1,1,1,2-Tetrafluoroethane
EC_{50}/48 h/Daphnia magna (water flea): 980 mg/l

Ecotoxic values:
When discharged may contribute to the greenhouse effect.

12.2. Persistence and degradability

Persistance and Degradability:
Biodegradability
/28 d
Biodegradation: 3%
Method: Closed Bottle test
Not readily biodegradable.

12.3. Bio accumulative potential

Bio-accumulative potential:	No data available.

12.4. Mobility in soil

Mobility:	No data available.

12.5. Results of PBT and vPvB assessment

PBT & vPvB identification:	This substance is not considered to be persistent, bio accumulating nor toxic (PBT). This substance is not considered to be very persistent nor very bio accumulating (vPvB).

12.6. Other adverse effects

Other adverse effects:	
Global Warming Potential (GWP) (CO_2 = 1)	1370
Ozone Depletion Potential (ODP) (R11 = 1)	0

SECTION 13. DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Disposal operations:	Do not allow product to be released into the environment.
Recovery Operations:	Consult the manufacturer or supplier for information regarding recovery and recycling of the product. If recovery is not possible, incinerate at a licensed installation.
Disposal of packaging:	De-gas and return cylinders to suppliers.
N.B.	The user's attention is drawn to the possible existence of regional or national regulations regarding disposal.

SECTION 14. TRANSPORT INFORMATION

14.1. ADR

Proper Shipping Name:	Refrigerant R134a or 1,1,1,2-Tetrafluoroethane
UN Number:	3159
Class:	2
Classification Code:	2A
Labelling No.:	2.2
HI Number:	20
Tunnel Code:	(C/E)

14.2. IATA_C

Proper Shipping Name:	Refrigerant R134a or 1,1,1,2-Tetrafluoroethane
UN Number:	3159
Labelling No.:	2.2

14.3. IMDG

Proper Shipping Name:	Refrigerant R134a or 1,1,1,2-Tetrafluoroethane
UN Number:	3159
Class:	2.2
Labelling Number:	2.2

SECTION 15. REGULATORY INFORMATION

15.1. Safety, health and environment regulations/legislation specific for the substance or mixture

Special labelling of certain mixtures:	Contains fluorinated greenhouse gases covered by the Kyoto Protocol.

15.2. Chemical Safety Assessment

Chemical safety assessment: A chemical safety assessment has been carried out by the supplier of this mixture.

16. OTHER INFORMATION

Other information: This safety sheet is prepared in accordance with Commission Regulation (EU) No. 453/2010.
* Indicates text in SDS which has changed since the last revision.

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NATIONAL REFRIGERANTS

GENERAL SAFETY & HANDLING DATA

1. GENERAL

Only trained persons should handle compressed gases.
Observe all regulations and local requirements regarding the storage of Cylinders.
Do not remove or deface labels provided by the supplier for the identification of the Cylinder contents.
Ascertain the identity of the gas before using it.
Know and understand the properties and hazards associated with each gas before using it.
When doubt exists as to the correct handling procedure for a particular gas contact the supplier.

HANDLING AND USE

Wear stout gloves.
Never lift a Cylinder by the cap or guard unless the supplier states it is designed for that purpose.
Use trolley or other suitable device or technique for transporting heavy Cylinders, even for a short distance.
Where necessary wear suitable eye and face protection. The choice between safety glasses, chemical goggles, or full face shield will depend on the pressure and nature of the gas being used,

Where necessary for toxic gases see that self-contained positive pressure breathing apparatus or full face airline respirator is available in the vicinity of the working area.
Employ suitable pressure regulating device on all Cylinders when gas is being emitted to systems with lower pressure rating than that of the Cylinder.
Ascertain that all electrical systems in the area are suitable for service with each gas.

Never use direct flame or electrical heating devices to raise the pressure of a Cylinder, Cylinders should not be subjected to temperatures above 45^{o}C.
Never re-compress a gas mixture without consulting the supplier. Never attempt to transfer gases from one Cylinder to another.
Do not use Cylinders as rollers or supports, or for any other purpose other than to contain the gas as supplied.
Never permit oil, grease or other readily combustible substances to come into contact with valves of Cylinders containing oxygen or other oxidants.
Keep Cylinder valves clean and free from contaminants particularly oil and water.

Do not subject Cylinders to mechanical shocks which may cause damage to their valves or safety devices.

Never attempt to repair or modify Cylinder valves or safety relief devices. Damaged valves should be reported immediately to the supplier.
Close the Cylinder valve whenever gas is not required even if the Cylinder is still connected to the equipment.

2. STORAGE

Cylinders should be stored in a well-ventilated area.
Some gases will require a purpose built area.
Store Cylinders in a location free from fire risk and away from sources of heat and ignition. Designate as a no smoking area.

Gas Cylinders should be segregated in the storage according to the various categories.

The storage area should be kept clear and access should be restricted to authorized persons only, the area should be clearly marked as a storage area and appropriate hazard warning signs displayed (Flammable, Toxic etc.).
The amount of flammable or toxic gases should be kept to a minimum.
Flammable gases should be stored away from other combustible materials.

Cylinders held in storage should be periodically checked for general condition and leakage.

Cylinders in storage should be properly secured to prevent toppling or rolling.
Vertical storage is recommended where the Cylinder is designed for this.
Cylinder valves should be tightly closed and, where appropriate, valves should be capped or plugged.
Protect Cylinders stored in the open against rusting and extremes of weather.
Cylinders should not be stored in conditions likely to encourage corrosion.
Store full and empty Cylinders separately and arrange full Cylinders so that the oldest stock is used first.

FOR FURTHER INFORMATION CONTACT YOUR NEAREST DISTRIBUTION CENTRE

Safety Data Sheets: Lime; Sodium Hypochlorite

Waste Stream: Caustic

EPA Waste Profile Sheet Number: 20145060-040

Safety Data Sheet
LIME

1. Identification

1.1 Product identifier

Product name LIME

Product code PID904

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Drilling fluid additive.

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I L.L.C.

P.O.Box 42842
Houston, TX 77242
www.miswaco.slb.com
Telephone: 1 281-561-1511

M-I SWACO, A Schlumberger Company
200 - 125, 9th Avenue SE
Calgary, Alberta T2G 0P6, Canada
Telephone: 1-780-962-8221

Prepared by
Global Regulatory Compliance - Chemicals (GRC - Chemicals) , Bethicia Prasek

1.4 Emergency Telephone Number

Emergency telephone (24 Hour) Australia +61 2801 44558, Asia Pacific +65 3158 1074, China +86 10 5100 3039, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, New Zealand +64 9929 1483, USA 001 281 561 1600

2. Hazards identification

2.1 Classification of the substance or mixture

GHS - Classification

Health hazards

Skin corrosion/irritation	Category 2
Serious eye damage/eye irritation	Category 1

Environmental hazards Not classified

Physical Hazards Not classified

2.2 Label elements

Signal word
DANGER

Hazard statements
H315 - Causes skin irritation
H318 - Causes serious eye damage
H335 - May cause respiratory irritation

Precautionary statements
P280 - Wear eye protection/ face protection
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a POISON CENTER or doctor/ physician

Supplementary precautionary statements
P264 - Wash face, hands and any exposed skin thoroughly after handling
P302 + P352 - IF ON SKIN: Wash with plenty of soap and water
P321 - Specific treatment (see supplemental first aid instructions on this label)
P332 + P313 - If skin irritation occurs: Get medical advice/ attention
P362 - Take off contaminated clothing and wash before reuse
P280 - Wear protective gloves/ protective clothing/ eye protection/ face protection
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a POISON CENTER or doctor/physician
P261 - Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray
P271 - Use only outdoors or in a well-ventilated area
P304 + P340 - IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing
P312 - Call a POISON CENTER or doctor/physician if you feel unwell
P403 + P233 - Store in a well-ventilated place. Keep container tightly closed
P501 - Dispose of contents/ container to an approved waste disposal plant

Unknown acute toxicity 0% of the mixture consists of ingredient(s) of unknown toxicity.

3. Composition/information on Ingredients

3.1 Substances

Component	CAS-No	Weight % - range
Calcium hydroxide	1305-62-0	100

3.2 Mixtures

Not Applicable

Comments
The exact percentage (concentration) of composition has been withheld as a trade secret

4. First aid measures

4.1 First-Aid Measures

Inhalation Move to fresh air. If breathing is difficult, (trained personnel should) give oxygen. If not breathing, give artificial respiration. Get medical attention immediately if symptoms occur.

Ingestion Do not induce vomiting. If conscious, give 2 glasses of water. Get immediate medical attention.

Skin contact Take off contaminated clothing and shoes immediately. Rinse immediately with plenty of water for at least 30 minutes. Get immediate medical attention.

Eye contact Rinse immediately with plenty of water, also under the eyelids. Remove contact lenses. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

4.2 Most important symptoms and effects, both acute and delayed

Main symptoms

Inhalation Please see Section 11. Toxicological Information for further information.

Ingestion Please see Section 11. Toxicological Information for further information.

Skin contact Please see Section 11. Toxicological Information for further information.

Eye contact Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated. Do not give chemical antidotes. Asphyxia from glottal edema may occur. Marked decrease in blood pressure may occur with moist rales, frothy sputum, and high pulse pressure

5. Fire-fighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Fog, Alcohol Foam, CO_2, Dry Chemical.

Extinguishing media which shall not be used for safety reasons
None known.

5.2 Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
None known.

Hazardous combustion products
Calcium oxide.

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

6. Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Wear suitable protective equipment. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Prevent further leakage or spillage if safe to do so.

6.2 Environmental precautions

Prevent product from entering drains.

Environmental exposure controls
No information available.

6.3 Methods and materials for containment and cleaning up

Methods for containment
Cover powder spill with plastic sheet or tarp to minimize spreading and keep powder dry.

Methods for cleaning up
Avoid dust formation. Sweep up and shovel into suitable containers for disposal.

6.4 Reference to other sections

No information available.

7. Handling and storage

7.1 Precautions for safe handling

Handling
Do not get in eyes, on skin or on clothing. Avoid breathing dust; if exposed to high dust concentration, leave area immediately.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Keep away from direct sunlight. Protect from moisture.

Storage precautions Keep containers tightly closed in a dry, cool and well-ventilated place.

8. Exposure controls/personal protection

8.1 Control parameters

Component Information

Component	ACGIH TLV	OSHA PEL
Calcium hydroxide 1305-62-0 (100)	5 mg/m³	5 mg/m³ (resp); 15 mg/m³ (total)

8.2 Exposure controls

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering measures to reduce exposure
Ensure adequate ventilation, especially in confined areas.

Personal protective equipment

Eye protection	Tightly fitting safety goggles.
Hand protection	Neoprene, Nitrile.
Respiratory protection	All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent. If exposed to airborne particles of this product use at least a NIOSH-approved N95 half-mask disposable or re-useable particulate respirator. In work environments containing oil mist/aerosol use at least a NIOSH-approved P95 half-mask disposable or re-useable particulate respirator.
Skin and body protection	Wear suitable protective clothing and gloves.
Hygiene measures	Wash hands before breaks and immediately after handling the product, Remove and wash contaminated clothing before re-use.

9. Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state	Solid powder
Appearance	Opaque
Color	White
Odor	Odorless
Odor threshold	Not applicable

Property	**Values**	**Remarks**
pH	No information available	
pH @ dilution	12.4	
Melting/freezing point	No information available	
Boiling point/range	No information available	
Flash point	No information available	PMCC
Evaporation rate (BuAc =1)	No information available	
Flammability (solid, gas)	Not Applicable	
Flammability Limits in Air		
Upper flammability limit	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	2.08 - 2.34	
Bulk density	No information available	
Water solubility	Slightly soluble in water.	
Solubility in other solvents	Partly miscible	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	
Log Pow	No information available	

Explosive properties	No information available
Oxidizing properties	No information available

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	No information available
Density	No information available

10. Stability and reactivity

10.1 Reactivity

No specific reactivity hazards associated with this product.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

Avoid extreme temperatures.

10.5 Incompatible materials

Acids.

10.6 Hazardous decomposition products

Calcium oxide.

11. Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Inhalation	Irritating to respiratory system.
Eye contact	Causes burns. Corrosive to the eyes and may cause severe damage including blindness.
Skin contact	Causes skin irritation.
Ingestion	Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation.

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Calcium hydroxide	= 7340 mg/kg (Rat)	No data available	No data available

Component	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Calcium hydroxide	No data available	No data available	No data available	No data available

Sensitization	This product does not contain any components suspected to be sensitizing.
Mutagenic effects	No evidence of mutagenic properties.
Carcinogenicity	No evidence of carcinogenic properties.
Reproductive toxicity	No evidence of toxicity to reproduction.
Developmental toxicity	Not known to cause birth defects or have a deleterious effect on a developing fetus.
Routes of exposure	Skin contact. Inhalation. Eye contact.
Routes of entry	No route of entry noted.
Specific target organ toxicity (single exposure)	Not classified
Specific target organ toxicity (repeated exposure)	Not classified.
Aspiration hazard	Not Applicable.

12. Ecological information

12.1 Toxicity

Toxicity to algae
See component information below.

Toxicity to fish
See component information below.

Toxicity to daphnia and other aquatic invertebrates
See component information below.

Component	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Calcium hydroxide	= 160 mg/L LC50 Gambusia affinis 96 h	No information available	No information available

12.2 Persistence and degradability

No product level data available.

12.3 Bioaccumulative potential

No product level data available.

12.4 Mobility in soil

No information available.

12.5 Results of PBT and vPvB assessment

This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT)
This preparation contains no substance considered to be very persistent nor very bioaccumulating (vPvB)

12.6 Other adverse effects.

None known.

13. Disposal considerations

13.1 Waste treatment methods

Disposal Method	Disposal should be made in accordance with federal, state and local regulations.
Contaminated packaging	Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport information

14.1 UN Number

UN No. (DOT)	Not regulated
UN No. (TDG)	Not regulated
UN/ID No. (ADR/RID/ADN/ADG)	Not regulated
UN No. (IMDG)	Not regulated
UN No. (ICAO)	Not regulated

14.2 Proper shipping name

The product is not covered by international regulation on the transport of dangerous goods

14.3 Hazard class(es)

DOT Hazard class	Not regulated
TDG Hazard class	Not regulated
ADR/RID/ADN/ADG Hazard class	Not regulated
IMDG Hazard class	Not regulated
ICAO Hazard class/division	Not regulated

14.4 Packing group

DOT Packing group	Not regulated
TDG Packing group	Not regulated
ADR/RID/ADN/ADG Packing group	Not regulated
IMDG Packing group	Not regulated
ICAO Packing group	Not regulated

14.5 Environmental hazard

No

14.6 Special precautions

Not Applicable

15. Regulatory information

International inventories

USA (TSCA)	Complies

Canada (DSL)	Complies
European Union (EINECS and ELINCS)	Complies
Philippines (PICCS)	Does not Comply
Japan (ENCS)	Complies
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Does not Comply

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories
Immediate (acute) health hazard.

Component	SARA 302 / TPQs	SARA 313	CERCLA RQ
Calcium hydroxide	N/A	N/A	N/A

State Comments
Proposition 65: This product is not known to contain chemicals considered by the State of California's Safe Drinking Water and Toxic Enforcement Act of 1986 as causing cancer and/or reproductive toxicity at levels that are expected to pose a significant risk under anticipated use conditions.

Canadian Classification

This Safety Data Sheet has been prepared in compliance with the Hazardous Products Regulations.

16. Other information

Supersedes date	17/Jun/2015
Revision date	25/Sep/2015
Version	9
The following sections have been revised:	1, 14, 15, 16.

HMIS classification

Health	3
Flammability	0
Physical hazard	0

N/A - Not Applicable, N/D - Not Determined.

Disclaimer
The information contained herein is considered in good faith as reliable of the date issued and is based upon on measurements, tests or data derived from supplier's own study or furnished by others. In providing this SDS information, Supplier makes no express or implied warranties as to the information or product; merchantability or fitness of purpose; any express or implied warranty; or non-infringement of intellectual property rights; and supplier assumes no responsibility for any direct, special or consequential damages, results obtained, or the activities of others. To the maximum extent permitted by law, supplier's warranty obligations and buyer's sole remedies are as stated in separate agreement between the parties.

ALLIED UNIVERSAL CORPORATION

Headquarters: *3901 NW 115th Avenue, Miami, Florida 33178* *Phone:* (305) 888 - 2623

MATERIAL SAFETY DATA SHEET

May be used to comply with OSHA's Hazard Communication Standard, 29 CFR § 1910.1200.

TODAY'S DATE: 09/06/07 MSDS NUMBER: 0001

24 HOUR EMERGENCY CHEMICAL SPILL OR RELEASE PHONE NUMBERS:

Allied Universal Corp. *at* ***1-305-483-7732*** *(Digital Beeper) and/or* ***CHEMTREC*** *at* ***1-800-424-9300***

SECTION 1 CHEMICAL PRODUCT/COMPANY IDENTIFICATION

Sodium Hypochlorite

Product Names: Aqua Guard Chlorinating Sanitizer, Aqua Guard Bleach, Liquid Chlorine Solution, Liquid Bleach, Hypochlorite, Hypo and Chlorine Bleach.

Listed Strengths: 10.5%, 12.5% and 15% **CAS Number:** 7681-52-9

Date MSDS Revised: August 2007 (previous revision 11/04)

Product Use: Disinfectant and sanitizer, see product label for all approved uses & instructions.

NSF Approval: Yes. Certified to NSF/ANSI Standard 60. Maximum use in Potable Water is 84 mg/L for 12.5% bleach and 100 mg/L for 10.5% bleach.

NSF Non-Food Compounds Approval: Yes

SECTION 2 HAZARD INGREDIENTS/IDENTITY INFORMATION

Hazardous Ingredient(s): % (w/w) as Sodium Hypochlorite : 10.5-16%

Exposure Standards: None established for Sodium Hypochlorite, as Chlorine exposure standards are:

PEL (OSHA):	1 ppm as Cl_2	**STEL (OSHA):**	3 ppm as Cl_2
TLV (ACGIH):	0.5 ppm as Cl_2	**TWA (ACGIH):**	0.5 ppm as Cl_2
WEEL (AIHA):	2 mg/m3, 15 minute TWA as Cl_2	**STEL (ACGIH):**	1 ppm as Cl_2

Emergency Overview: May cause burns to the eyes, skin and mucous membranes.

SECTION 3 PHYSICAL/CHEMICAL CHARACTERISTICS

Alternate Name(s):	Bleach
Chemical Name:	Sodium Hypochlorite
Chemical Family:	Oxidizing Agent
Molecular Formula:	Na-O-Cl
Form:	Liquid
Appearance:	Water clear to a slight greenish-yellow, or light yellow aqueous solution
Odor:	Chlorine odor
pH:	11-14, dependent upon % weight as Sodium Hypochlorite
Vapor Pressure:	Not available
Vapor Density (Air=1):	Not available
Boiling Point:	Approximately 230º F (110º C)
Freezing Point:	14 F(8% w/w Cl_2 solution), 7 F(10% w/w Cl_2 solution), -3 F (12% w/w Cl_2 solution)
Solubility (Water):	Completely Soluble
Solubility (Other):	Reacts with Many Organic Solvents
Density:	Appx. 10 lbs. per gallon
Evaporation Rate:	Not Available
Specific Gravity:	1.126 (8% w/w Cl_2 solution), 1.163 (10% w/w Cl_2 solution), 1.202 (12% w/w Cl_2 solution), 1.25 (15% w/w Cl_2 solution)
Molecular Weight:	74.5

SECTION 4 STABILITY & REACTIVITY DATA

Chemical Stability	**Stable** __X__	**Unstable** _____

Incompatibility (Conditions to Avoid): Stability decreases with heat and light exposure.

