

Project Name

Source Storage and Calibration Building

Project Owner

Schlumberger Guyana Inc.

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1.0 PROJECT SITE DESCRIPTION

1.1 LOCATION

The Schlumberger Property on which the Source Storage and Calibration Building is to be construction is located at Lot 1, Area X Houston, East Bank Demerara. The location of the project area is shown in Figure 1.

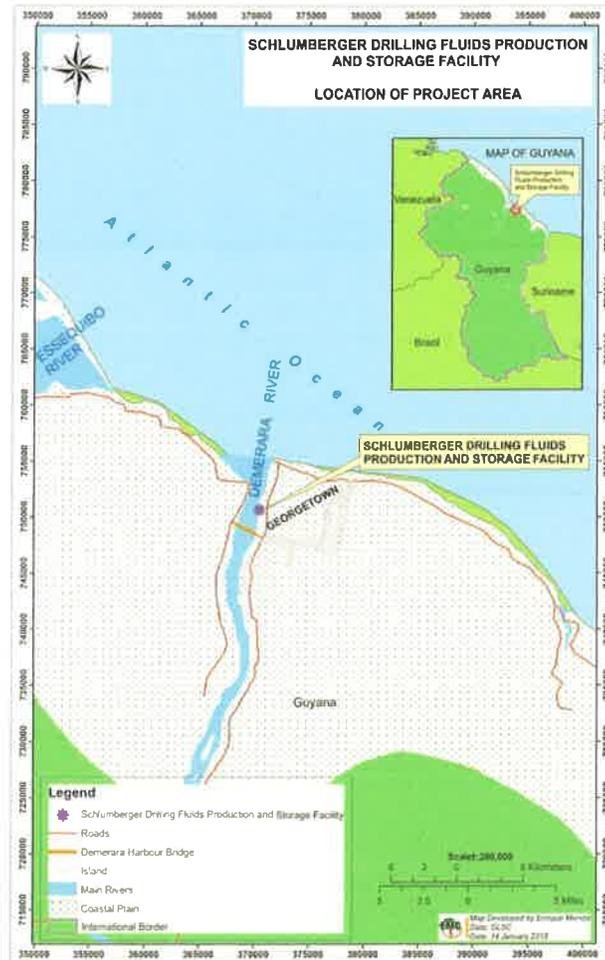


Figure 1: Layout of Project Area

This property was previously the old Gafoors Houston Warehousing property and has been under development by Schlumberger over the last 3 years. The property now serves as Schlumberger's Offshore Services Base and includes a Liquid Mud Plant, Dry Bulk Facility, and Workshop facilities to support the offshore drilling and production operations by the Esso Exploration and Production Guyana Limited (EEPGL).

1.2 AREAS AND BOUNDARIES

The property is approximately 33,000 square meters total (63 meters x 480 meters). It is bordered by Guyana Shore Base (GYSBI) to the south, a private access road and private property (ECV

owned) to the north, East Bank Public Road to the east, and the Demerara River to the west. A layout of property surroundings is shown in Figure 2.