Incompatibility (Materials to Avoid): May react violently with strong acids. Other incompatibles include strong caustics, ammonia, urea, reducing agents, organics, ether and oxidizable materials. Reaction with metals (nickel, iron, cobalt and copper) may produce oxygen gas, which supports combustion. May react with organohalogen compounds to

form spontaneously combustible compounds. May react explosively with nitro- and chloro-organic compounds as well as acids and reducing agents. Acidification liberates chlorine gas.
Hazardous Decomposition or Byproducts: Chlorine gas. Decomposes with heat and reacts with acids. Hazardous gases/vapors produced are hypochlorous acid, chlorine and hydrochloric acid. Composition depends upon temperature and decrease in pH. Additional decomposition products, which depend on pH, temperature and time, are sodium chloride and chlorate, and oxygen.

No Mechanical Shock or Impact	**No Static Discharge**	**Oxidizer: No if <12% by weight, Yes if > than 12% by weight**
Hazardous Polymerization	**May Occur _____**	**Will Not Occur __X__**

Note: Sodium Hypochlorite reacts violently with amines and ammonium salts. Solutions are reactive with common cleaning products such as toilet bowl cleaners, rust removers, vinegar, acids, organics and ammonia products to produce hazardous gases such as chlorine and other chlorinated species.

SECTION 5 POTENTIAL HEALTH EFFECTS AND FIRST AID INFORMATION

GENERAL: May cause immediate pain. Exposure to the skin may cause sensitization or other allergic responses. If the eye is not irrigated immediately after it has been exposed permanent eye damage may occur. Strict adherence to first aid measures following any exposure is essential. SPEED IS ESSENTIAL!

ROUTE(S) OF ENTRY AND POTENTIAL HEALTH EFFECTS	***EMERGENCY & FIRST AIDE PROCEDURES***
INHALATION: Strong irritating to mucous membranes in the nose, throat and respiratory tract. Prolonged contact can cause chronic irritation, pulmonary edema and central nervous system depression. Repeated inhalation exposure may cause impairment of lung function and permanent lung damage.	**If inhaled,** move expose person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. If breathing is difficult, have trained person administer oxygen. Call a poison control center or medical physician for further treatment advice. Have the product label or MSDS with you when calling or going for medical treatment.
SKIN CONTACT: Prolonged and repeated exposure to dilute solutions often causes irritation, redness, pain and drying and cracking of the skin. Human evidence has indicated that an ingredient in this product can cause skin sensitization. Depending upon the concentration and how soon after exposure the skin is washed with water, skin contact may cause burns and tissue destruction.	**If on skin or clothing,** take off all contaminated clothing and rinse skin immediately with plenty of water for 15-20 minutes. If irritation persists, repeat flushing. Do not transport victim unless the recommended irrigation period is completed unless flushing can be continued during transport. Call a poison control center or medical physician for treatment advice. Have the product label or MSDS with you when calling or going for medical treatment.
EYE CONTACT: Strongly irritating to eyes. Exposure to vapor can cause tearing, conjunctivitis and burning of the eyes. Eye contact may cause a corneal injury. The severity of the effects depend on the concentration and how soon after exposure the eyes are washed with water. In severe exposure cases, glaucoma, cataracts and permanent blindness may occur.	**If in eyes,** hold eye open and rinse slowly and gently with plenty of water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye for 10-15 minutes. Do not transport victim until the recommended flushing period is completed unless irrigation can be continued during transport. Call a poison control center or medical physician for further treatment advice. Have the product label and/or MSDS with you when calling or going to medical treatment.
INGESTION: Corrosive. Can cause severe corrosion of and damage to the gastrointestinal tract (including mouth, throat, and esophagus). Exposure is characterized by nausea, vomiting, abdominal pain, diarrhea, bleeding, and/or tissue ulceration.	**If swallowed,** call poison control center or medical physician immediately for treatment advice. Have the product label or MSDS with you when calling or going for medical treatment. Have exposed person sip a glass of water if able to swallow, and dilute immediately by giving milk, melted ice cream, starch paste or antacids such as milk of magnesia. Avoid sodium bicarbonate because of carbon dioxide release. DO NOT INDUCE VOMITING, LAVAGE OR ACIDIC ANTIDOTES unless told to do so by poison control center or medical physician. DO NOT give anything by mouth to an unconscious person. If spontaneous vomiting occurs, have victim lean forward with head down to avoid breathing in of vomitus, rinse mouth and administer more water.

NOTE TO PHYSICIAN(S): Pre-existing medical conditions may be aggravated by exposures affecting target organs. There are no known chronic effects. Probable mucosal damage may contraindicate the use of gastric lavage. In addition to the alkalinity of this product, the continued generation of chlorine gas after ingestion can damage further the stomach mucous, depending on the amount ingested. Consideration may be given to removal of the product from the stomach, taking care to avoid perforation of esophagus or stomach. An ounce of 1% sodium thiosulfate or milk of magnesia is helpful.

SECTION 6 TOXICOLOGICAL DATA

ANIMAL DATA: Inhalation 0.25-hour LC50 - 10.5 mg/L in rats; Acute Dermal LD50 - 10,000 mg/kg in rabbits; Acute Oral LD50 - 8910 mg/kg in rats

SUMMARY: The concentrated solution is corrosive to skin, and a 5% solution is a severe eye irritant. Solutions containing more than 5% available chlorine are classified by DOT corrosive (please see section 10 of this MSDS). Toxicity described in animals from single exposures by ingestion include muscular weakness, and hypoactivity. Repeated ingestion exposure in animals caused an increase in the relative weight of adrenal glands in one study, but no pathological changes were observed in two other studies. Long-term administration of compound in drinking water of rats caused depression of the immune system. No adverse changes were observed in an eight week dermal study of a 1% solution in guinea pigs. Tests in animals demonstrate no carcinogenic activity by either the oral or dermal routes. Tests in bacterial and mammalian cell cultures demonstrate mutagenic activity.

CARCINOGENICITY: None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA or ACGIH as carcinogen.

MUTAGENICITY: Sodium Hypochlorite has been shown to produce damage to genetic material when tested in vitro. Studies in vivo have shown no evidence of mutagenic potential for this material. It is judged that the risk of genetic damage is insignificant for sodium hypochlorite because of its biological activity, lack of mutagenicity in vivo, and failure to produce carcinogenic response.

SECTION 7 FIRE AND EXPLOSION HAZARD DATA

Flash Point: This product does not flash	**Flammable Limits (Lower):** Not Applicable	
Flammable Limits (Upper): Not Applicable	**Auto Ignition Temperature:** Not Applicable	
Decomposition Temperature: Not Applicable	**Rate of Burning:** Not Available	
Explosive Power: Not Available	**Sensitivity to Mechanical Impact:** Not expected to be sensitive to mechanical impact	**Sensitivity to Static Discharge:** Not expected to be sensitive to static discharge

Fire and Explosion Hazards: This material is non-flammable but is decomposed by heat and light, causing a pressure build-up which could result in an explosion. When heated, it may release chlorine gas or hydrochloric acid. Vigorous reaction with oxidizable or organic materials may result in fire.	**Extinguishing Media:** Use agents appropriate for surrounding fire. Foam, dry chemical, carbon dioxide, water fog or spray. If leak or spill has not ignited, use water spray to disperse the vapors and to protect persons attempting to stop the leak.
Fire Fighting Procedures: Water spray should be used to cool containers and may be used to knock down escaping vapor. Remove storage vessels from the fire zone.	**Fire Fighting Protective Equipment:** Full protective clothing, including a NIOSH approved self-contained breathing apparatus, must be worn in a fire involving this material. Toxic gas vapors are produced upon decomposition.

SECTION 8 ECOLOGICAL INFORMATION

The toxicity and corrosivity of this product is a function of concentration and the concentration's pH.

ECOTOXICOLOGICAL INFORMATION: Toxic to aquatic life. 96-hour LC50: fathead minnows: 0.090-5.9 mg/L, bluegill sunfish: 0.10-2.48 mg/L, shore crab: 1.418 mg/L, grass shrimp: 52.0 mg/L, scud: 0.145-4.0 mg/L, water flea: 2.1 mg/L.

ENVIRONMENTAL EFFECTS: Do not contaminate domestic or irrigation water supplies, lakes, streams, ponds, or rivers. May be an aesthetic nuisance due to color. Mammals and birds, exposed wildlife would be subject to skin irritation and burns due to the corrosive nature of this material.

SECTION 9 DISPOSAL CONSIDERATIONS

Treatment, storage, transportation, and disposal must be in accordance with applicable Federal, State, and Local regulations. Do not burn. Do not flush to surface water or sanitary sewer system. If pH of material is equal to or greater than a 12.5, the material is a RCRA Hazardous Waste D002, corrosive.

SECTION 10 TRANSPORT INFORMATION

U.S. DOT Basic Shipping Description: Hypochlorite Solutions, 8, UN1791, III

U.S. DOT Hazardous Substance: Yes, RQ 100 pounds (Sodium Hypochlorite)

U.S. DOT Marine Pollutant: No

U.S. DOT Required Label: Corrosive (see column 6, 49 CFR §172.101)

U.S. DOT Packaging Exception: Yes, if package meets the criteria of a limited quantity or consumer commodity as defined by 49 CFR §171.8, §173.144 and .154, and §172.312 and .316

N. AMERICAN EMERGENCY GUIDE PAGE NUMBER: 154

Transportation Emergency Phone Numbers: *CHEMTREC 1-800-424-9300*

SECTION 11 PRECAUTIONS FOR SAFE HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Take all precautions to avoid personal contact. Keep container closed except when transferring material. Locate safety shower and eyewash station close to chemical handling area. Use normal good industrial hygiene and housekeeping practices, wash thoroughly after handling. Store in a cool, dry, well-ventilated area, away from incompatibles (minimum distance of 20-25 feet per NFPA Code 1) and direct sunlight. Keep container properly labeled at all times. Vented containers must be used and must be kept closed when not

being used. Long-term storage is impossible without decomposition. Only use containers made from tinted glass, polyethylene & FRP. Keep out of reach of children.

PROCESS HAZARDS: Not Available

STORAGE TEMPERATURE: Store containers below 29°C and above freezing point. Do not expose sealed containers above 40°C. Try to store in the dark at the lowest possible temperature, but keep from freezing, to slow-down decomposition.

SECTION 12 EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS: Full handling precautions should be taken at all times. Provide good room ventilation plus local exhaust at points of emission and low level floor exhaust in immediate handling area. Where engineering controls are not feasible, use adequate local exhaust ventilation wherever mist, spray or vapor may be generated.

PERSONAL PROTECTIVE EQUIPMENT:

Eye: Use chemical safety goggles when there is potential for contact (splashing), faceshield recommended – ANSI Z87.1

Skin: Gloves and protective clothing (apron, boots, and bodysuits) made from rubber, vinyl, neoprene or PVC. Standard work clothing closed at the neck and wrist while wearing impervious equipment.

Respiratory (*Specify Type*): A NIOSH/MSHA approved air purifying respirator with an acid gas cartridge or canister may be permissible under circumstances where airborne concentrations are expected to exceed exposure limits. Protection provided by air purifying respirators is limited. Use a positive pressure air supplied respirator if there is potential for uncontrolled releases, exposure levels are not known, or other circumstances where air purifying respirators may not provide adequate protection.

Other: Eyewash, shower station (ANSI Z358.1) must be provided within the immediate work area.

SECTION 13 ACCIDENTAL RELEASE MEASURES

Ventilate enclosed area. Collect product for recovery or disposal. For release to land, contain discharge by constructing dikes or applying inert absorbent; for release to water, utilize damming and/or water diversion to reduce the spread of contamination; and, for release to air, vapors may be suppressed by the use of a water fog. All run-off water must be captured for treatment and disposal. Collect contaminated soil and water, and absorbent for disposal. Notify applicable government authority if release is reportable or could adversely affect the environment. Please follow all Local, State and Federal Laws for clean-up and disposal of all contaminated material. **Deactivating Chemicals:** Sodium Sulfite, Sodium Thiosulfate and Sodium Bisulfite.

SECTION 14 REGULATORY INFORMATION

OSHA CLASSIFICATION, 29 CFR §1900-1910:

Physical Hazards: Reactivity **Health Hazards**: Acute - Skin Sensitizer, Corrosive

CERCLA AND SARA REGULATIONS, 40 CFR §300-373:

Reportable Quantity = 100 lb. **CERCLA Hazardous Material:** Yes

Title III Hazard Classifications: Acute - yes, Chronic - no, Fire - yes, Reactivity - yes & Sudden Release of Pressure - No. This product may be reportable under the requirements of 40 CFR §370.

SARA Extremely Hazardous Substance: No **SARA Toxic Chemical:** No **CA Prop 65:** No

FDA 21 CFR 178.1010: Yes, Approved as Sanitizer

NSF Whitebook (former USDA Approval) Listing: Aqua Guard Chlorinating Sanitizer 10.5% - 3D, B1, B2, D1, D2, G4, G7, GX, Q4, **Aqua Guard Bleach 12.5% -** 3D, B1, B2, D1, D2, G4, GX, Q4

EPA "CLEAN AIR ACT": This product does not contain nor is it manufactured with ozone depleting substances. It is not defined as a Hazardous Air Pollutant per 40 CFR 112.

EPA Pesticide: The 10.5% and 12.5% sodium hypochlorite products are registered with the U.S. EPA as a pesticide, as required under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). It is a violation of Federal law to use this product for pesticidal applications in a manner inconsistent with the FIFRA labeling.

NPCA-HMIS RATING: HEALTH: 3 FLAMMABILITY: 0 REACTIVITY: 2

NFPA RATING:NONE AT THIS TIME

SECTION 15 REFERENCES

Suppliers' Material Safety Data Sheets and EPA Labeling Requirements
Olin and OxyChem Sodium Hypochlorite Handbook
Chlorine Institute Sodium Hypochlorite Pamphlet #96
Chlorine Institute Product Stewardship Bulletins for Sodium Hypochlorite

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APPENDIX J ANALYTICAL RESULTS

Waste Stream: Drill Cuttings/Mud Slops

EPA Waste Profile Sheet Number: 20140506-009

EcoTox Environmental Services Ltd.

Mud Slop 1 Drill Cuttings from EEPGL

Quality Analysis Report

Date of Report: 9th April 2021

Client: Tiger Tanks Trinidad Unlimited

Project Code: ECO-TTTU-285

Test Conducted By:

ECOTOX ENVIRONMENTAL SERVICES LIMITED

213 Caroni Savannah Road, Charlieville, Chaguanas, Trinidad, W.I.
Tel.: (868) 672-6620 Fax: (868) 665-8620 E-mail: admin@ecotoxes.com, www.ecotoxes.com

Nafeesa Ali

Laboratory Manager

Mikaiel Dookie

Operations Manager/Chemist

Date of Report: **9th April 2021**

Client: **Tiger Tanks Trinidad Unlimited**

Client Address: **La Bidco Estate, La Brea, Trinidad, W.I.**

Project Code: **ECO-TTTU-285**

Report No.: **ECO-TTTU-285**

1.0 Introduction

ECOTOX Environmental Services Limited (ECOTOX) was contracted by Tiger Tanks Trinidad Unlimited (TTTU) to conduct analysis of one Mud Slop 1 Drill Cuttings from EEPGL sample for pH, Total Oil and Grease, Total Petroleum Hydrocarbons and TCLP[1] Extracted Heavy Metals. Samples were logged into the ECOTOX sample tracking system and assigned sample identification numbers (Table #1). The samples were appropriately stored until the tests were initiated.

Table #1: Client I.D. and Sample Details

Client Sample ID	ECOTOX Sample ID	Sample Collection Date / Time
Mud Slop 1 Drill Cuttings from EEPGL	**2101108**	**25th March 2021 / 8:00 a.m.**

The samples were collected on the 25th March 2021, by a representative from Tiger Tanks Guyana Rentals Inc. Samples were collected and preserved according to recommended procedures as stipulated in the United States Environmental Protection Agency Methods for the requested parameters. The samples were appropriately stored in a cooler, on ice at 4 ± 2°C, for transportation to the laboratory. The samples were received by ECOTOX on the 8th February 2021. On receipt by the laboratory, samples were logged into the ECOTOX sample tracking system and assigned sample identification numbers. The samples were appropriately stored (refrigerator 4 ± 2°C) until the tests were initiated.

[1] Toxicity Characteristic Leaching Procedure - a sample extraction method for chemical analysis employed as an analytical method to simulate leaching through a landfill.

2.0 Results

Tests were done in accordance with those stipulated in the Standard Methods for the Examination of Water and Wastewater 23rd Edition (2017) and the United States Environmental Protection Agency Standard Methods for the requested parameters. Standard test procedures were followed for all analyses conducted with several quality control measures implemented for each parameter investigated. The results for the requested analyses are listed below in Table #2. Replicate analyses, blanks, spikes and standard reference materials were included during tests to assess the accuracy and precision of the analytical results obtained. Refer to Appendix A for method description and quality control and assurance measures. Refer to Appendix B, for Chain of Custody/Sample Receipt information.

Table #2: Waste Characterization Results

Parameter	Maximum Permissible Limit (mg/Kg)	2101108 Mud Slop 1 Drill Cuttings from EEPGL 25th March 2021
pH (Hydrogen Ion, H^+)	6 - 12[2] (H^+)	10.60
Total Petroleum Hydrocarbons (mg/Kg)	Not Listed[2]	32,256.5
Total Oil & Grease (mg/Kg)	< 3% or < 30,000 ppm[2]	51,383.4
TCLP Extractable Arsenic (mg/L)	5.0 mg/L[3]	< 0.005
TCLP Extractable Barium (mg/L)	100 mg/L[3]	1.870
TCLP Extractable Cadmium (mg/L)	1.0 mg/L[3]	< 0.005
TCLP Extractable Chromium (mg/L)	5.0 mg/L[3]	< 0.005
TCLP Extractable Lead (mg/L)	5.0 mg/L[3]	0.076
TCLP Extractable Mercury (mg/L)	0.2 mg/L[3]	< 0.005
TCLP Extractable Selenium (mg/L)	1.0 mg/L[3]	< 0.005
TCLP Extractable Silver (mg/L)	5.0 mg/L[3]	< 0.005

[2] Louisiana Administrative Code (LAC), Title 43, part XIX, Office of Conservation – General Operations Subpart 1. Statewide Order No. 29-B; Section 313, E, Burial or Trenching of Treated Pit Solid Phase Contents – Pit Closure Techniques and Onsite Disposal of Exploration and Production Waste Standard (November 2019).

[3] TCLP United States Environmental Protection Agency Resource Recovery and Conservation Act, RCRA-8 Metals Maximum Permissible Limits (Maximum Concentration of Contaminants).

3.0 Appendix A - Quality Control and Quality Assurance Procedures for Analyses Performed

All sampling and tests procedures employed by ECOTOX for the duration of this project were a direct adaptation from standard procedures as outlined in the SMEWW – Standard Methods for the Examination of Water and Wastewater, American Public Health Association, 23rd Edition, 2017; and US Environmental Protection Agency Standard Methods. The following will outline a brief description of the procedures used. The relative standard deviation (RSD) was less than 10.0 % for all analyses conducted. Standard reference materials and spiked solutions were used with 85 –115 % recovery obtained during testing. The following table will illustrate the analyses to be performed and necessary details for each.

As outlined in **Laboratory Manual for the Analysis of Exploration and Production Waste** (Department of Natural Resources, May 2005), Analytical Methodology Table (Refer to below):

ANALYTICAL METHODOLOGY REFERENCE TABLE
LAC 43:XIX.Subpart 1

Parameter	Method
Soils / Sediment / Sludges / Reusable Material	
pH	SW-846 9045C, EPA 150.1^
TPH (Total Petroleum Hydrocarbons)	SW-846 1664 HEM/SGT / SW-846 9071
Leachable TPH Test	LDNR Lab Procedures for Analysis of E&P Waste
Leachable Chlorides Test	LDNR Lab Procedures for Analysis of E&P Waste
Electrical Conductivity (EC)	LDNR Lab Procedures for Analysis of E&P Waste
Sodium Absorption Ratio (SAR)	LDNR Lab Procedures for Analysis of E&P Waste
Exchangeable Sodium Percentage (ESP)	LDNR Lab Procedures for Analysis of E&P Waste
Cation Exchange Capacity (CEC)	LDNR Lab Procedures for Analysis of E&P Waste
Benzene	SW-846 8021
TCLP Benzene	SW-846 8021/1311
NORM	EMSL-LV-0539-17@
Reactive Sulfide	SW-846 7.3.4
Total Metals and/or Leachable Metals	
TCLP Extraction	SW-846 1311
Arsenic (As)	SW-846 6010/6020/7000
True Total Barium (Ba)	LDNR Lab Procedures for Analysis of E&P Waste
Barium (Ba)	SW-846 6010/6020/7000
Cadmium (Cd)	SW-846 6010/6020/7000
Chromium (Cr)	SW-846 6010/6020/7000
Copper (Cu)	SW-846 6010/6020/7000
Lead (Pb)	SW-846 6010/6020/7000
Mercury (Hg)	SW-846 7470/7471
Molybdenum (Mo)	SW-846 6010/6020/7000
Nickel (Ni)	SW-846 6010/6020/7000
Selenium (Se)	SW-846 6010/6020/7000
Silver (Ag)	SW-846 6010/6020/7000
Sodium (Na)	SW-846 6010/6020/7000
Zinc (Zn)	SW-846 6010/6020/7000
Soluble Cations (Na, Ca, Mg)	LDNR Lab Procedures for Analysis of E&P Waste
Soluble Anions (Cl, CO3, HCO3, SO4)	SW-846 9056/9253, SM 2320B*

2

Table #3: Methodology Listing – Sampling – Solid Waste Matrices

Item	Test Method and Description
Test Method Reference	SOLID- As outlined and guided by the following reference methods: • ASTM D6051 – 15. Standard Guide for Composite Sampling and Field Subsampling for Environmental Waste Management Activities. • RCRA Waste Sampling Draft Technical Guidance, Planning, Implementation, and Assessment, EPA530-D-02-002, August 2002. • US EPA SW 846 Compendium of Hazardous Waste Testing Methods, Test Methods for Evaluating Solid Waste. • US EPA Hazardous Waste Incineration Measurement Guidance Manual, Volume III of the Hazardous Waste Incineration Guidance, Section 3.3 "Sampling", EPA/625/6-89/021, June 1989. • US EPA Hazardous Waste Incineration Measurement Guidance Manual, Volume III of the Hazardous Waste Incineration Guidance, Section 3.3.1.2 "Viscous Liquids, Slurries, Sludges, and Solid Waste Samples", EPA/625/6-89/021, June 1989, as follows: Incinerator Ash, Moist or Dry Solids - Trowel (Scoop) Method
Test Description	Composite Sample – Solid/Sludge *Composite Gross Sample* *Reduction of Gross Sample: Coning and quartering procedure:* A composite sample will be collected from no more than 3-bags per homogenous waste type and sent to the lab for analysis.
Sample Collection & Preservation	**Borosilicate (Glass), PTFE[4] Lined Cap (8 ounces)** – Fill bottle to top with minimal amount of air remaining in bottle. Stopper tightly and store on ice in cooler. Cool, < 6°C, in dark. Samples to be stored cool 4 ± 2°C, but not freezing.
Maximum Holding Time/Storage	Samples should be stored field-moist at 4 ± 2°C for 14-days. Preserved Metal TCLP digest holding time = 6 months, 4 ± 2°C. TOG/TPH samples holding time = 14 days, 4 ± 2°C.
Transportation	After collection, sample handling should be minimized. Field Technicians should use extreme care to ensure that samples are not contaminated during storage. Environmental and waste samples are typically stored in coolers. To reduce the risk of cross contamination, sample containers should be placed inside of sealed, plastic bags before being placed in the cooler. If ice is required for preservation of the samples, the ice should be contained in a plastic bag or some equivalent container to prevent the potential for cross contamination of the samples by water produced from melting ice. If ice is used, the coolers should be checked regularly and water should be drained as needed. Custody of samples will be maintained. If analysis is to be delayed for more than six (6) hours, samples must be stored in a cooler with ice to maintain sample temperature of 4 ± 2°C. All samples must therefore be transported to the laboratory in this manner.

[4] Polytetrafluoroethylene.

Table #4: Methodology Listing – Total Petroleum Hydrocarbons

Parameter	Test Method and Description
Test Method Reference and Description	As outlined in **Laboratory Manual for the Analysis of Exploration and Production Waste** (Department of Natural Resources, May 2005) Analytical Methodology Reference Table, page 2. As outlined in **US EPA Method 9071B**, n-Hexane Extractable Material (HEM) for Sludge, Sediment, and Solid Samples. Quantification of oil and grease in soil, sediments, sludges, and other solid materials amenable to chemical drying and solvent extraction with n-hexane. "Oil and grease" is a conventional pollutant under 40 CFR 401.16 and generally refers to substances, including biological lipids and mineral hydrocarbons that have similar physical characteristics and common solubility in an organic extracting solvent. As such, oil and grease is an operationally defined parameter, and the results will depend entirely on the extracting solvent and method of extraction. Method 9071 employs n-hexane as the extraction solvent with Soxhlet extraction and the results of this method are appropriately termed "n-hexane extractable material (HEM)." As outlined in **US EPA 3540C – Soxhlet Extraction Method.** Method 3540 is a procedure for extracting non-volatile and semi volatile organic compounds from solids such as soils, sludges, and wastes. The Soxhlet extraction process ensures intimate contact of the sample matrix with the extraction solvent. The solid sample is mixed with anhydrous sodium sulfate, placed in an extraction thimble or between two plugs of glass wool, and extracted using an appropriate solvent in a Soxhlet extractor. The extract is then dried, concentrated (if necessary), and, as necessary, exchanged into a solvent compatible with the clean-up or determinative step being employed. As outlined in **5520F – Hydrocarbons (TPH).** Silica gel has the ability to adsorb polar materials. If a solution of hydrocarbons and fatty materials in a nonpolar solvent is mixed with silica gel, the fatty acids are removed selectively from solution. The materials not eliminated by silica gel adsorption are designated hydrocarbons by this test.
Quality/Assurance Control Measures	• Duplicate/Triplicate analyses, • Method Blank, Laboratory Fortified Blank. • Routine and Random Duplicates/Triplicates. • Determine Method Detection Limit for sample analyte. • Instrument Operational Range – Upper and Lower Limits • Calibration & Verification Procedures and Standards. • Equipment Maintenance and Preventative Maintenance Procedures.

Table #5: Methodology Listing – TCLP[5] Extractable Metals

Parameter	Test Method and Description
Test Method Reference and Description	As outlined in **Laboratory Manual for the Analysis of Exploration and Production Waste** (Department of Natural Resources, May 2005), Analytical Methodology Reference Table, page 2. As outlined in **US EPA Method Number 1311**. Toxicity characteristic leaching procedure (TCLP) is a soil sample extraction method for chemical analysis employed as an analytical method to simulate leaching through a landfill. The testing methodology is used to determine if a waste is characteristically hazardous. The solid phase is extracted with an amount of extraction fluid equal to 20 times the weight of the solid phase. The extraction fluid employed is a function of the alkalinity of the solid phase of the waste. Following extraction, the liquid extract is separated from the solid phase by filtration through a 0.6 to 0.8 µm glass fiber filter. The TCLP Extract is analyzed for metals as outlined in: **As, Ba, Cd, Cr, Pb, Zn, Se & Ag** – US EPA SW-846 Test Method 7000B and SMEWW[6] Method 3111B, D: Flame Atomic Absorption Spectrophotometry. **Mercury**: Hg – US EPA Method 7470 - Cold-Vapor Atomic Absorption Spectrometry 7471B-Solids or Semis solid Waste Cold-Vapor Atomic Absorption Spectrometry. Free mercury atoms in a carrier gas are excited by a collimated ultraviolet light source at a wavelength of 53.7 nanometres. The excited atoms re-radiate their absorbed energy (fluoresce) at this same wavelength. Unlike the directional excitation source, the fluorescence is omnidirectional and may thus be detected using a photomultiplier tube or UV photodiode. The technique differs from the more conventional atomic absorption (AA) technique in that it is more sensitive, more selective, and is linear over a wide range of concentrations. **Arsenic** Hydride Generation/Atomic Absorption Spectrometry and ECOTOX SOP Method W-M-As. This method is applicable to the determination of arsenic by conversion to its hydride by sodium borohydride reagent and transport into an atomic absorption atomizer. Arsenous acid, the As (III) oxidation state of arsenic is instantaneously converted by sodium borohydride reagent in acid solution to its volatile hydride. The hydride is purged continuously by argon or nitrogen into a quartz cell heated electrically or by the flame of an atomic absorption spectrometer and converted to the gas-phase atoms. The sodium borohydride reducing agent, by rapid generation of the elemental hydrides in an appropriate reaction cell, minimizes dilution of the hydrides by the carrier gas and provides rapid, sensitive determination of arsenic. At room temperature and solution pH values of 1 or less, arsenic acid, the As(V) oxidation state of arsenic, is reduced relatively slowly by sodium borohydride to As (III), which is then instantaneously converted to arsine. Organic and inorganic forms of arsenic are first oxidized to As(V) by acid digestion. The As(V) then is quantitatively reduced to As (III) with sodium or potassium iodide before reaction with sodium borohydride.
Quality/Assurance Control Measures	• Duplicate/Triplicate analyses, • Method Blank, Laboratory Fortified Blank. • Routine and Random Duplicates/Triplicates. • Determine Method Detection Limit for sample analyte. • Instrument Operational Range – Upper and Lower Limits • Calibration & Verification Procedures and Standards. • Equipment Maintenance and Preventative Maintenance Procedures.

[5] Toxicity characteristic leaching procedure.
[6] SMEWW – Standard Methods for the Examination of Water and Wastewater, American Public Health Association, 2017, 23rd Edition.

Table #6: Methodology Listing – pH

Parameter	Test Method and Description
Test Method Reference and Description	As outlined in **Laboratory Manual for the Analysis of Exploration and Production Waste** (Department of Natural Resources, May 2005) Analytical Methodology Reference Table, page 2. As outlined in **US EPA Method SW-846 Test Method 9045C: Soil and Waste pH.** Sample Preparation and pH measurement of waste materials: To 20 grams waste sample in a 50-mL beaker, add 20 mL of reagent water, cover and continuously stir for 5 minutes. Let waste suspension stand for about 15 minutes to allow most of the suspended waste to settle from the suspension or filter or centrifuge off aqueous phase for pH measurement. pH measurement by pH Meter.
Quality/Assurance Control Measures	• Duplicate analyses, • Method Blank, Laboratory Fortified Blank. • Routine and Random Duplicates/Triplicates. • Determine Method Detection Limit for sample analyte. • Instrument Operational Range – Upper and Lower Limits • Calibration & Verification Procedures and Standards. • Equipment Maintenance and Preventative Maintenance Procedures.

The following is a table of the calculated detection limits and the associated bias for each of the analyses performed.

Table #7: List of Parameters with Associated Instrument Detection Limits and Bias

Parameter	Detection Limit/Range	Bias
pH	0.01 H^+	± 0.01 H^+
OG/TPH	0.1 ppm	±0.1 ppm
TCLP Metals	0.005 ppm	±0.005 ppm

ECOTOX
ENVIRONMENTAL SERVICES LIMITED

ANALYTICAL REQUEST FORM
CHAIN OF CUSTODY

Laboratory Address: #213 Caroni Savannah Rd, Charlieville, Trinidad, West Indies.
Tel: (868)-672-6620 Fax: (868) 665-8620; (868) 221-9149
e-mail: admin@ecotoxes.com, md@ecotoxes.com

CLIENT: Tiger Tanks Trinidad Unlimited (for Tiger Tanks Guyana,Rentals Inc.)

INVOICE TO:

REPORT TO: Mr. Shane Singh

ADDRESS: #126 Quamina & Carmichael Streets, Georgetown, Guyana.

PHONE: 592-501-0620 **FAX:**

BILLING ADDRESS:

P.O. NUMBER:

PROJECT NAME: Waste Testing

PROJECT NUMBER: 295

SAMPLED BY: Nandkishore Singh

COC#:

TURNAROUND REQUEST in Business Days

Analysis

10 | 7 ✓ | 5 | 3 | 2 | 1 | <1

STD.

Microbiological Analyses

10 | 7 | 5 | 3 | 2 | 1

STD.

Please Specify

OTHER

REQUESTED ANALYSIS

CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	TPH	Oil & Grease	TCLP As, Ba, Cr, Pb, Hg, Se, Ag, Cd	pH			MATRIX (W.S.O)	# OF CONT.	COMMENTS	ECOTOX ID
1. Mud Slop / Drill Cuttings	25/3/2021 @ 8:00AM	✓	✓	✓	✓			S	1	Plastic	2101105
2. From EEPGL	9:00 am.										
3. #. ADRL											
4. 7100 346.											
5.											
6.											
7.											
8.											
9.											
10.											

RELINQUISHED BY: K. Ramrattan DATE: 25/3/21
PRINT NAME: KENNY RAMRATTAN FIRM: TRG TIME: 7:00 AM

RECEIVED BY:
PRINT NAME: CARISSA GOODMAN FIRM: DATE: 1-4-21 TIME: 11:07AM

RELINQUISHED BY: DATE:
PRINT NAME: FIRM: TIME:

RELINQUISHED BY: DATE:
PRINT NAME: FIRM: TIME:

ADDITIONAL INFO/SPECIAL REQUESTS:

PAGE 3 OF 7

Waste Stream: Completion Fluids/Contaminated Brine

EPA Waste Profile Sheet Number: 20140506-021

EcoTox Environmental Services Ltd.

Frac Tank Flow back Fluids from

Frac Tank #59487

Wastewater Quality Analysis Report

Date of Report: 13th April 2021

Client: Tiger Tanks Trinidad Unlimited (TTTU)

Project Code: ECO-TTTU-289

Test Conducted By:

ECOTOX ENVIRONMENTAL SERVICES LIMITED

213 Caroni Savannah Road, Charlieville, Chaguanas, Trinidad, W.I.
Tel.: (868) 672-6620 Fax: (868) 665-8620 E-mail: admin@ecotoxes.com, www.ecotoxes.com

Nafeesa Ali — Laboratory Manager

Mikaiel Dookie — Environmental Chemist

Date of Report: **13th April 2021**
Client: **Tiger Tanks Trinidad Unlimited**
Client Address: **La Bidco Estate, La Brea, Trinidad, W.I.**
Project Code: **ECO-TTTU-289**
Project Number: **ECO-TTTU-289**

Table 1: Sample Details and I.D. Codes

Client Sample I.D.	ECOTOX Sample ID	Sample Collection Date / Time
Frac Tank Flow back Fluids from Frac Tank #59487	2101112	25th March 2021 / 8:00 a.m.

1. Summary:

ECOTOX was contracted by Tiger Tanks Trinidad Unlimited to conduct analytical testing of one Frac Tank Flow back Fluids from Frac Tank #59487 sample for pH, Flash Point, Total Oil and Grease, Total Petroleum Hydrocarbons, Chemical Oxygen Demand, Biological Oxygen Demand, BTEX and TCLP Extractable Metals. This report summarizes the test results for the samples taken.

The samples were collected on the 25th March 2021, by a representative of Tiger Tanks Guyana Rentals Inc. Samples were collected and preserved according to recommended procedures as stipulated in the Standard Methods for the Examination of Water and Wastewater 23rd Edition (2017) for the requested parameters. The samples were appropriately stored in a cooler, on ice at ≤ 6°C, for transportation to the laboratory. The samples were received by ECOTOX on the 1st April 2021. On receipt by the laboratory, samples were logged into the ECOTOX sample tracking system and assigned sample identification numbers. The samples were appropriately stored (refrigerated ≤ 6°C) until the tests were initiated.

2. Results:

Tests were done in accordance with those stipulated in the Examination of Water and Wastewater 23rd Edition (2017) standard methods and the US EPA. Standard test procedures were followed for all analyses conducted with several quality control measures implemented for each parameter tested. The results for the requested analyses are listed below in Table 2. Replicate analyses, blanks and other reference materials were included during tests to assess the accuracy and precision of the analytical results obtained. Refer to Appendix A for description of methods and quality assurance and control measures. Chain of Custody form is displayed in Appendix B.

Table 2: Analysis of Wastewater Samples

Parameter	Maximum Permissible Limits[1]	Client Sample Name: Frac Tank Flow back Fluids from Frac Tank #59487 Wastewater Ecotox Sample I.D.: 2101112
Date of Sample Collection		25th March 2021
Time of Sample Collection		8:00 a.m.
pH (H^+ ions)	5 – 9 H^+ ions	8.00
Total Petroleum Hydrocarbons (TPH) (mg/L)	≤ 40 mg/L	> 10%
Total Oil & Grease (TO&G) (mg/L)	Not Listed	> 10%
Biological Oxygen Demand (BOD) (mg/L)	≤ 50 mg/Ls	5,630.4
Chemical Oxygen Demand (COD) (mg/L)	≤ 50 mg/Ls	13,166.9
TCLP Extractable Arsenic (mg/L)	Not Listed	< 0.005
TCLP Extractable Barium (mg/L)	Not Listed	< 0.005
TCLP Extractable Cadmium (mg/L)	Not Listed	< 0.005
TCLP Extractable Chromium (mg/L)	Not Listed	0.409
TCLP Extractable Lead (mg/L)	Not Listed	< 0.005
TCLP Extractable Mercury (mg/L)	Not Listed	< 0.005
TCLP Extractable Selenium (mg/L)	Not Listed	< 0.005
TCLP Extractable Silver (mg/L)	Not Listed	< 0.005
Flash Point (°C)	Not Listed	99.0
Benzene (µg/L)	Not Listed	1.40
Toluene (µg/L)	Not Listed	1.76
Ethylbenzene (µg/L)	Not Listed	4.39
Xylene (µg/L)	Not Listed	9.19

NOTE: 1% = 10,000 ppm

[1] Guyana National Bureau of Standards Interim Guidelines for Industrial Effluent Discharge into the Environment.

Table 3: Analysis of Wastewater Samples

Parameter	Maximum Permissible Limits[2]	Client Sample Name: Frac Tank Flow back Fluids from Frac Tank #59487 Wastewater Ecotox Sample I.D.: 2101112
Date of Sample Collection		25th March 2021
Time of Sample Collection		8:00 a.m.
Naphthalene (mg/L)	Not Listed	2,108.5
Acenaphthylene (mg/L)	Not Listed	43.2
Acenaphthene (mg/L)	Not Listed	< 0.005
Fluorene (mg/L)	Not Listed	100.6
Anthracene (mg/L)	Not Listed	4.6
Phenanthrene (mg/L)	Not Listed	80.1
Fluoranthene (mg/L)	Not Listed	3.1
Pyrene (mg/L)	Not Listed	6.4
Benzo(a)anthracene (mg/L)	Not Listed	2.5
Chrysene (mg/L)	Not Listed	35.1
Benzo(b)fluoranthene (mg/L)	Not Listed	< 0.005
Benzo(k)fluoranthene (mg/L)	Not Listed	< 0.005
Benzo(a)pyrene (mg/L)	Not Listed	< 0.005
Dibenz(ah)anthracene (mg/L)	Not Listed	< 0.005
Benzo(ghi)perylene (mg/L)	Not Listed	< 0.005
Ideno(1,2,3-c,d)pyrene (mg/L)	Not Listed	< 0.005

[2] Guyana National Bureau of Standards Interim Guidelines for Industrial Effluent Discharge into the Environment.