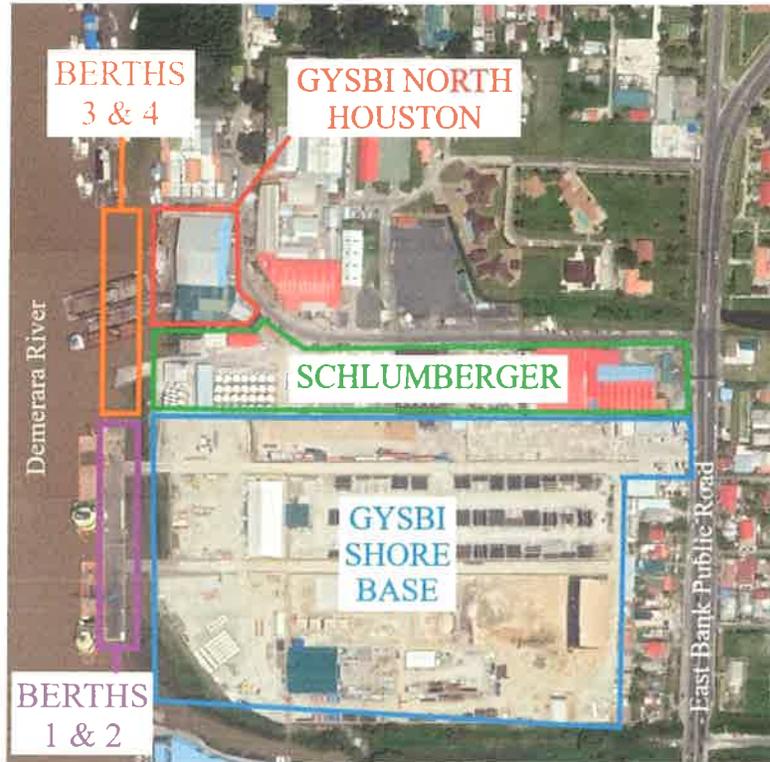


Figure 2: Layout of Property Surroundings

This specific project on the property requires approximately 450 square meters of land. The source storage and calibration building is 12.2 meters wide x 43.4 meters long. The proposed location, shown highlighted in Figures 3 & 4 below, is on the piece of open land just east of the new workshop expansion and just west of the new access road to GYSBI.