4. Appendix A

Quality Control and Quality Assurance Procedures for Analyses Performed

All sampling and tests procedures employed by ECOTOX for the duration of this project were a direct adaptation from standard procedures as outlined in the Standard Methods for the Examination of Water and Wastewater 23rd Edition (2017) The following will outline a brief description of the procedures used.

Table 4A. Description of Parameters Investigated and Associated Quality Control Measures

Parameter	Test Method and Description	Quality Control Measures.
Sampling	As outlined in SMEWW # 1060 Grab Samples	Duplicate Samples were taken, preserved with 50% Sulphuric Acid to pH 2 or otherwise as outlined in WPR 2000.
Total Oil and Grease / Total Petroleum Hydrocarbons	**N-Hexane Extractable Material (Non-polar Material) Total Oil and Grease by Extraction and Gravimetry (HEM; Oil and Grease) and Silica Gel Treated N-Hexane Extractable Material (SGTHEM; USEPA Method 1664 Revision A. February 1999.** The term "n-hexane extractable material" reflects that this method can used to determine materials other than oils and greases. Similarly, the term "silica gel treated n-hexane extractable material" reflects that this method can be used to determine material that is not adsorbed by silica gel (non-polar material). A 1-L sample is acidified to pH <2 with Hydrochloric Acid or Sulphuric Acid and serially extracted three times with n-hexane in a separatory funnel. The extract is dried over sodium sulfate. The solvent is distilled from the extract and the HEM is desiccated and weighed. If the HEM is to be used for determination of SGT-HEM, the HEM is re-suspended in n-hexane. For SGT-HEM determination, an amount of silica gel proportionate to the amount of HEM is added to the solution containing the re-suspended HEM to remove polar materials. The solution is filtered to remove the silica gel, the solvent is distilled, and the SGT-HEM is desiccated and weighed.	Duplicate analyses, multiple blanks and spikes.
Biological Oxygen Demand	As outlined in **SMEWW Method # 5210 B 5-Day BOD Test Method.** Quantification of the relative oxygen requirements of wastewaters, effluents, and polluted waters after 5 Days of incubating diluted samples at 20 ± 1ºC.	Standard Reference Material. Blanks. Controls.
Total Chemical Oxygen Demand (COD) - Modified for Chloride Correction	As outlined in **SMEWW Method # 5220 D Closed Reflux, Colorimetric Method.** Used to indirectly measure the amount of organic compounds in water as nearly all organic compounds can be fully oxidized to carbon dioxide with a strong chemical oxidizing agent under acidic conditions. In the process of oxidizing the organic substances found in the water sample, potassium dichromate is reduced (since in all redox reactions, one reagent is oxidized and the other is reduced), forming Cr^{3+}. The amount of Cr^{3+} is determined after oxidization is complete, and is used as an indirect measure of the organic contents of the water sample. EQUIPMENT used - Block Digester, relevant glassware and chemicals for digestion procedure, UV-VIS Spectrophotometer.	Duplicate analysis, standard reference material – Potassium hydrogen phthalate standard, multiple banks per batch.

Table 4B. Description of Parameters Investigated and Associated Quality Control Measures

Parameter	Test Method and Description	Quality Control Measures.
pH	**As outlined in SMEWW Method # No. 4500-H^+ pH Value B Electrometric Method.** The basic principle of electrometric pH measurement is determination of the activity of the hydrogen ions by potentiometric measurement using a standard hydrogen electrode and a reference electrode.	Calibration/Standard Solutions.
TCLP Extractable Metals	As outlined in **US EPA Method Number 1311**. The TCLP is designed to determine the mobility of both organic and inorganic analytes present in liquid, solid, and multiphasic wastes. For liquid wastes, after filtration through a 0.6 to 0.8 µm glass fiber filter, is defined as the TCLP extract. The TCLP Extract is analyzed for metals as outlined in: As, Ba, Cd, Cr, Pb, Se & Ag – US EPA SW-846 Test Method 7000B and SMEWW Method 3111B, D: Flame Atomic Absorption Spectrophotometry. Hg – US EPA Method 7470 - Cold-Vapor Atomic Absorption Spectrometry 7471B-Solids or Semis solid Waste Cold-Vapor Atomic Absorption Spectrometry. As – US EPA Method 7061 Hydride Generation/Atomic Absorption Spectrometry.	Standard addition, blanks, triplicate analyses, standard reference water solutions.
BTEX	As outlined in US EPA Method Number 8260D, Volatile Organic Compounds By Gas Chromatography/Mass Spectrometry. VOCs are introduced into the GC by one of the preparation methods mentioned in Sec. 1.2. The analytes may be introduced directly to a capillary column, cryofocussed on a capillary pre-column before being flash evaporated to a capillary column for analysis, or desorbed from a trap and sent to an injection port operating in the split mode for injection to a capillary column. The column is temperature-programmed to separate the analytes, which are then detected with a MS interfaced to the GC. Quantitation is accomplished by comparing the response of a major (quantitation) ion relative to an internal standard (IS) using an appropriate calibration curve for the intended application	Method blanks, surrogates, reference materials.
PAHs	As outlines in US EPA Method Number 610. A measured volume of sample, approximately 1 L, is extracted with methylene chloride using a separatory funnel. The methylene chloride extract is dried and concentrated to a volume of 10 mL or less. The extract is then separated GC. A flame ionization detector is used with GC. GC (Gas chromatograph) an analytical system complete with temperature programmable gas chromatograph suitable for on-column or splitless injection and all required accessories including syringes, analytical columns, gases, detector, and strip-chart recorder. A data system is recommended for measuring peak areas.	Method blanks, surrogates, reference materials.
Flash Point	ASTM E502-21 – Standard Test Method for Selection and Use of ASTM Standards for the Determination of Flash Point of Chemicals by Closed Cup Method.	Testing conducted by Trinidad & Tobago Bureau of Standards. Report# 20210171

The following is a table of the calculated detection limits and the associated bias for each of the analyses performed.

Table 5: List of Parameters with Associated Instrument Detection Limits and Bias.

Parameter	Detection Limit/Range	Bias
pH (H^+ ions)	0.02 H^+ ions	±0.01 H^+ ions
Total Petroleum Hydrocarbons (TPH) (mg/L)	0.05 mg/L	±0.01 mg/L
Total Oil & Grease (TO&G) (mg/L)	0.05 mg/L	±0.01 mg/L
Biological Oxygen Demand (BOD) (mg/L)	< 2 mg/L	There is no measurement for establishing the BOD test's bias[3]. Check using GGA Standard (85 to 115% Recovery), Dilution water blanks.
Chemical Oxygen Demand (COD) (mg/L)	2.9 mg/L	± 2.9 mg/L
TCLP Extractable Arsenic (mg/L)	0.005 mg/L	± 0.005 mg/L
TCLP Extractable Barium (mg/L)	0.005 mg/L	± 0.005 mg/L
TCLP Extractable Cadmium (mg/L)	0.005 mg/L	± 0.005 mg/L
TCLP Extractable Chromium (mg/L)	0.005 mg/L	± 0.005 mg/L
TCLP Extractable Lead (mg/L)	0.005 mg/L	± 0.005 mg/L
TCLP Extractable Mercury (mg/L)	0.005 mg/L	± 0.005 mg/L
TCLP Extractable Selenium (mg/L)	0.005 mg/L	± 0.005 mg/L
TCLP Extractable Silver (mg/L)	0.005 mg/L	± 0.005 mg/L
BTEX	0.005 mg/L	± 0.005 mg/L
PAHs	0.005 mg/L	± 0.005 mg/L
Flash Point (°C)	± 0.5 (°C)	

[3] SMEWW 23rd Edition: 5210 Biological Oxygen Demand (BOD) Approved by Standard Methods Committee, 2016. The GGA check prescribed in 5210B.6b is intended to be a reference point for evaluating dilution-water quality, seed effectiveness, and analytical technique.

5. APPENDIX B

Sample Collection & Preservation

As Outlined in Method #1060, Collection and Preservation of Samples, Standard Methods for Examination of Water and Wastewater, 23rd Edition (2017).

TABLE 1060:I. SUMMARY OF SPECIAL SAMPLING AND HANDLING REQUIREMENTS*

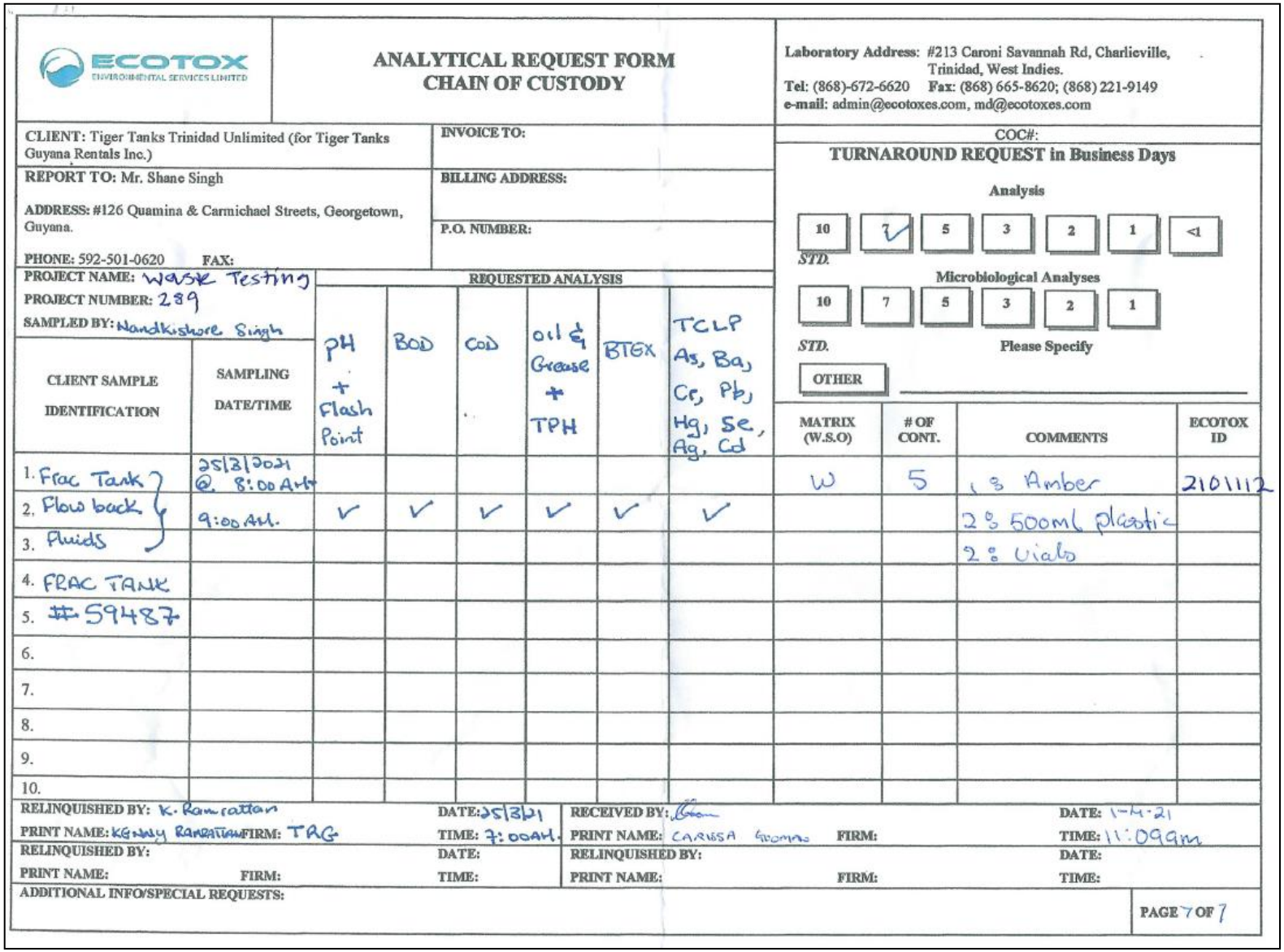
Determination	Container†	Minimum Sample Size *mL*	Sample Type‡	Preservation§	Maximum Storage Recommended	Regulatory‖
Acidity	P, G(B), FP	100	g	Cool, ≤6°C	24 h	14 d
Alkalinity	P, G, FP	200	g	Cool, ≤6°C	24 h	14 d
BOD	P, G, FP	1000	g, c	Cool, ≤6°C	6 h	48 h
Boron	F, P (PTFE) or quartz	1000	g, c	HNO_3 to pH<2	28 d	6 months
Bromide	P, G, FP	100	g, c	None required	28 d	28 d
Carbon, organic, total	G (B),P, FP	100	g, c	Analyze immediately; or cool ≤6°C, and add HCl, H_3PO_4, or H_2SO_4 to pH	7 d	28 d
Carbon dioxide	P, G	100	g	Analyze immediately	0.25 h	N.S.
COD	P, G, FP	100	g, c	Analyze as soon as possible, or add H_2SO_4 to pH<2; Cool, ≤6°C	7 d	28 d
Chloride	P, G, FP	50	g, c	None required	N.S.	28 d
Chlorine, total, residual	P, G	500	g	Analyze immediately	0.25 h	0.25 h
Chlorine dioxide	P, G	500	g	Analyze immediately	0.25 h	N.S.
Chlorophyll	P, G	500	g	Unfiltered, dark, ≤6°C Filtered, dark, –20°C (Do not store in frost-free freezer)	24–48 h 28 d	N.S.
Color	P, G, FP	500	g, c	Cool, ≤6°C	48 h	48 h
Specific conductance	P, G, FP	500	g, c	Cool, ≤6°C	28 d	28 d
Cyanide						
Total	P, G, FP	1000	g, c	Analyze within 15 min. Add NaOH to pH>12 if sample is to be stored, Cool, ≤6°C, in dark. Add thiosulfate if residual chlorine present	24 h	14 d; 24 h if sulfide present
Amenable to chlorination	P, G, FP	1000	g, c	Remove residual chlorine with thiosulfate and cool ≤6 °C	stat	14 d; 24 h if sulfide present
Fluoride	P	100	g, c	None required	28 d	28 d
Hardness	P, G, FP	100	g, c	Add HNO_3 or H_2SO_4 to pH<2	6 months	6 months
Iodine	P, G	500	g	Analyze immediately	0.25 h	N.S.
Metals	P(A), G(A), FP (A)	1000	g, c	For dissolved metals filter immediately, add HNO_3 to pH<2	6 months	6 months
Chromium VI	P(A), G(A), FP (A)	250	g	Cool, ≤6°C, pH 9.3–9.7, ammonium sulfate buffer preservative as specified in method 3500-Cr to extend to 28 days HT	28 d	28 d
Copper by colorimetry	—*	—	g, c	—	—	
Mercury	P(A), G(A), FP(A)	500	g, c	Add HNO_3 to pH<2, Cool ≤6°C	28 d	28 d
Nitrogen						
Ammonia	P, G, FP	500	g, c	Analyze as soon as possible or add H_2SO_4 to pH<2, Cool, ≤6°C	7 d	28 d
Nitrate	P, G, FP	100	g, c	Analyze as soon as possible; Cool, ≤6°C	48 h	48 h (14 d for chlorinated samples)
Nitrate + nitrite	P, G, FP	200	g, c	Add H_2SO_4 to pH<2, Cool, ≤6°C	1–2 d	28 d
Nitrite	P, G, FP	100	g, c	Analyze as soon as possible; Cool, ≤6°C	none	48 h
Organic, Kjeldahl	P, G, FP	500	g, c	Cool, ≤6°C, add H_2SO_4 to pH<2	7 d	28 d
Odor	G	500	g	Analyze as soon as possible; Cool ≤6°C	6 h	24 h (EPA Manual drinking water)
Oil and Grease	G, wide-mouth calibrated	1000	g	Add HCl or H_2SO_4 to pH<2, Cool, ≤6°C	28 d	28 d

TABLE 1060:I. CONT.

Determination	Container†	Minimum Sample Size *mL*	Sample Type‡	Preservation§	Maximum Storage Recommended	Regulatory‖
Organic Compounds						
MBAS	P, G, FP	250	g, c	Cool ≤6°C	48 h	48 h as per CFR 136
Pesticides*	G(S), PTFE-lined cap	1000	g, c	Cool, ≤6°C add 1000 mg ascorbic acid/L if residual chlorine present (0.008 % sodium thiosulfate in CFR 136)	7 d	7 d until extraction; 40 d after extraction
Phenols	P, G, PTFE-lined cap	500	g, c	Cool, ≤6°C, add H_2SO_4 to pH<2	*	28 d until extraction, 2 d after extraction
Purgeables* by purge and trap	G, PTFE-lined cap	2×40	g	Cool, ≤6°C; add HCl to pH<2; add 1000 mg ascorbic acid/L if residual chlorine present (0.008% sodium thiosulfate in CFR 136)	7 d	14 d
Base/neutrals & acids	G(S) amber	1000	g, c	Cool, ≤6°C, 0.008 % sodium thiosulfate in CFR 136 if chlorine is present	7 d	7 d until extraction; 40 d after extraction
Oxygen, dissolved	G, BOD bottle	300	g			
Electrode				Analyze immediately	0.25 h	0.25 h
Winkler				Titration may be delayed after acidification	8 h	8 h
Ozone	G	1000	g	Analyze immediately	0.25 h	N.S.
pH	P, G	50	g	Analyze immediately	0.25 h	0.25 h
Phosphate	G(A)	100	g	For dissolved phosphate filter immediately; Cool, ≤6°C	48 h	48 h as per EPA manual for DW.
Phosphorus, total	P, G, FP	100	g, c	Add H_2SO_4 to pH<2 and cool, ≤6°C	28 d	28 d
Salinity	G, wax seal	240	g	Analyze immediately or use wax seal	6 months	N.S.
Silica	F, P (PTFE) or quartz	200	g, c	Cool ≤6°C, do not freeze	28 d	28 d
Sludge digester gas	G, gas bottle	—	g	—	N.S.	
Solids[9]	P, G	200	g, c	Cool, ≤6°C	7 d	2–7 d; see cited reference
Sulfate	P, G, FP	100	g, c	Cool, ≤6°C	28 d	28 d
Sulfide	P, G, FP	100	g, c	Cool, ≤6°C; add 4 drops 2*N* zinc acetate/100 mL; add NaOH to pH>9	28 d	7 d
Temperature	P, G, FP	—	g	Analyze immediately	0.25 h	0.25 h
Turbidity	P, G, FP	100	g, c	Analyze same day; store in dark up to 24 h, Cool, ≤6°C	24 h	48 h

* For determinations not listed, use glass or plastic containers; preferably refrigerate during storage and analyze as soon as possible.
† P = plastic (polyethylene or equivalent); G = glass; G(A) or P(A) = rinsed with 1 + 1 HNO_3; G(B) = glass, borosilicate; G(S) = glass, rinsed with organic solvents or baked; FP = fluoropolymer (polytetrafluoroethylene (PTFE, Teflon) or other fluoropolymer
‡ g = grab; c = composite.
§ Cool = storage at, >0°C, ≤6°C (above freezing point of water); in the dark; analyze immediately = analyze usually within 15 min of sample collection.
‖ See citation[10] for possible differences regarding container and preservation requirements. N.S. = not stated in cited reference; stat = no storage allowed; analyze immediately (within 15 min).
Some drinking water (DW) and treated wastewater (WW) matrices may be subject to positive interference as a result of preservation. If such interference is demonstrable, samples should be analyzed as soon as possible without preservation. Do not hold for more than 15 minutes without demonstrating that cyanide (CN) is stable for longer periods in a specific matrix.
NOTE: This table is intended for guidance only. If there is a discrepancy between this table and the method, the information in the current method takes precedence. If performing the method for compliance purposes, be aware that alternative preservation and holding-time requirements may exist. If so, the regulatory requirements should be used.

6. Appendix C - Chain of Custody



ECOTOX ENVIRONMENTAL SERVICES LIMITED

ANALYTICAL REQUEST FORM
CHAIN OF CUSTODY

Laboratory Address: #213 Caroni Savannah Rd, Charlieville, Trinidad, West Indies.
Tel: (868)-672-6620 Fax: (868) 665-8620; (868) 221-9149
e-mail: admin@ecotoxes.com, md@ecotoxes.com

CLIENT: Tiger Tanks Trinidad Unlimited (for Tiger Tanks Guyana Rentals Inc.)

INVOICE TO:

REPORT TO: Mr. Shane Singh

ADDRESS: #126 Quamina & Carmichael Streets, Georgetown, Guyana.

PHONE: 592-501-0620 FAX:

BILLING ADDRESS:

P.O. NUMBER:

COC#:

TURNAROUND REQUEST in Business Days

Analysis

10 | 7 ✓ | 5 | 3 | 2 | 1 | <1 — STD.

Microbiological Analyses

10 | 7 | 5 | 3 | 2 | 1 — STD.

Please Specify

OTHER

PROJECT NAME: Waste Testing
PROJECT NUMBER: 289
SAMPLED BY: Nandkishore Singh

REQUESTED ANALYSIS

CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	pH + Flash Point	BOD	COD	Oil & Grease + TPH	BTEX	TCLP As, Ba, Cr, Pb, Hg, Se, Ag, Cd	MATRIX (W.S.O)	# OF CONT.	COMMENTS	ECOTOX ID
1. Frac Tank	25/3/2021 @ 8:00 AM							W	5	3 Amber	2101112
2. Flow back	9:00 AM.	✓	✓	✓	✓	✓	✓			2 x 500ml plastic	
3. Fluids										2 x Vials	
4. FRAC TANK											
5. # 59487											
6.											
7.											
8.											
9.											
10.											

RELINQUISHED BY: K. Ramrattan
PRINT NAME: KENNY RAMRATTAN FIRM: TRG
DATE: 25/3/21
TIME: 7:00AM.

RECEIVED BY:
PRINT NAME: CARISSA GOOMAN FIRM:
DATE: 1-4-21
TIME: 11:09am

RELINQUISHED BY:
PRINT NAME: FIRM:
DATE:
TIME:

RELINQUISHED BY:
PRINT NAME: FIRM:
DATE:
TIME:

ADDITIONAL INFO/SPECIAL REQUESTS:

PAGE 7 OF 7

Waste Stream: Oily Water

EPA Waste Profile Sheet Number: 20140506-027

EcoTox Environmental Services Ltd.

Oily Water from Frac Tank #35907

Wastewater Quality Analysis Report

Date of Report: 13th April 2021

Client: Tiger Tanks Trinidad Unlimited (TTTU)

Project Code: ECO-TTTU-287

Test Conducted By:

ECOTOX ENVIRONMENTAL SERVICES LIMITED

213 Caroni Savannah Road, Charlieville, Chaguanas, Trinidad, W.I.
Tel.: (868) 672-6620 Fax: (868) 665-8620 E-mail: admin@ecotoxes.com, www.ecotoxes.com

Nafeesa Ali

Laboratory Manager

Mikaiel Dookie

Environmental Chemist

Date of Report: **13th April 2021**
Client: **Tiger Tanks Trinidad Unlimited**
Client Address: **La Bidco Estate, La Brea, Trinidad, W.I.**
Project Code: **ECO-TTTU-287**
Project Number: **ECO-TTTU-287**

Table 1: Sample Details and I.D. Codes

Client Sample I.D.	ECOTOX Sample ID	Sample Collection Date / Time
Oily Water from Frac Tank #35907	2101110	25th March 2021 / 8:00 a.m.

1. Summary:

ECOTOX was contracted by Tiger Tanks Trinidad Unlimited to conduct analytical testing of one Oily Water from Frac Tank #35907 sample for pH, Flash Point, Total Oil and Grease, Total Petroleum Hydrocarbons, Chemical Oxygen Demand, Biological Oxygen Demand, BTEX and TCLP Extractable Metals. This report summarizes the test results for the samples taken.

The samples were collected on the 25th March 2021, by a representative of Tiger Tanks Guyana Rentals Inc. Samples were collected and preserved according to recommended procedures as stipulated in the Standard Methods for the Examination of Water and Wastewater 23rd Edition (2017) for the requested parameters. The samples were appropriately stored in a cooler, on ice at ≤ 6°C, for transportation to the laboratory. The samples were received by ECOTOX on the 1st April 2021. On receipt by the laboratory, samples were logged into the ECOTOX sample tracking system and assigned sample identification numbers. The samples were appropriately stored (refrigerated ≤ 6°C) until the tests were initiated.

2. Results:

Tests were done in accordance with those stipulated in the Examination of Water and Wastewater 23rd Edition (2017) standard methods and the US EPA. Standard test procedures were followed for all analyses conducted with several quality control measures implemented for each parameter tested. The results for the requested analyses are listed below in Table 2. Replicate analyses, blanks and other reference materials were included during tests to assess the accuracy and precision of the analytical results obtained. Refer to Appendix A for description of methods and quality assurance and control measures. Chain of Custody form is displayed in Appendix B.

Table 2: Analysis of Wastewater Samples

Parameter	Maximum Permissible Limits[1]	Client Sample Name: Oily Water from Frac Tank #35907 Wastewater Ecotox Sample I.D.: 2101110
Date of Sample Collection		25th March 2021
Time of Sample Collection		8:00 a.m.
pH (H^+ ions)	5 – 9 H^+ ions	9.00
Total Petroleum Hydrocarbons (TPH) (mg/L)	≤ 40 mg/L	> 10%
Total Oil & Grease (TO&G) (mg/L)	Not Listed	> 10%
Biological Oxygen Demand (BOD) (mg/L)	≤ 50 mg/Ls	6,080.4
Chemical Oxygen Demand (COD) (mg/L)	≤ 50 mg/Ls	13,195.4
TCLP Extractable Arsenic (mg/L)	Not Listed	< 0.005
TCLP Extractable Barium (mg/L)	Not Listed	< 0.005
TCLP Extractable Cadmium (mg/L)	Not Listed	< 0.005
TCLP Extractable Chromium (mg/L)	Not Listed	0.516
TCLP Extractable Lead (mg/L)	Not Listed	< 0.005
TCLP Extractable Mercury (mg/L)	Not Listed	< 0.005
TCLP Extractable Selenium (mg/L)	Not Listed	< 0.005
TCLP Extractable Silver (mg/L)	Not Listed	< 0.005
Flash Point (°C)	Not Listed	96.1
Benzene (µg/L)	Not Listed	1.62
Toluene (µg/L)	Not Listed	2.01
Ethylbenzene (µg/L)	Not Listed	4.68
Xylene (µg/L)	Not Listed	9.33

NOTE: 1% = 10,000 ppm

[1] Guyana National Bureau of Standards Interim Guidelines for Industrial Effluent Discharge into the Environment.

Table 3: Analysis of Wastewater Samples

Parameter	Maximum Permissible Limits[2]	Client Sample Name: Oily Water from Frac Tank #35907 Wastewater Ecotox Sample I.D.: 2101110
Date of Sample Collection		25th March 2021
Time of Sample Collection		8:00 a.m.
Naphthalene (mg/L)	Not Listed	2,145.0
Acenaphthylene (mg/L)	Not Listed	43.2
Acenaphthene (mg/L)	Not Listed	< 0.005
Fluorene (mg/L)	Not Listed	122.0
Anthracene (mg/L)	Not Listed	6.1
Phenanthrene (mg/L)	Not Listed	88.1
Fluoranthene (mg/L)	Not Listed	3.5
Pyrene (mg/L)	Not Listed	11.1
Benzo(a)anthracene (mg/L)	Not Listed	2.1
Chrysene (mg/L)	Not Listed	46.1
Benzo(b)fluoranthene (mg/L)	Not Listed	< 0.005
Benzo(k)fluoranthene (mg/L)	Not Listed	< 0.005
Benzo(a)pyrene (mg/L)	Not Listed	< 0.005
Dibenz(ah)anthracene (mg/L)	Not Listed	< 0.005
Benzo(ghi)perylene (mg/L)	Not Listed	< 0.005
Ideno(1,2,3-c,d)pyrene (mg/L)	Not Listed	< 0.005

[2] Guyana National Bureau of Standards Interim Guidelines for Industrial Effluent Discharge into the Environment.

4. Appendix A

Quality Control and Quality Assurance Procedures for Analyses Performed

All sampling and tests procedures employed by ECOTOX for the duration of this project were a direct adaptation from standard procedures as outlined in the Standard Methods for the Examination of Water and Wastewater 23rd Edition (2017) The following will outline a brief description of the procedures used.

Table 4A. Description of Parameters Investigated and Associated Quality Control Measures

Parameter	Test Method and Description	Quality Control Measures.
Sampling	As outlined in SMEWW # 1060 Grab Samples	Duplicate Samples were taken, preserved with 50% Sulphuric Acid to pH 2 or otherwise as outlined in WPR 2000.
Total Oil and Grease / Total Petroleum Hydrocarbons	**N-Hexane Extractable Material (Non-polar Material) Total Oil and Grease by Extraction and Gravimetry (HEM; Oil and Grease) and Silica Gel Treated N-Hexane Extractable Material (SGTHEM; USEPA Method 1664 Revision A. February 1999.** The term "n-hexane extractable material" reflects that this method can used to determine materials other than oils and greases. Similarly, the term "silica gel treated n-hexane extractable material" reflects that this method can be used to determine material that is not adsorbed by silica gel (non-polar material). A 1-L sample is acidified to pH <2 with Hydrochloric Acid or Sulphuric Acid and serially extracted three times with n-hexane in a separatory funnel. The extract is dried over sodium sulfate. The solvent is distilled from the extract and the HEM is desiccated and weighed. If the HEM is to be used for determination of SGT-HEM, the HEM is re-suspended in n-hexane. For SGT-HEM determination, an amount of silica gel proportionate to the amount of HEM is added to the solution containing the re-suspended HEM to remove polar materials. The solution is filtered to remove the silica gel, the solvent is distilled, and the SGT-HEM is desiccated and weighed.	Duplicate analyses, multiple blanks and spikes.
Biological Oxygen Demand	As outlined in **SMEWW Method # 5210 B 5-Day BOD Test Method.** Quantification of the relative oxygen requirements of wastewaters, effluents, and polluted waters after 5 Days of incubating diluted samples at 20 ± 1ºC.	Standard Reference Material. Blanks. Controls.
Total Chemical Oxygen Demand (COD) - Modified for Chloride Correction	As outlined in **SMEWW Method # 5220 D Closed Reflux, Colorimetric Method.** Used to indirectly measure the amount of organic compounds in water as nearly all organic compounds can be fully oxidized to carbon dioxide with a strong chemical oxidizing agent under acidic conditions. In the process of oxidizing the organic substances found in the water sample, potassium dichromate is reduced (since in all redox reactions, one reagent is oxidized and the other is reduced), forming Cr^{3+}. The amount of Cr^{3+} is determined after oxidization is complete, and is used as an indirect measure of the organic contents of the water sample. EQUIPMENT used - Block Digester, relevant glassware and chemicals for digestion procedure, UV-VIS Spectrophotometer.	Duplicate analysis, standard reference material – Potassium hydrogen phthalate standard, multiple banks per batch.

Table 4B. Description of Parameters Investigated and Associated Quality Control Measures

Parameter	Test Method and Description	Quality Control Measures.
pH	**As outlined in SMEWW Method # No. 4500-H^+ pH Value B Electrometric Method.** The basic principle of electrometric pH measurement is determination of the activity of the hydrogen ions by potentiometric measurement using a standard hydrogen electrode and a reference electrode.	Calibration/Standard Solutions.
TCLP Extractable Metals	As outlined in **US EPA Method Number 1311**. The TCLP is designed to determine the mobility of both organic and inorganic analytes present in liquid, solid, and multiphasic wastes. For liquid wastes, after filtration through a 0.6 to 0.8 µm glass fiber filter, is defined as the TCLP extract. The TCLP Extract is analyzed for metals as outlined in: As, Ba, Cd, Cr, Pb, Se & Ag – US EPA SW-846 Test Method 7000B and SMEWW Method 3111B, D: Flame Atomic Absorption Spectrophotometry. Hg – US EPA Method 7470 - Cold-Vapor Atomic Absorption Spectrometry 7471B-Solids or Semis solid Waste Cold-Vapor Atomic Absorption Spectrometry. As – US EPA Method 7061 Hydride Generation/Atomic Absorption Spectrometry.	Standard addition, blanks, triplicate analyses, standard reference water solutions.
BTEX	As outlined in US EPA Method Number 8260D, Volatile Organic Compounds By Gas Chromatography/Mass Spectrometry. VOCs are introduced into the GC by one of the preparation methods mentioned in Sec. 1.2. The analytes may be introduced directly to a capillary column, cryofocussed on a capillary pre-column before being flash evaporated to a capillary column for analysis, or desorbed from a trap and sent to an injection port operating in the split mode for injection to a capillary column. The column is temperature-programmed to separate the analytes, which are then detected with a MS interfaced to the GC. Quantitation is accomplished by comparing the response of a major (quantitation) ion relative to an internal standard (IS) using an appropriate calibration curve for the intended application	Method blanks, surrogates, reference materials.
PAHs	As outlines in US EPA Method Number 610. A measured volume of sample, approximately 1 L, is extracted with methylene chloride using a separatory funnel. The methylene chloride extract is dried and concentrated to a volume of 10 mL or less. The extract is then separated GC. A flame ionization detector is used with GC. GC (Gas chromatograph) an analytical system complete with temperature programmable gas chromatograph suitable for on-column or splitless injection and all required accessories including syringes, analytical columns, gases, detector, and strip-chart recorder. A data system is recommended for measuring peak areas.	Method blanks, surrogates, reference materials.
Flash Point	ASTM E502-21 – Standard Test Method for Selection and Use of ASTM Standards for the Determination of Flash Point of Chemicals by Closed Cup Method.	Testing conducted by Trinidad & Tobago Bureau of Standards. Report# 20210171

The following is a table of the calculated detection limits and the associated bias for each of the analyses performed.

Table 5: List of Parameters with Associated Instrument Detection Limits and Bias.

Parameter	Detection Limit/Range	Bias
pH (H^+ ions)	0.02 H^+ ions	±0.01 H^+ ions
Total Petroleum Hydrocarbons (TPH) (mg/L)	0.05 mg/L	±0.01 mg/L
Total Oil & Grease (TO&G) (mg/L)	0.05 mg/L	±0.01 mg/L
Biological Oxygen Demand (BOD) (mg/L)	< 2 mg/L	There is no measurement for establishing the BOD test's bias[3]. Check using GGA Standard (85 to 115% Recovery), Dilution water blanks.
Chemical Oxygen Demand (COD) (mg/L)	2.9 mg/L	± 2.9 mg/L
TCLP Extractable Arsenic (mg/L)	0.005 mg/L	± 0.005 mg/L
TCLP Extractable Barium (mg/L)	0.005 mg/L	± 0.005 mg/L
TCLP Extractable Cadmium (mg/L)	0.005 mg/L	± 0.005 mg/L
TCLP Extractable Chromium (mg/L)	0.005 mg/L	± 0.005 mg/L
TCLP Extractable Lead (mg/L)	0.005 mg/L	± 0.005 mg/L
TCLP Extractable Mercury (mg/L)	0.005 mg/L	± 0.005 mg/L
TCLP Extractable Selenium (mg/L)	0.005 mg/L	± 0.005 mg/L
TCLP Extractable Silver (mg/L)	0.005 mg/L	± 0.005 mg/L
BTEX	0.005 mg/L	± 0.005 mg/L
PAHs	0.005 mg/L	± 0.005 mg/L
Flash Point (°C)	± 0.5 (°C)	

[3] SMEWW 23rd Edition: 5210 Biological Oxygen Demand (BOD) Approved by Standard Methods Committee, 2016. The GGA check prescribed in 5210B.6b is intended to be a reference point for evaluating dilution-water quality, seed effectiveness, and analytical technique.

5. APPENDIX B

Sample Collection & Preservation

As Outlined in Method #1060, Collection and Preservation of Samples, Standard Methods for Examination of Water and Wastewater, 23rd Edition (2017).

TABLE 1060:I. SUMMARY OF SPECIAL SAMPLING AND HANDLING REQUIREMENTS*

Determination	Container†	Minimum Sample Size *mL*	Sample Type‡	Preservation§	Maximum Storage Recommended	Regulatory‖
Acidity	P, G(B), FP	100	g	Cool, ≤6°C	24 h	14 d
Alkalinity	P, G, FP	200	g	Cool, ≤6°C	24 h	14 d
BOD	P, G, FP	1000	g, c	Cool, ≤6°C	6 h	48 h
Boron	F, P (PTFE) or quartz	1000	g, c	HNO_3 to pH<2	28 d	6 months
Bromide	P, G, FP	100	g, c	None required	28 d	28 d
Carbon, organic, total	G (B),P, FP	100	g, c	Analyze immediately; or cool ≤6°C, and add HCl, H_3PO_4, or H_2SO_4 to pH	7 d	28 d
Carbon dioxide	P, G	100	g	Analyze immediately	0.25 h	N.S.
COD	P, G, FP	100	g, c	Analyze as soon as possible, or add H_2SO_4 to pH<2; Cool, ≤6°C	7 d	28 d
Chloride	P, G, FP	50	g, c	None required	N.S.	28 d
Chlorine, total, residual	P, G	500	g	Analyze immediately	0.25 h	0.25 h
Chlorine dioxide	P, G	500	g	Analyze immediately	0.25 h	N.S.
Chlorophyll	P, G	500	g	Unfiltered, dark, ≤6°C Filtered, dark, –20°C (Do not store in frost-free freezer)	24–48 h 28 d	N.S.
Color	P, G, FP	500	g, c	Cool, ≤6°C	48 h	48 h
Specific conductance	P, G, FP	500	g, c	Cool, ≤6°C	28 d	28 d
Cyanide						
Total	P, G, FP	1000	g, c	Analyze within 15 min. Add NaOH to pH>12 if sample is to be stored, Cool, ≤6°C, in dark. Add thiosulfate if residual chlorine present	24 h	14 d; 24 h if sulfide present
Amenable to chlorination	P, G, FP	1000	g, c	Remove residual chlorine with thiosulfate and cool ≤6 °C	stat	14 d; 24 h if sulfide present
Fluoride	P	100	g, c	None required	28 d	28 d
Hardness	P, G, FP	100	g, c	Add HNO_3 or H_2SO_4 to pH<2	6 months	6 months
Iodine	P, G	500	g	Analyze immediately	0.25 h	N.S.
Metals	P(A), G(A), FP (A)	1000	g, c	For dissolved metals filter immediately, add HNO_3 to pH<2	6 months	6 months
Chromium VI	P(A), G(A), FP (A)	250	g	Cool, ≤6°C, pH 9.3–9.7, ammonium sulfate buffer preservative as specified in method 3500-Cr to extend to 28 days HT	28 d	28 d
Copper by colorimetry	—*	—	g, c	—	—	
Mercury	P(A), G(A), FP(A)	500	g, c	Add HNO_3 to pH<2, Cool ≤6°C	28 d	28 d
Nitrogen						
Ammonia	P, G, FP	500	g, c	Analyze as soon as possible or add H_2SO_4 to pH<2, Cool, ≤6°C	7 d	28 d
Nitrate	P, G, FP	100	g, c	Analyze as soon as possible; Cool, ≤6°C	48 h	48 h (14 d for chlorinated samples)
Nitrate + nitrite	P, G, FP	200	g, c	Add H_2SO_4 to pH<2, Cool, ≤6°C	1–2 d	28 d
Nitrite	P, G, FP	100	g, c	Analyze as soon as possible; Cool, ≤6°C	none	48 h
Organic, Kjeldahl	P, G, FP	500	g, c	Cool, ≤6°C, add H_2SO_4 to pH<2	7 d	28 d
Odor	G	500	g	Analyze as soon as possible; Cool ≤6°C	6 h	24 h (EPA Manual drinking water)
Oil and Grease	G, wide-mouth calibrated	1000	g	Add HCl or H_2SO_4 to pH<2, Cool, ≤6°C	28 d	28 d

TABLE 1060:I. CONT.