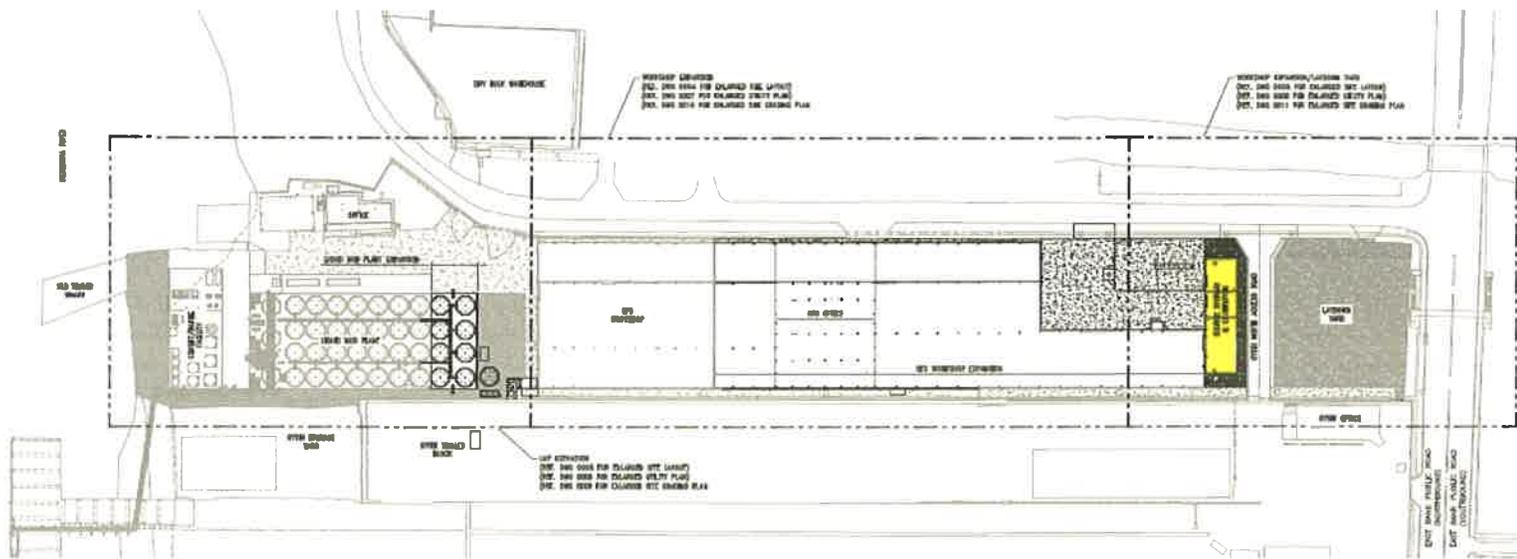


Figure 3: Overall Proposed Location of Source Storage and Calibration Building

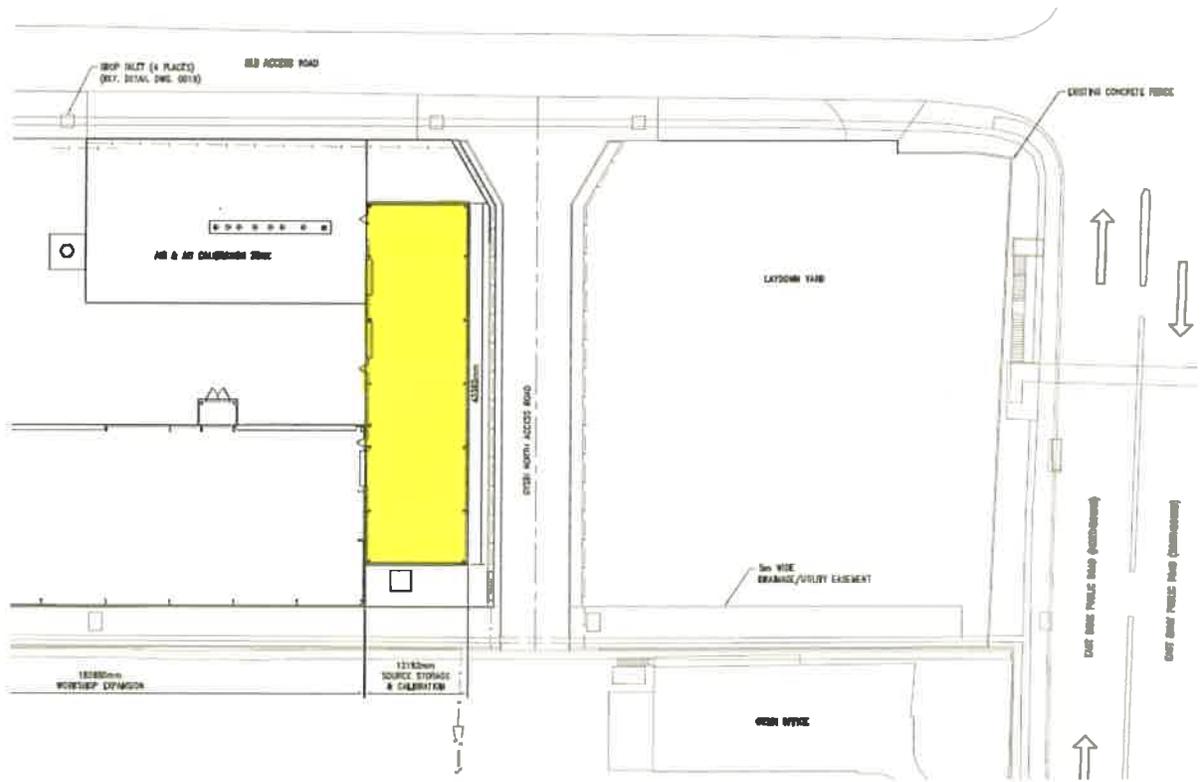


Figure 4: Enlarged Proposed Location of Source Storage and Calibration Building

1.3 RECEIVING WATERS AND POINTS OF DISCHARGE

The receiving water for the Schlumberger site is the Demerara River. The roof structure of the Source Storage and Calibration Building is single sloped to the east. The rainwater will be collected in a gutter system along the east wall and be released in downspouts at each column line. The water will be released to the heavy-duty aggregate pavement and drain north or south. The high point of the pavement will be approximately at the center of the length of the building and half of the water will drain north into the private access road trench drain while the other half will drain south to the drainage/utility easement trench which runs the length of the Schlumberger property from East Bank Public Road to the Existing Workshop. The drains at both the north and south of the property drain to the east to meet up and tie-into the public drainage trench that runs the length of East Bank Public Road. At the points of tie-in to the East Bank Public Road drainage trench, the water then runs south to enter into McDoom Drainage Canal, which drains into the Demerara River. Figure 5 below shows the drainage for the project and surroundings. Reference drawing 19364-02-0011 for detailed Enlarged Site Grading Plan for the Source Storage and Calibration Building.