Determination	Container†	Minimum Sample Size *mL*	Sample Type‡	Preservation§	Maximum Storage Recommended	Regulatory‖
Organic Compounds						
MBAS	P, G, FP	250	g, c	Cool ≤6°C	48 h	48 h as per CFR 136
Pesticides*	G(S), PTFE-lined cap	1000	g, c	Cool, ≤6°C add 1000 mg ascorbic acid/L if residual chlorine present (0.008 % sodium thiosulfate in CFR 136)	7 d	7 d until extraction; 40 d after extraction
Phenols	P, G, PTFE-lined cap	500	g, c	Cool, ≤6°C, add H_2SO_4 to pH<2	*	28 d until extraction, 2 d after extraction
Purgeables* by purge and trap	G, PTFE-lined cap	2×40	g	Cool, ≤6°C; add HCl to pH<2; add 1000 mg ascorbic acid/L if residual chlorine present (0.008% sodium thiosulfate in CFR 136)	7 d	14 d
Base/neutrals & acids	G(S) amber	1000	g, c	Cool, ≤6°C, 0.008 % sodium thiosulfate in CFR 136 if chlorine is present	7 d	7 d until extraction; 40 d after extraction
Oxygen, dissolved	G, BOD bottle	300	g			
Electrode				Analyze immediately	0.25 h	0.25 h
Winkler				Titration may be delayed after acidification	8 h	8 h
Ozone	G	1000	g	Analyze immediately	0.25 h	N.S.
pH	P, G	50	g	Analyze immediately	0.25 h	0.25 h
Phosphate	G(A)	100	g	For dissolved phosphate filter immediately; Cool, ≤6°C	48 h	48 h as per EPA manual for DW.
Phosphorus, total	P, G, FP	100	g, c	Add H_2SO_4 to pH<2 and cool, ≤6°C	28 d	28 d
Salinity	G, wax seal	240	g	Analyze immediately or use wax seal	6 months	N.S.
Silica	F, P (PTFE) or quartz	200	g, c	Cool ≤6°C, do not freeze	28 d	28 d
Sludge digester gas	G, gas bottle	—	g	—	N.S.	
Solids[9]	P, G	200	g, c	Cool, ≤6°C	7 d	2–7 d; see cited reference
Sulfate	P, G, FP	100	g, c	Cool, ≤6°C	28 d	28 d
Sulfide	P, G, FP	100	g, c	Cool, ≤6°C; add 4 drops 2*N* zinc acetate/100 mL; add NaOH to pH>9	28 d	7 d
Temperature	P, G, FP	—	g	Analyze immediately	0.25 h	0.25 h
Turbidity	P, G, FP	100	g, c	Analyze same day; store in dark up to 24 h, Cool, ≤6°C	24 h	48 h

* For determinations not listed, use glass or plastic containers; preferably refrigerate during storage and analyze as soon as possible.

† P = plastic (polyethylene or equivalent); G = glass; G(A) or P(A) = rinsed with 1 + 1 HNO_3; G(B) = glass, borosilicate; G(S) = glass, rinsed with organic solvents or baked; FP = fluoropolymer (polytetrafluoroethylene (PTFE, Teflon) or other fluoropolymer

‡ g = grab; c = composite.

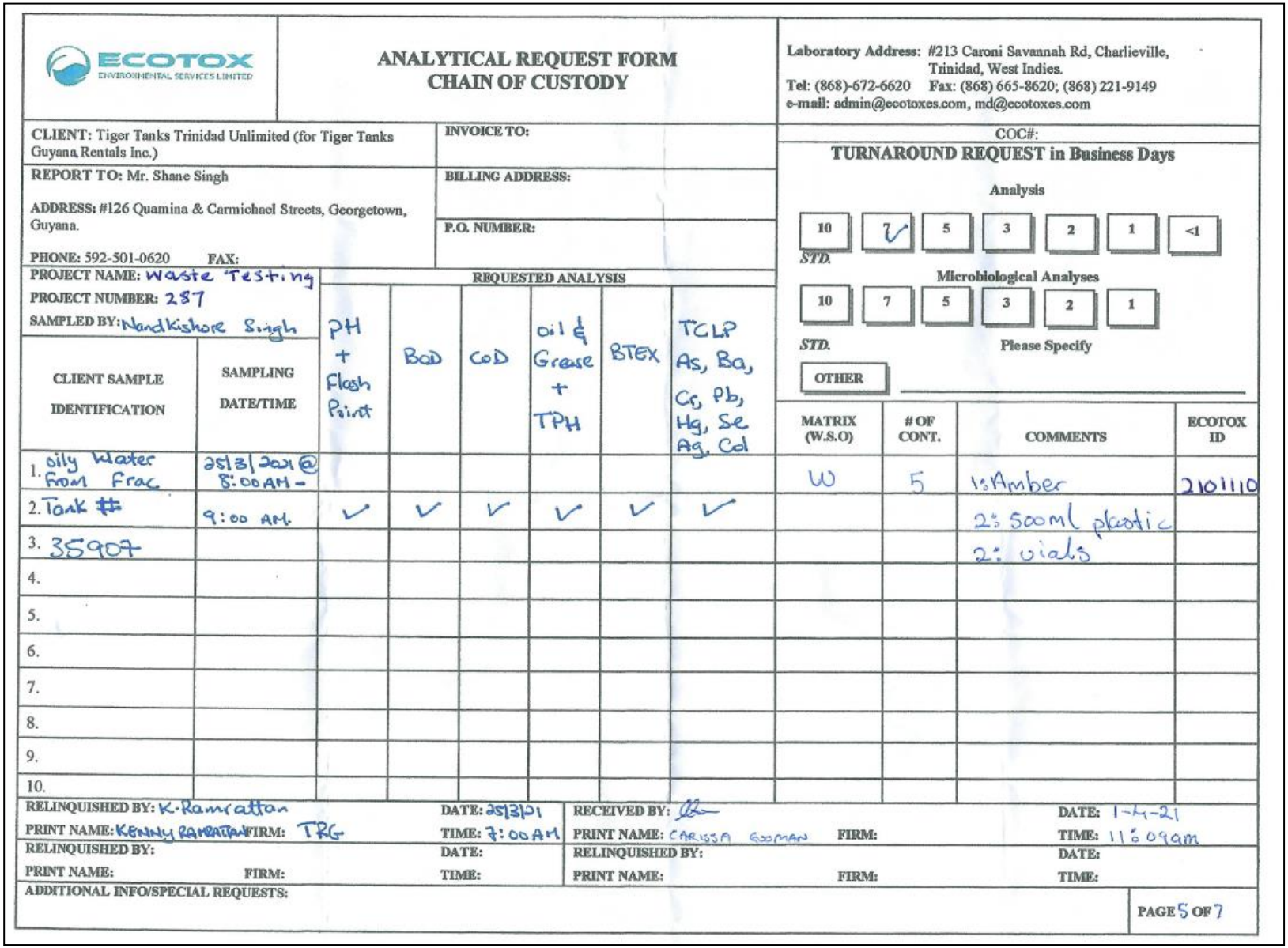
§ Cool = storage at, >0°C, ≤6°C (above freezing point of water); in the dark; analyze immediately = analyze usually within 15 min of sample collection.

‖ See citation[10] for possible differences regarding container and preservation requirements. N.S. = not stated in cited reference; stat = no storage allowed; analyze immediately (within 15 min).

Some drinking water (DW) and treated wastewater (WW) matrices may be subject to positive interference as a result of preservation. If such interference is demonstrable, samples should be analyzed as soon as possible without preservation. Do not hold for more than 15 minutes without demonstrating that cyanide (CN) is stable for longer periods in a specific matrix.

NOTE: This table is intended for guidance only. If there is a discrepancy between this table and the method, the information in the current method takes precedence. If performing the method for compliance purposes, be aware that alternative preservation and holding-time requirements may exist. If so, the regulatory requirements should be used.

6. Appendix C - Chain of Custody



ECOTOX ENVIRONMENTAL SERVICES LIMITED

ANALYTICAL REQUEST FORM
CHAIN OF CUSTODY

Laboratory Address: #213 Caroni Savannah Rd, Charlieville, Trinidad, West Indies.
Tel: (868)-672-6620 Fax: (868) 665-8620; (868) 221-9149
e-mail: admin@ecotoxes.com, md@ecotoxes.com

CLIENT: Tiger Tanks Trinidad Unlimited (for Tiger Tanks Guyana Rentals Inc.)

INVOICE TO:

REPORT TO: Mr. Shane Singh

ADDRESS: #126 Quamina & Carmichael Streets, Georgetown, Guyana.

PHONE: 592-501-0620 FAX:

BILLING ADDRESS:

P.O. NUMBER:

COC#:

TURNAROUND REQUEST in Business Days

Analysis

10 | ✓ | 5 | 3 | 2 | 1 | <1

STD.

Microbiological Analyses

10 | 7 | 5 | 3 | 2 | 1

STD.

Please Specify

OTHER

PROJECT NAME: Waste Testing
PROJECT NUMBER: 287
SAMPLED BY: Nandkishore Singh

REQUESTED ANALYSIS

CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	pH + Flash Point	BOD	COD	Oil & Grease + TPH	BTEX	TCLP As, Ba, Cr, Pb, Hg, Se Ag, Cd	MATRIX (W.S.O)	# OF CONT.	COMMENTS	ECOTOX ID
1. oily Water From Frac	25/3/2021 @ 8:00 AM -							W	5	1: Amber	2101110
2. Tank #	9:00 AM	✓	✓	✓	✓	✓	✓			2: 500ml plastic	
3. 35907										2: vials	
4.											
5.											
6.											
7.											
8.											
9.											
10.											

RELINQUISHED BY: K. Ramratton
PRINT NAME: KENNY RAMRATTAN FIRM: TRG
DATE: 25/3/21
TIME: 7:00 AM

RECEIVED BY:
PRINT NAME: CARISSA GOODMAN FIRM:
DATE: 1-4-21
TIME: 11:09 am

RELINQUISHED BY:
PRINT NAME: FIRM:
DATE:
TIME:

RECEIVED BY:
PRINT NAME: FIRM:
DATE:
TIME:

ADDITIONAL INFO/SPECIAL REQUESTS:

PAGE 5 OF 7

EcoTox Environmental Services Ltd.

Oily Water from Frac Tank #44296

Wastewater Quality Analysis Report

Date of Report: 13th April 2021

Client: Tiger Tanks Trinidad Unlimited (TTTU)

Project Code: ECO-TTTU-288

Test Conducted By:

ECOTOX ENVIRONMENTAL SERVICES LIMITED

213 Caroni Savannah Road, Charlieville, Chaguanas, Trinidad, W.I.
Tel.: (868) 672-6620 Fax: (868) 665-8620 E-mail: admin@ecotoxes.com, www.ecotoxes.com

Nafeesa Ali

Laboratory Manager

Mikaiel Dookie

Environmental Chemist

Date of Report: **13th April 2021**
Client: **Tiger Tanks Trinidad Unlimited**
Client Address: **La Bidco Estate, La Brea, Trinidad, W.I.**
Project Code: **ECO-TTTU-288**
Project Number: **ECO-TTTU-288**

Table 1: Sample Details and I.D. Codes

Client Sample I.D.	ECOTOX Sample ID	Sample Collection Date / Time
Oily Water from Frac Tank #44296	2101111	25th March 2021 / 8:00 a.m.

1. Summary:

ECOTOX was contracted by Tiger Tanks Trinidad Unlimited to conduct analytical testing of one Oily Water from Frac Tank #44296 sample for pH, Flash Point, Total Oil and Grease, Total Petroleum Hydrocarbons, Chemical Oxygen Demand, Biological Oxygen Demand, BTEX and TCLP Extractable Metals. This report summarizes the test results for the samples taken.

The samples were collected on the 25th March 2021, by a representative of Tiger Tanks Guyana Rentals Inc. Samples were collected and preserved according to recommended procedures as stipulated in the Standard Methods for the Examination of Water and Wastewater 23rd Edition (2017) for the requested parameters. The samples were appropriately stored in a cooler, on ice at ≤ 6°C, for transportation to the laboratory. The samples were received by ECOTOX on the 1st April 2021. On receipt by the laboratory, samples were logged into the ECOTOX sample tracking system and assigned sample identification numbers. The samples were appropriately stored (refrigerated ≤ 6°C) until the tests were initiated.

2. Results:

Tests were done in accordance with those stipulated in the Examination of Water and Wastewater 23rd Edition (2017) standard methods and the US EPA. Standard test procedures were followed for all analyses conducted with several quality control measures implemented for each parameter tested. The results for the requested analyses are listed below in Table 2. Replicate analyses, blanks and other reference materials were included during tests to assess the accuracy and precision of the analytical results obtained. Refer to Appendix A for description of methods and quality assurance and control measures. Chain of Custody form is displayed in Appendix B.

Table 2: Analysis of Wastewater Samples

Parameter	Maximum Permissible Limits[1]	Client Sample Name: Oily Water from Frac Tank #44296 Wastewater Ecotox Sample I.D.: 2101111
Date of Sample Collection		25th March 2021
Time of Sample Collection		8:00 a.m.
pH (H^+ ions)	5 – 9 H^+ ions	8.00
Total Petroleum Hydrocarbons (TPH) (mg/L)	≤ 40 mg/L	> 10%
Total Oil & Grease (TO&G) (mg/L)	Not Listed	> 10%
Biological Oxygen Demand (BOD) (mg/L)	≤ 50 mg/Ls	5,420.4
Chemical Oxygen Demand (COD) (mg/L)	≤ 50 mg/Ls	13,124.1
TCLP Extractable Arsenic (mg/L)	Not Listed	< 0.005
TCLP Extractable Barium (mg/L)	Not Listed	< 0.005
TCLP Extractable Cadmium (mg/L)	Not Listed	< 0.005
TCLP Extractable Chromium (mg/L)	Not Listed	0.694
TCLP Extractable Lead (mg/L)	Not Listed	< 0.005
TCLP Extractable Mercury (mg/L)	Not Listed	< 0.005
TCLP Extractable Selenium (mg/L)	Not Listed	< 0.005
TCLP Extractable Silver (mg/L)	Not Listed	< 0.005
Flash Point (°C)	Not Listed	87.0
Benzene (µg/L)	Not Listed	1.41
Toluene (µg/L)	Not Listed	1.98
Ethylbenzene (µg/L)	Not Listed	3.92
Xylene (µg/L)	Not Listed	8.45

NOTE: 1% = 10,000 ppm

[1] Guyana National Bureau of Standards Interim Guidelines for Industrial Effluent Discharge into the Environment.

Table 3: Analysis of Wastewater Samples

Parameter	Maximum Permissible Limits[2]	Client Sample Name: Oily Water from Frac Tank #44296 Wastewater Ecotox Sample I.D.: 2101111
Date of Sample Collection		25th March 2021
Time of Sample Collection		8:00 a.m.
Naphthalene (mg/L)	Not Listed	1,953.0
Acenaphthylene (mg/L)	Not Listed	49.1
Acenaphthene (mg/L)	Not Listed	< 0.005
Fluorene (mg/L)	Not Listed	101.0
Anthracene (mg/L)	Not Listed	4.5
Phenanthrene (mg/L)	Not Listed	90.2
Fluoranthene (mg/L)	Not Listed	4.6
Pyrene (mg/L)	Not Listed	8.4
Benzo(a)anthracene (mg/L)	Not Listed	3.7
Chrysene (mg/L)	Not Listed	33.5
Benzo(b)fluoranthene (mg/L)	Not Listed	< 0.005
Benzo(k)fluoranthene (mg/L)	Not Listed	< 0.005
Benzo(a)pyrene (mg/L)	Not Listed	< 0.005
Dibenz(ah)anthracene (mg/L)	Not Listed	< 0.005
Benzo(ghi)perylene (mg/L)	Not Listed	< 0.005
Ideno(1,2,3-c,d)pyrene (mg/L)	Not Listed	< 0.005

[2] Guyana National Bureau of Standards Interim Guidelines for Industrial Effluent Discharge into the Environment.

4. Appendix A

Quality Control and Quality Assurance Procedures for Analyses Performed

All sampling and tests procedures employed by ECOTOX for the duration of this project were a direct adaptation from standard procedures as outlined in the Standard Methods for the Examination of Water and Wastewater 23rd Edition (2017) The following will outline a brief description of the procedures used.

Table 4A. Description of Parameters Investigated and Associated Quality Control Measures

Parameter	Test Method and Description	Quality Control Measures.
Sampling	As outlined in SMEWW # 1060 Grab Samples	Duplicate Samples were taken, preserved with 50% Sulphuric Acid to pH 2 or otherwise as outlined in WPR 2000.
Total Oil and Grease / Total Petroleum Hydrocarbons	**N-Hexane Extractable Material (Non-polar Material) Total Oil and Grease by Extraction and Gravimetry (HEM; Oil and Grease) and Silica Gel Treated N-Hexane Extractable Material (SGTHEM; USEPA Method 1664 Revision A. February 1999.** The term "n-hexane extractable material" reflects that this method can used to determine materials other than oils and greases. Similarly, the term "silica gel treated n-hexane extractable material" reflects that this method can be used to determine material that is not adsorbed by silica gel (non-polar material). A 1-L sample is acidified to pH <2 with Hydrochloric Acid or Sulphuric Acid and serially extracted three times with n-hexane in a separatory funnel. The extract is dried over sodium sulfate. The solvent is distilled from the extract and the HEM is desiccated and weighed. If the HEM is to be used for determination of SGT-HEM, the HEM is re-suspended in n-hexane. For SGT-HEM determination, an amount of silica gel proportionate to the amount of HEM is added to the solution containing the re-suspended HEM to remove polar materials. The solution is filtered to remove the silica gel, the solvent is distilled, and the SGT-HEM is desiccated and weighed.	Duplicate analyses, multiple blanks and spikes.
Biological Oxygen Demand	As outlined in **SMEWW Method # 5210 B 5-Day BOD Test Method.** Quantification of the relative oxygen requirements of wastewaters, effluents, and polluted waters after 5 Days of incubating diluted samples at 20 ± 1ºC.	Standard Reference Material. Blanks. Controls.
Total Chemical Oxygen Demand (COD) - Modified for Chloride Correction	As outlined in **SMEWW Method # 5220 D Closed Reflux, Colorimetric Method.** Used to indirectly measure the amount of organic compounds in water as nearly all organic compounds can be fully oxidized to carbon dioxide with a strong chemical oxidizing agent under acidic conditions. In the process of oxidizing the organic substances found in the water sample, potassium dichromate is reduced (since in all redox reactions, one reagent is oxidized and the other is reduced), forming Cr^{3+}. The amount of Cr^{3+} is determined after oxidization is complete, and is used as an indirect measure of the organic contents of the water sample. EQUIPMENT used - Block Digester, relevant glassware and chemicals for digestion procedure, UV-VIS Spectrophotometer.	Duplicate analysis, standard reference material – Potassium hydrogen phthalate standard, multiple banks per batch.

Table 4B. Description of Parameters Investigated and Associated Quality Control Measures

Parameter	Test Method and Description	Quality Control Measures.
pH	**As outlined in SMEWW Method # No. 4500-H^+ pH Value B Electrometric Method.** The basic principle of electrometric pH measurement is determination of the activity of the hydrogen ions by potentiometric measurement using a standard hydrogen electrode and a reference electrode.	Calibration/Standard Solutions.
TCLP Extractable Metals	As outlined in **US EPA Method Number 1311**. The TCLP is designed to determine the mobility of both organic and inorganic analytes present in liquid, solid, and multiphasic wastes. For liquid wastes, after filtration through a 0.6 to 0.8 µm glass fiber filter, is defined as the TCLP extract. The TCLP Extract is analyzed for metals as outlined in: As, Ba, Cd, Cr, Pb, Se & Ag – US EPA SW-846 Test Method 7000B and SMEWW Method 3111B, D: Flame Atomic Absorption Spectrophotometry. Hg – US EPA Method 7470 - Cold-Vapor Atomic Absorption Spectrometry 7471B-Solids or Semis solid Waste Cold-Vapor Atomic Absorption Spectrometry. As – US EPA Method 7061 Hydride Generation/Atomic Absorption Spectrometry.	Standard addition, blanks, triplicate analyses, standard reference water solutions.
BTEX	As outlined in US EPA Method Number 8260D, Volatile Organic Compounds By Gas Chromatography/Mass Spectrometry. VOCs are introduced into the GC by one of the preparation methods mentioned in Sec. 1.2. The analytes may be introduced directly to a capillary column, cryofocussed on a capillary pre-column before being flash evaporated to a capillary column for analysis, or desorbed from a trap and sent to an injection port operating in the split mode for injection to a capillary column. The column is temperature-programmed to separate the analytes, which are then detected with a MS interfaced to the GC. Quantitation is accomplished by comparing the response of a major (quantitation) ion relative to an internal standard (IS) using an appropriate calibration curve for the intended application	Method blanks, surrogates, reference materials.
PAHs	As outlines in US EPA Method Number 610. A measured volume of sample, approximately 1 L, is extracted with methylene chloride using a separatory funnel. The methylene chloride extract is dried and concentrated to a volume of 10 mL or less. The extract is then separated GC. A flame ionization detector is used with GC. GC (Gas chromatograph) an analytical system complete with temperature programmable gas chromatograph suitable for on-column or splitless injection and all required accessories including syringes, analytical columns, gases, detector, and strip-chart recorder. A data system is recommended for measuring peak areas.	Method blanks, surrogates, reference materials.
Flash Point	ASTM E502-21 – Standard Test Method for Selection and Use of ASTM Standards for the Determination of Flash Point of Chemicals by Closed Cup Method.	Testing conducted by Trinidad & Tobago Bureau of Standards. Report# 20210171

The following is a table of the calculated detection limits and the associated bias for each of the analyses performed.

Table 5: List of Parameters with Associated Instrument Detection Limits and Bias.

Parameter	Detection Limit/Range	Bias
pH (H^+ ions)	0.02 H^+ ions	±0.01 H^+ ions
Total Petroleum Hydrocarbons (TPH) (mg/L)	0.05 mg/L	±0.01 mg/L
Total Oil & Grease (TO&G) (mg/L)	0.05 mg/L	±0.01 mg/L
Biological Oxygen Demand (BOD) (mg/L)	< 2 mg/L	There is no measurement for establishing the BOD test's bias[3]. Check using GGA Standard (85 to 115% Recovery), Dilution water blanks.
Chemical Oxygen Demand (COD) (mg/L)	2.9 mg/L	± 2.9 mg/L
TCLP Extractable Arsenic (mg/L)	0.005 mg/L	± 0.005 mg/L
TCLP Extractable Barium (mg/L)	0.005 mg/L	± 0.005 mg/L
TCLP Extractable Cadmium (mg/L)	0.005 mg/L	± 0.005 mg/L
TCLP Extractable Chromium (mg/L)	0.005 mg/L	± 0.005 mg/L
TCLP Extractable Lead (mg/L)	0.005 mg/L	± 0.005 mg/L
TCLP Extractable Mercury (mg/L)	0.005 mg/L	± 0.005 mg/L
TCLP Extractable Selenium (mg/L)	0.005 mg/L	± 0.005 mg/L
TCLP Extractable Silver (mg/L)	0.005 mg/L	± 0.005 mg/L
BTEX	0.005 mg/L	± 0.005 mg/L
PAHs	0.005 mg/L	± 0.005 mg/L
Flash Point (°C)	± 0.5 (°C)	

[3] SMEWW 23rd Edition: 5210 Biological Oxygen Demand (BOD) Approved by Standard Methods Committee, 2016. The GGA check prescribed in 5210B.6b is intended to be a reference point for evaluating dilution-water quality, seed effectiveness, and analytical technique.

5. APPENDIX B

Sample Collection & Preservation

As Outlined in Method #1060, Collection and Preservation of Samples, Standard Methods for Examination of Water and Wastewater, 23rd Edition (2017).

TABLE 1060:I. SUMMARY OF SPECIAL SAMPLING AND HANDLING REQUIREMENTS*

Determination	Container†	Minimum Sample Size *mL*	Sample Type‡	Preservation§	Maximum Storage Recommended	Regulatory‖
Acidity	P, G(B), FP	100	g	Cool, ≤6°C	24 h	14 d
Alkalinity	P, G, FP	200	g	Cool, ≤6°C	24 h	14 d
BOD	P, G, FP	1000	g, c	Cool, ≤6°C	6 h	48 h
Boron	F, P (PTFE) or quartz	1000	g, c	HNO_3 to pH<2	28 d	6 months
Bromide	P, G, FP	100	g, c	None required	28 d	28 d
Carbon, organic, total	G (B),P, FP	100	g, c	Analyze immediately; or cool ≤6°C, and add HCl, H_3PO_4, or H_2SO_4 to pH	7 d	28 d
Carbon dioxide	P, G	100	g	Analyze immediately	0.25 h	N.S.
COD	P, G, FP	100	g, c	Analyze as soon as possible, or add H_2SO_4 to pH<2; Cool, ≤6°C	7 d	28 d
Chloride	P, G, FP	50	g, c	None required	N.S.	28 d
Chlorine, total, residual	P, G	500	g	Analyze immediately	0.25 h	0.25 h
Chlorine dioxide	P, G	500	g	Analyze immediately	0.25 h	N.S.
Chlorophyll	P, G	500	g	Unfiltered, dark, ≤6°C Filtered, dark, –20°C (Do not store in frost-free freezer)	24–48 h 28 d	N.S.
Color	P, G, FP	500	g, c	Cool, ≤6°C	48 h	48 h
Specific conductance	P, G, FP	500	g, c	Cool, ≤6°C	28 d	28 d
Cyanide						
Total	P, G, FP	1000	g, c	Analyze within 15 min. Add NaOH to pH>12 if sample is to be stored, Cool, ≤6°C, in dark. Add thiosulfate if residual chlorine present	24 h	14 d; 24 h if sulfide present
Amenable to chlorination	P, G, FP	1000	g, c	Remove residual chlorine with thiosulfate and cool ≤6 °C	stat	14 d; 24 h if sulfide present
Fluoride	P	100	g, c	None required	28 d	28 d
Hardness	P, G, FP	100	g, c	Add HNO_3 or H_2SO_4 to pH<2	6 months	6 months
Iodine	P, G	500	g	Analyze immediately	0.25 h	N.S.
Metals	P(A), G(A), FP (A)	1000	g, c	For dissolved metals filter immediately, add HNO_3 to pH<2	6 months	6 months
Chromium VI	P(A), G(A), FP (A)	250	g	Cool, ≤6°C, pH 9.3–9.7, ammonium sulfate buffer preservative as specified in method 3500-Cr to extend to 28 days HT	28 d	28 d
Copper by colorimetry	—*	—	g, c	—	—	
Mercury	P(A), G(A), FP(A)	500	g, c	Add HNO_3 to pH<2, Cool ≤6°C	28 d	28 d
Nitrogen						
Ammonia	P, G, FP	500	g, c	Analyze as soon as possible or add H_2SO_4 to pH<2, Cool, ≤6°C	7 d	28 d
Nitrate	P, G, FP	100	g, c	Analyze as soon as possible; Cool, ≤6°C	48 h	48 h (14 d for chlorinated samples)
Nitrate + nitrite	P, G, FP	200	g, c	Add H_2SO_4 to pH<2, Cool, ≤6°C	1–2 d	28 d
Nitrite	P, G, FP	100	g, c	Analyze as soon as possible; Cool, ≤6°C	none	48 h
Organic, Kjeldahl	P, G, FP	500	g, c	Cool, ≤6°C, add H_2SO_4 to pH<2	7 d	28 d
Odor	G	500	g	Analyze as soon as possible; Cool ≤6°C	6 h	24 h (EPA Manual drinking water)
Oil and Grease	G, wide-mouth calibrated	1000	g	Add HCl or H_2SO_4 to pH<2, Cool, ≤6°C	28 d	28 d

TABLE 1060:I. CONT.

Determination	Container†	Minimum Sample Size *mL*	Sample Type‡	Preservation§	Maximum Storage Recommended	Regulatory‖
Organic Compounds						
MBAS	P, G, FP	250	g, c	Cool ≤6°C	48 h	48 h as per CFR 136
Pesticides*	G(S), PTFE-lined cap	1000	g, c	Cool, ≤6°C add 1000 mg ascorbic acid/L if residual chlorine present (0.008 % sodium thiosulfate in CFR 136)	7 d	7 d until extraction; 40 d after extraction
Phenols	P, G, PTFE-lined cap	500	g, c	Cool, ≤6°C, add H_2SO_4 to pH<2	*	28 d until extraction, 2 d after extraction
Purgeables* by purge and trap	G, PTFE-lined cap	2×40	g	Cool, ≤6°C; add HCl to pH<2; add 1000 mg ascorbic acid/L if residual chlorine present (0.008% sodium thiosulfate in CFR 136)	7 d	14 d
Base/neutrals & acids	G(S) amber	1000	g, c	Cool, ≤6°C, 0.008 % sodium thiosulfate in CFR 136 if chlorine is present	7 d	7 d until extraction; 40 d after extraction
Oxygen, dissolved	G, BOD bottle	300	g			
Electrode				Analyze immediately	0.25 h	0.25 h
Winkler				Titration may be delayed after acidification	8 h	8 h
Ozone	G	1000	g	Analyze immediately	0.25 h	N.S.
pH	P, G	50	g	Analyze immediately	0.25 h	0.25 h
Phosphate	G(A)	100	g	For dissolved phosphate filter immediately; Cool, ≤6°C	48 h	48 h as per EPA manual for DW.
Phosphorus, total	P, G, FP	100	g, c	Add H_2SO_4 to pH<2 and cool, ≤6°C	28 d	28 d
Salinity	G, wax seal	240	g	Analyze immediately or use wax seal	6 months	N.S.
Silica	F, P (PTFE) or quartz	200	g, c	Cool ≤6°C, do not freeze	28 d	28 d
Sludge digester gas	G, gas bottle	—	g	—	N.S.	
Solids[9]	P, G	200	g, c	Cool, ≤6°C	7 d	2–7 d; see cited reference
Sulfate	P, G, FP	100	g, c	Cool, ≤6°C	28 d	28 d
Sulfide	P, G, FP	100	g, c	Cool, ≤6°C; add 4 drops 2*N* zinc acetate/100 mL; add NaOH to pH>9	28 d	7 d
Temperature	P, G, FP	—	g	Analyze immediately	0.25 h	0.25 h
Turbidity	P, G, FP	100	g, c	Analyze same day; store in dark up to 24 h, Cool, ≤6°C	24 h	48 h

* For determinations not listed, use glass or plastic containers; preferably refrigerate during storage and analyze as soon as possible.
† P = plastic (polyethylene or equivalent); G = glass; G(A) or P(A) = rinsed with 1 + 1 HNO_3; G(B) = glass, borosilicate; G(S) = glass, rinsed with organic solvents or baked; FP = fluoropolymer (polytetrafluoroethylene (PTFE, Teflon) or other fluoropolymer
‡ g = grab; c = composite.
§ Cool = storage at, >0°C, ≤6°C (above freezing point of water); in the dark; analyze immediately = analyze usually within 15 min of sample collection.
‖ See citation[10] for possible differences regarding container and preservation requirements. N.S. = not stated in cited reference; stat = no storage allowed; analyze immediately (within 15 min).
Some drinking water (DW) and treated wastewater (WW) matrices may be subject to positive interference as a result of preservation. If such interference is demonstrable, samples should be analyzed as soon as possible without preservation. Do not hold for more than 15 minutes without demonstrating that cyanide (CN) is stable for longer periods in a specific matrix.
NOTE: This table is intended for guidance only. If there is a discrepancy between this table and the method, the information in the current method takes precedence. If performing the method for compliance purposes, be aware that alternative preservation and holding-time requirements may exist. If so, the regulatory requirements should be used.

6. Appendix C - Chain of Custody

ECOTOX ENVIRONMENTAL SERVICES LIMITED

ANALYTICAL REQUEST FORM
CHAIN OF CUSTODY

Laboratory Address: #213 Caroni Savannah Rd, Charlieville, Trinidad, West Indies.
Tel: (868)-672-6620 **Fax:** (868) 665-8620; (868) 221-9149
e-mail: admin@ecotoxes.com, md@ecotoxes.com

CLIENT: Tiger Tanks Trinidad Unlimited (for Tiger Tanks Guyana Rentals Inc.)

INVOICE TO:

REPORT TO: Mr. Shane Singh

ADDRESS: #126 Quamina & Carmichael Streets, Georgetown, Guyana.

PHONE: 592-501-0620 **FAX:**

BILLING ADDRESS:

P.O. NUMBER:

COC#:

PROJECT NAME: Waste Testing
PROJECT NUMBER: 288
SAMPLED BY: Nandkishore Singh

TURNAROUND REQUEST in Business Days

Analysis

10	7	5	3	2	1	<1
STD.	✓					

Microbiological Analyses

10	7	5	3	2	1
STD.					

Please Specify

OTHER

REQUESTED ANALYSIS

CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	pH + Flash Point	BOD	COD	Oil & Grease + TPH	BTEX	TCLP As, Ba, Cr, Pb, Hg, Se, Ag, Cd	MATRIX (W.S.O)	# OF CONT.	COMMENTS	ECOTOX ID
1. Oily Water From	25/3/2021 @ 8:00AM –							W	5	1 x Amber	210111
2. Frac Tank #4	9:00 AM	✓	✓	✓	✓	✓	✓			2 x 500ml plastic	
3. 44296										2 x vials	
4.											
5.											
6.											
7.											
8.											
9.											
10.											

RELINQUISHED BY: K. Ramcattan
PRINT NAME: KENNY RAMRATTAN **FIRM:** TRG
DATE: 25/3/21
TIME: 7:00AM

RECEIVED BY:
PRINT NAME: CARISSA GOODMAN **FIRM:**
DATE: 1-4-21
TIME: 11:09AM

RELINQUISHED BY:
PRINT NAME: **FIRM:**
DATE:
TIME:

RELINQUISHED BY:
PRINT NAME: **FIRM:**
DATE:
TIME:

ADDITIONAL INFO/SPECIAL REQUESTS:

PAGE 6 OF 7

Waste Stream: Produced Solids

EPA Waste Profile Sheet Number: 20140506-031

EcoTox Environmental Services Ltd.

Produced Sand from EEPGL

Quality Analysis Report

Date of Report: 9th April 2021

Client: Tiger Tanks Trinidad Unlimited

Project Code: ECO-TTTU-286

Test Conducted By:

ECOTOX ENVIRONMENTAL SERVICES LIMITED

213 Caroni Savannah Road, Charlieville, Chaguanas, Trinidad, W.I.
Tel.: (868) 672-6620 Fax: (868) 665-8620 E-mail: admin@ecotoxes.com, www.ecotoxes.com

Nafeesa Ali

Laboratory Manager

Mikaiel Dookie

Operations Manager/Chemist

Date of Report: **9th April 2021**

Client: **Tiger Tanks Trinidad Unlimited**

Client Address: **La Bidco Estate, La Brea, Trinidad, W.I.**

Project Code: **ECO-TTTU-286**

Report No.: **ECO-TTTU-286**

1.0 Introduction

ECOTOX Environmental Services Limited (ECOTOX) was contracted by Tiger Tanks Trinidad Unlimited (TTTU) to conduct analysis of one Produced Sand from EEPGL sample for pH, Total Oil and Grease, Total Petroleum Hydrocarbons and TCLP[1] Extracted Heavy Metals. Samples were logged into the ECOTOX sample tracking system and assigned sample identification numbers (Table #1). The samples were appropriately stored until the tests were initiated.

Table #1: Client I.D. and Sample Details

Client Sample ID	ECOTOX Sample ID	Sample Collection Date / Time
Produced Sand from EEPGL	**2101109**	**25th March 2021 / 8:00 a.m.**

The samples were collected on the 25th March 2021, by a representative from Tiger Tanks Guyana Rentals Inc. Samples were collected and preserved according to recommended procedures as stipulated in the United States Environmental Protection Agency Methods for the requested parameters. The samples were appropriately stored in a cooler, on ice at 4 ± 2°C, for transportation to the laboratory. The samples were received by ECOTOX on the 8th February 2021. On receipt by the laboratory, samples were logged into the ECOTOX sample tracking system and assigned sample identification numbers. The samples were appropriately stored (refrigerator 4 ± 2°C) until the tests were initiated.

[1] Toxicity Characteristic Leaching Procedure - a sample extraction method for chemical analysis employed as an analytical method to simulate leaching through a landfill.

2.0 Results

Tests were done in accordance with those stipulated in the Standard Methods for the Examination of Water and Wastewater 23rd Edition (2017) and the United States Environmental Protection Agency Standard Methods for the requested parameters. Standard test procedures were followed for all analyses conducted with several quality control measures implemented for each parameter investigated. The results for the requested analyses are listed below in Table #2. Replicate analyses, blanks, spikes and standard reference materials were included during tests to assess the accuracy and precision of the analytical results obtained. Refer to Appendix A for method description and quality control and assurance measures. Refer to Appendix B, for Chain of Custody/Sample Receipt information.