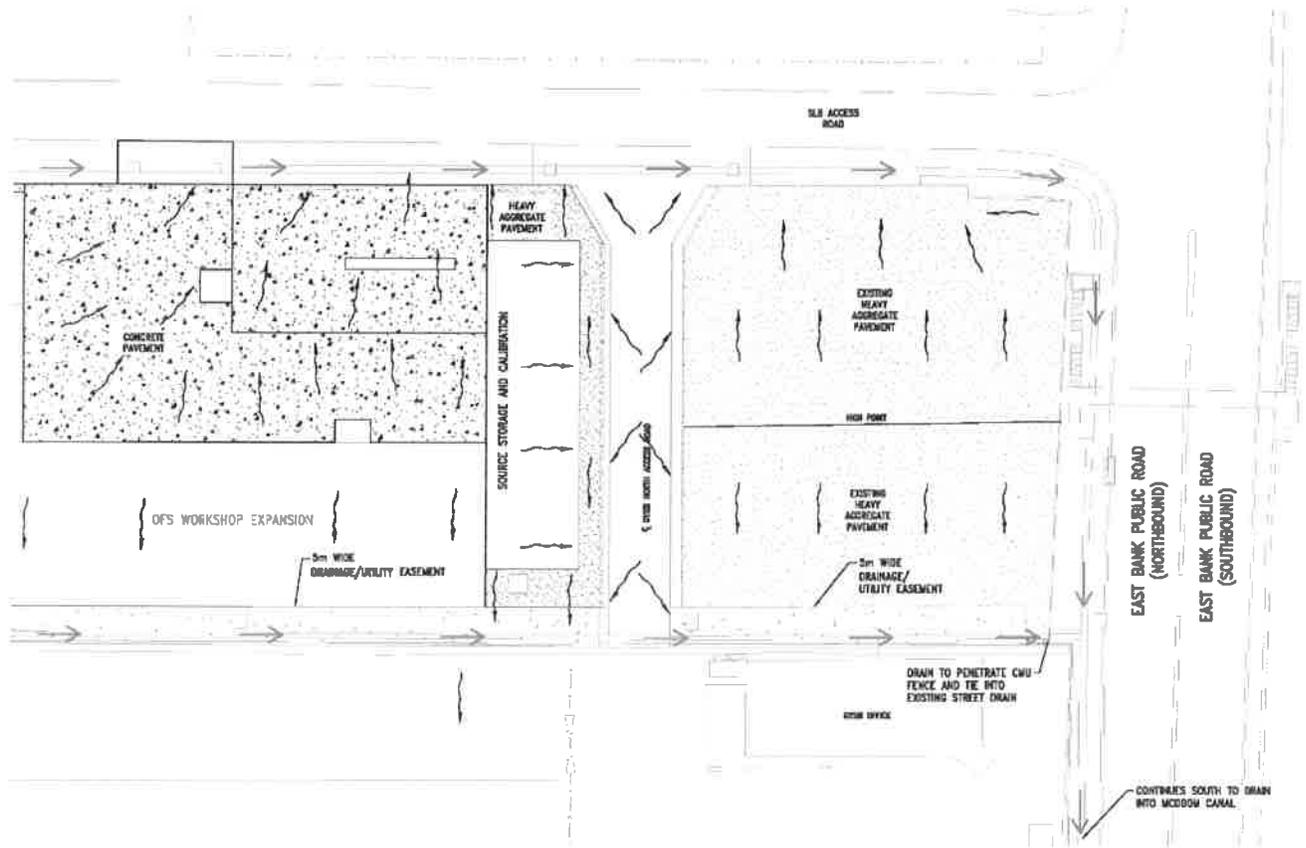


Figure 5: Source Storage and Calibration Area Drainage

2.0 PROJECT DESIGN

2.1 CONSTRUCTION

The Source Storage and Calibration Building construction is expected to take place while other construction and operational activities are ongoing on the property. The office building construction is scheduled to begin in January of 2021. The Office construction is located approximately 120 meters west of the proposed location for the Source Storage and Calibration Building. The workshop expansion just west of this project (located within the 120 meters between the Office and Source Storage and Calibration Building) is expected to be operational in the first quarter of 2021. Construction works for this project will be planned so as to not affect the ongoing construction and operations activities on the property. The methods adopted shall ensure that works are undertaken in a safe and well-planned manner so as to achieve our set objectives.

2.1.1 RESPONSIBILITIES

Site Superintendent (Contractor) – Responsible for all construction operations

Surveyor (Contractor) – Responsible for all land surveying works to provide the grades shown on the final construction drawings

HSE Officer (Contractor) – Responsible for safety, security, and environmental aspects

Schlumberger Site Inspector / Construction Manager (CASE) – Responsible for overseeing the construction project as a whole and inspecting the work according to the defined quality required

Schlumberger HSE Manager – Responsible for implementing the environmental health and safety program for the Schlumberger Guyana Base

2.1.2 APPROVALS/PERMITS

In keeping with the City of Georgetown Building Regulations, permits are required for the execution of this Project. Schlumberger is to provide the following permits:

- Mayor & City Council
- EPA
- Central Housing & Planning Authority

2.1.3 SITE ACCESS

Site access for all construction works for the Source Storage and Calibration Building will be done via the 50' wide entrance gate into the Schlumberger property off of the access road bordering the north property line.

2.1.4 TEMPORARY SERVICES

- Electricity – This will be facilitated by use of a generator supplied and maintained by the contractor
- Internet Access – Contractor will provide internet access for construction office