Table #2: Waste Characterization Results

Parameter	Maximum Permissible Limit (mg/Kg)	2101109 Produced Sand from EEPGL 25th March 2021
pH (Hydrogen Ion, H^+)	6 - 12[2] (H^+)	7.01
Total Petroleum Hydrocarbons (mg/Kg)	Not Listed[2]	32,002.5
Total Oil & Grease (mg/Kg)	< 3% or < 30,000 ppm[2]	66,150.6
TCLP Extractable Arsenic (mg/L)	5.0 mg/L[3]	< 0.005
TCLP Extractable Barium (mg/L)	100 mg/L[3]	1.075
TCLP Extractable Cadmium (mg/L)	1.0 mg/L[3]	< 0.005
TCLP Extractable Chromium (mg/L)	5.0 mg/L[3]	< 0.005
TCLP Extractable Lead (mg/L)	5.0 mg/L[3]	0.164
TCLP Extractable Mercury (mg/L)	0.2 mg/L[3]	< 0.005
TCLP Extractable Selenium (mg/L)	1.0 mg/L[3]	< 0.005
TCLP Extractable Silver (mg/L)	5.0 mg/L[3]	< 0.005

[2] Louisiana Administrative Code (LAC), Title 43, part XIX, Office of Conservation – General Operations Subpart 1. Statewide Order No. 29-B; Section 313, E, Burial or Trenching of Treated Pit Solid Phase Contents – Pit Closure Techniques and Onsite Disposal of Exploration and Production Waste Standard (November 2019).

[3] TCLP United States Environmental Protection Agency Resource Recovery and Conservation Act, RCRA-8 Metals Maximum Permissible Limits (Maximum Concentration of Contaminants).

3.0 Appendix A - Quality Control and Quality Assurance Procedures for Analyses Performed

All sampling and tests procedures employed by ECOTOX for the duration of this project were a direct adaptation from standard procedures as outlined in the SMEWW – Standard Methods for the Examination of Water and Wastewater, American Public Health Association, 23rd Edition, 2017; and US Environmental Protection Agency Standard Methods. The following will outline a brief description of the procedures used. The relative standard deviation (RSD) was less than 10.0 % for all analyses conducted. Standard reference materials and spiked solutions were used with 85 –115 % recovery obtained during testing. The following table will illustrate the analyses to be performed and necessary details for each.

As outlined in **Laboratory Manual for the Analysis of Exploration and Production Waste** (Department of Natural Resources, May 2005), Analytical Methodology Table (Refer to below):

ANALYTICAL METHODOLOGY REFERENCE TABLE
LAC 43:XIX.Subpart 1

Parameter	Method
Soils / Sediment / Sludges / Reusable Material	
pH	SW-846 9045C, EPA 150.1^
TPH (Total Petroleum Hydrocarbons)	SW-846 1664 HEM/SGT / SW-846 9071
Leachable TPH Test	LDNR Lab Procedures for Analysis of E&P Waste
Leachable Chlorides Test	LDNR Lab Procedures for Analysis of E&P Waste
Electrical Conductivity (EC)	LDNR Lab Procedures for Analysis of E&P Waste
Sodium Absorption Ratio (SAR)	LDNR Lab Procedures for Analysis of E&P Waste
Exchangeable Sodium Percentage (ESP)	LDNR Lab Procedures for Analysis of E&P Waste
Cation Exchange Capacity (CEC)	LDNR Lab Procedures for Analysis of E&P Waste
Benzene	SW-846 8021
TCLP Benzene	SW-846 8021/1311
NORM	EMSL-LV-0539-17@
Reactive Sulfide	SW-846 7.3.4
Total Metals and/or Leachable Metals	
TCLP Extraction	SW-846 1311
Arsenic (As)	SW-846 6010/6020/7000
True Total Barium (Ba)	LDNR Lab Procedures for Analysis of E&P Waste
Barium (Ba)	SW-846 6010/6020/7000
Cadmium (Cd)	SW-846 6010/6020/7000
Chromium (Cr)	SW-846 6010/6020/7000
Copper (Cu)	SW-846 6010/6020/7000
Lead (Pb)	SW-846 6010/6020/7000
Mercury (Hg)	SW-846 7470/7471
Molybdenum (Mo)	SW-846 6010/6020/7000
Nickel (Ni)	SW-846 6010/6020/7000
Selenium (Se)	SW-846 6010/6020/7000
Silver (Ag)	SW-846 6010/6020/7000
Sodium (Na)	SW-846 6010/6020/7000
Zinc (Zn)	SW-846 6010/6020/7000
Soluble Cations (Na, Ca, Mg)	LDNR Lab Procedures for Analysis of E&P Waste
Soluble Anions (Cl, CO3, HCO3, SO4)	SW-846 9056/9253, SM 2320B*

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Table #3: Methodology Listing – Sampling – Solid Waste Matrices

Item	Test Method and Description
Test Method Reference	SOLID- As outlined and guided by the following reference methods: • ASTM D6051 – 15. Standard Guide for Composite Sampling and Field Subsampling for Environmental Waste Management Activities. • RCRA Waste Sampling Draft Technical Guidance, Planning, Implementation, and Assessment, EPA530-D-02-002, August 2002. • US EPA SW 846 Compendium of Hazardous Waste Testing Methods, Test Methods for Evaluating Solid Waste. • US EPA Hazardous Waste Incineration Measurement Guidance Manual, Volume III of the Hazardous Waste Incineration Guidance, Section 3.3 "Sampling", EPA/625/6-89/021, June 1989. • US EPA Hazardous Waste Incineration Measurement Guidance Manual, Volume III of the Hazardous Waste Incineration Guidance, Section 3.3.1.2 "Viscous Liquids, Slurries, Sludges, and Solid Waste Samples", EPA/625/6-89/021, June 1989, as follows: Incinerator Ash, Moist or Dry Solids - Trowel (Scoop) Method
Test Description	Composite Sample – Solid/Sludge *Composite Gross Sample* *Reduction of Gross Sample: Coning and quartering procedure:* A composite sample will be collected from no more than 3-bags per homogenous waste type and sent to the lab for analysis.
Sample Collection & Preservation	**Borosilicate (Glass), PTFE[4] Lined Cap (8 ounces)** – Fill bottle to top with minimal amount of air remaining in bottle. Stopper tightly and store on ice in cooler. Cool, < 6°C, in dark. Samples to be stored cool 4 ± 2°C, but not freezing.
Maximum Holding Time/Storage	Samples should be stored field-moist at 4 ± 2°C for 14-days. Preserved Metal TCLP digest holding time = 6 months, 4 ± 2°C. TOG/TPH samples holding time = 14 days, 4 ± 2°C.
Transportation	After collection, sample handling should be minimized. Field Technicians should use extreme care to ensure that samples are not contaminated during storage. Environmental and waste samples are typically stored in coolers. To reduce the risk of cross contamination, sample containers should be placed inside of sealed, plastic bags before being placed in the cooler. If ice is required for preservation of the samples, the ice should be contained in a plastic bag or some equivalent container to prevent the potential for cross contamination of the samples by water produced from melting ice. If ice is used, the coolers should be checked regularly and water should be drained as needed. Custody of samples will be maintained. If analysis is to be delayed for more than six (6) hours, samples must be stored in a cooler with ice to maintain sample temperature of 4 ± 2°C. All samples must therefore be transported to the laboratory in this manner.

[4] Polytetrafluoroethylene.

Table #4: Methodology Listing – Total Petroleum Hydrocarbons

Parameter	Test Method and Description
Test Method Reference and Description	As outlined in **Laboratory Manual for the Analysis of Exploration and Production Waste** (Department of Natural Resources, May 2005) Analytical Methodology Reference Table, page 2. As outlined in **US EPA Method 9071B**, n-Hexane Extractable Material (HEM) for Sludge, Sediment, and Solid Samples. Quantification of oil and grease in soil, sediments, sludges, and other solid materials amenable to chemical drying and solvent extraction with n-hexane. "Oil and grease" is a conventional pollutant under 40 CFR 401.16 and generally refers to substances, including biological lipids and mineral hydrocarbons that have similar physical characteristics and common solubility in an organic extracting solvent. As such, oil and grease is an operationally defined parameter, and the results will depend entirely on the extracting solvent and method of extraction. Method 9071 employs n-hexane as the extraction solvent with Soxhlet extraction and the results of this method are appropriately termed "n-hexane extractable material (HEM)." As outlined in **US EPA 3540C – Soxhlet Extraction Method.** Method 3540 is a procedure for extracting non-volatile and semi volatile organic compounds from solids such as soils, sludges, and wastes. The Soxhlet extraction process ensures intimate contact of the sample matrix with the extraction solvent. The solid sample is mixed with anhydrous sodium sulfate, placed in an extraction thimble or between two plugs of glass wool, and extracted using an appropriate solvent in a Soxhlet extractor. The extract is then dried, concentrated (if necessary), and, as necessary, exchanged into a solvent compatible with the clean-up or determinative step being employed. As outlined in **5520F – Hydrocarbons (TPH).** Silica gel has the ability to adsorb polar materials. If a solution of hydrocarbons and fatty materials in a nonpolar solvent is mixed with silica gel, the fatty acids are removed selectively from solution. The materials not eliminated by silica gel adsorption are designated hydrocarbons by this test.
Quality/Assurance Control Measures	• Duplicate/Triplicate analyses, • Method Blank, Laboratory Fortified Blank. • Routine and Random Duplicates/Triplicates. • Determine Method Detection Limit for sample analyte. • Instrument Operational Range – Upper and Lower Limits • Calibration & Verification Procedures and Standards. • Equipment Maintenance and Preventative Maintenance Procedures.

Table #5: Methodology Listing – TCLP[5] Extractable Metals

Parameter	Test Method and Description
Test Method Reference and Description	As outlined in **Laboratory Manual for the Analysis of Exploration and Production Waste** (Department of Natural Resources, May 2005), Analytical Methodology Reference Table, page 2. As outlined in **US EPA Method Number 1311**. Toxicity characteristic leaching procedure (TCLP) is a soil sample extraction method for chemical analysis employed as an analytical method to simulate leaching through a landfill. The testing methodology is used to determine if a waste is characteristically hazardous. The solid phase is extracted with an amount of extraction fluid equal to 20 times the weight of the solid phase. The extraction fluid employed is a function of the alkalinity of the solid phase of the waste. Following extraction, the liquid extract is separated from the solid phase by filtration through a 0.6 to 0.8 µm glass fiber filter. The TCLP Extract is analyzed for metals as outlined in: **As, Ba, Cd, Cr, Pb, Zn, Se & Ag** – US EPA SW-846 Test Method 7000B and SMEWW[6] Method 3111B, D: Flame Atomic Absorption Spectrophotometry. **Mercury**: Hg – US EPA Method 7470 - Cold-Vapor Atomic Absorption Spectrometry 7471B-Solids or Semis solid Waste Cold-Vapor Atomic Absorption Spectrometry. Free mercury atoms in a carrier gas are excited by a collimated ultraviolet light source at a wavelength of 53.7 nanometres. The excited atoms re-radiate their absorbed energy (fluoresce) at this same wavelength. Unlike the directional excitation source, the fluorescence is omnidirectional and may thus be detected using a photomultiplier tube or UV photodiode. The technique differs from the more conventional atomic absorption (AA) technique in that it is more sensitive, more selective, and is linear over a wide range of concentrations. **Arsenic** Hydride Generation/Atomic Absorption Spectrometry and ECOTOX SOP Method W-M-As. This method is applicable to the determination of arsenic by conversion to its hydride by sodium borohydride reagent and transport into an atomic absorption atomizer. Arsenous acid, the As (III) oxidation state of arsenic is instantaneously converted by sodium borohydride reagent in acid solution to its volatile hydride. The hydride is purged continuously by argon or nitrogen into a quartz cell heated electrically or by the flame of an atomic absorption spectrometer and converted to the gas-phase atoms. The sodium borohydride reducing agent, by rapid generation of the elemental hydrides in an appropriate reaction cell, minimizes dilution of the hydrides by the carrier gas and provides rapid, sensitive determination of arsenic. At room temperature and solution pH values of 1 or less, arsenic acid, the As(V) oxidation state of arsenic, is reduced relatively slowly by sodium borohydride to As (III), which is then instantaneously converted to arsine. Organic and inorganic forms of arsenic are first oxidized to As(V) by acid digestion. The As(V) then is quantitatively reduced to As (III) with sodium or potassium iodide before reaction with sodium borohydride.
Quality/Assurance Control Measures	• Duplicate/Triplicate analyses, • Method Blank, Laboratory Fortified Blank. • Routine and Random Duplicates/Triplicates. • Determine Method Detection Limit for sample analyte. • Instrument Operational Range – Upper and Lower Limits • Calibration & Verification Procedures and Standards. • Equipment Maintenance and Preventative Maintenance Procedures.

[5] Toxicity characteristic leaching procedure.
[6] SMEWW – Standard Methods for the Examination of Water and Wastewater, American Public Health Association, 2017, 23rd Edition.

Table #6: Methodology Listing – pH

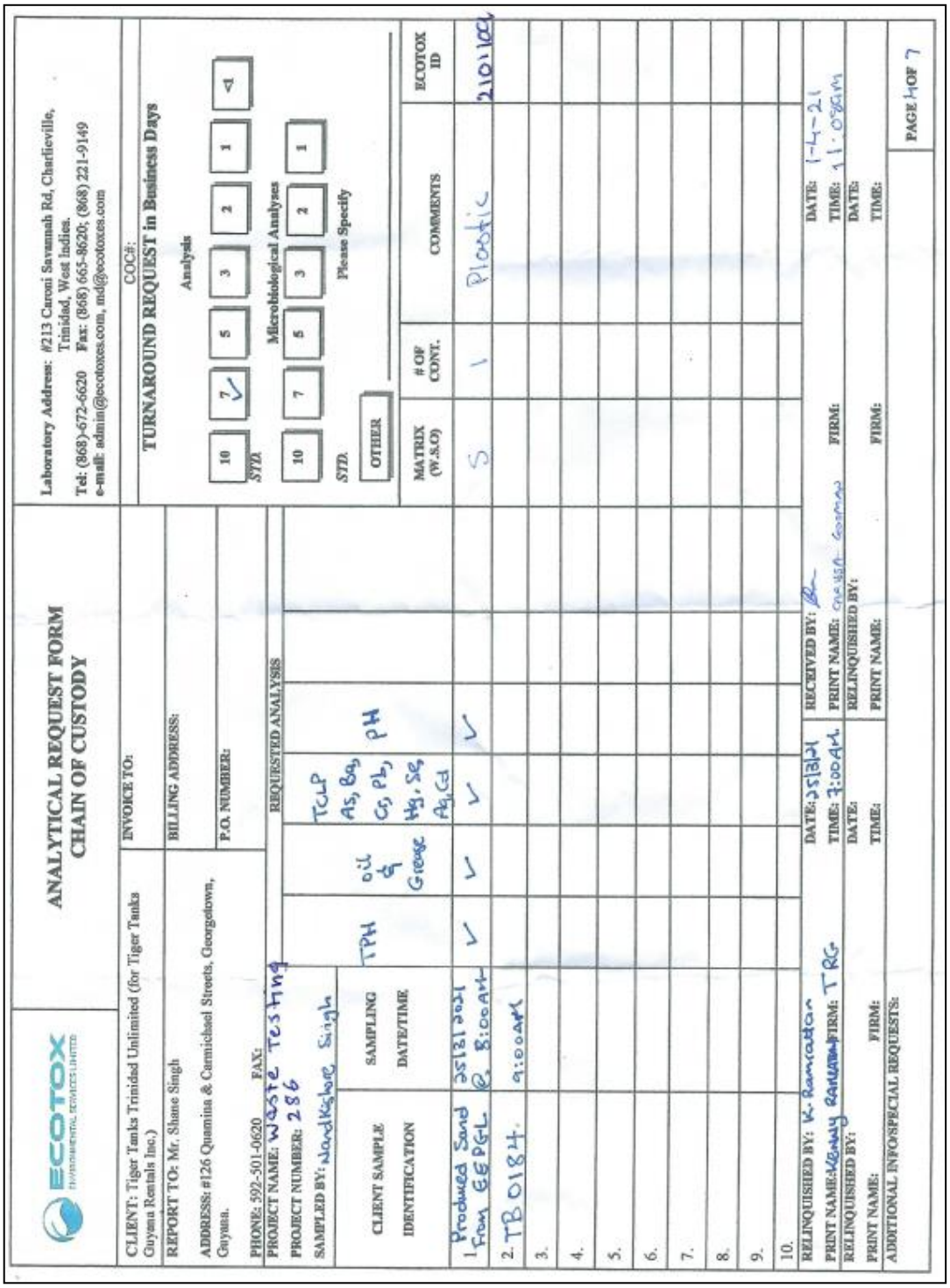
Parameter	Test Method and Description
Test Method Reference and Description	As outlined in **Laboratory Manual for the Analysis of Exploration and Production Waste** (Department of Natural Resources, May 2005) Analytical Methodology Reference Table, page 2. As outlined in **US EPA Method SW-846 Test Method 9045C: Soil and Waste pH.** Sample Preparation and pH measurement of waste materials: To 20 grams waste sample in a 50-mL beaker, add 20 mL of reagent water, cover and continuously stir for 5 minutes. Let waste suspension stand for about 15 minutes to allow most of the suspended waste to settle from the suspension or filter or centrifuge off aqueous phase for pH measurement. pH measurement by pH Meter.
Quality/Assurance Control Measures	• Duplicate analyses, • Method Blank, Laboratory Fortified Blank. • Routine and Random Duplicates/Triplicates. • Determine Method Detection Limit for sample analyte. • Instrument Operational Range – Upper and Lower Limits • Calibration & Verification Procedures and Standards. • Equipment Maintenance and Preventative Maintenance Procedures.

The following is a table of the calculated detection limits and the associated bias for each of the analyses performed.

Table #7: List of Parameters with Associated Instrument Detection Limits and Bias

Parameter	Detection Limit/Range	Bias
pH	0.01 H^+	± 0.01 H^+
OG/TPH	0.1 ppm	±0.1 ppm
TCLP Metals	0.005 ppm	±0.005 ppm

4.0 Appendix B – Chain of Custody



ECOTOX
ENVIRONMENTAL SERVICES LIMITED

ANALYTICAL REQUEST FORM
CHAIN OF CUSTODY

Laboratory Address: #213 Curoni Savannah Rd, Charlieville, Trinidad, West Indies.
Tel: (868)-672-6620 Fax: (868) 665-8620; (868) 221-9149
e-mail: admin@ecotoxcos.com, md@ecotoxcos.com

CLIENT: Tiger Tanks Trinidad Unlimited (for Tiger Tanks Guyana Rentals Inc.)

INVOICE TO:

COC#:

REPORT TO: Mr. Shane Singh

BILLING ADDRESS:

ADDRESS: #126 Quamina & Carmichael Streets, Georgetown, Guyana.

P.O. NUMBER:

PHONE: 592-501-0620 FAX:

TURNAROUND REQUEST in Business Days

Analysis

10 STD.	7	5	3	2	1	<1

Microbiological Analyses

10 STD.	7	5	3	2	1

Please Specify

OTHER _____

PROJECT NAME: Waste Testing

PROJECT NUMBER: 256

SAMPLED BY: Nandkishore Singh

REQUESTED ANALYSIS

CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	TPH	Oil & Grease	TCLP As, Ba, Cr, Pb, Hg, Se, Ag, Cd	pH			MATRIX (W,S,O)	# OF CONT.	COMMENTS	ECOTOX ID
1. Produced Sand from EE PGL	25/3/2021 @ 8:00AM	✓	✓	✓	✓			S	1	Plastic	2101102
2. TB 01814	9:00AM										
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											

RELINQUISHED BY: K. Ramcharan DATE: 25/3/21 RECEIVED BY: _____ DATE: 1-4-21
PRINT NAME: Keanu Ramcharan FIRM: TRG TIME: 8:00AM PRINT NAME: Cheska Gomes FIRM: TIME: 11:05AM

RELINQUISHED BY: _____ DATE: _____ RELINQUISHED BY: _____ DATE: _____
PRINT NAME: _____ FIRM: _____ TIME: _____ PRINT NAME: _____ FIRM: _____ TIME: _____

ADDITIONAL INFO/SPECIAL REQUESTS:

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