- Water – Contractor will use storage tank or access water from Schlumberger's water supply (GWI) in the workshop expansion

- Security – Contractor will provide security for project specific construction materials & property

2.1.5 MOBILIZATION & DEMOBILIZATION

Mobilization will begin with set up of temporary facilities, including the Contractor's construction site office and portable restroom facilities. The temporary facilities will be located east of the new GYSBI access road near the existing CASE construction site offices. The contractor will then mobilize equipment needed to perform the work. Due to the limitations of available storage space on site, equipment will only be mobilized to the site as needed during the construction sequence and will be demobilized once the specific equipment is no longer needed.

2.1.6 SURVEY & CONSTRUCTION LAYOUT

All concrete in the proposed area for the building has been previously demolished and the existing grade is a sand/loam fill. Prior to construction, the surveyor will work with the Project Engineer to establish a project benchmark and lay out the overall project. The Surveyor will work with the civil works contractor to establish and verify cut grades for any required soil removal. During backfilling to reach final subgrade elevation, the Surveyor will set grade stakes and verify elevations for each compaction layer. Daily surveying and layout will be done to allow for accurate excavation, shaping of fill material, and setting top of concrete elevations. The surveyor will verify and record all final layers and verify top of concrete elevation once the concrete foundation is poured.

2.1.7 EXCAVATION

Soil excavation will be performed for the column footings, grade beams, and the source storage pits. Excavation will begin using large bucket excavators to perform the main digging and small buckets or skid steers will be used to obtain final depth. All excavated material will either be salvaged and reused by the contractor or disposed of by the contractor at an approved landfill. A small generator driven sump pump shall be used to keep excavated pits free from standing water after rains. The surveyor will confirm all excavation depths.

2.1.8 STRUCTURAL BACKFILL

Once excavation to required depth is completed, structural backfilling shall commence. Approved structural backfill materials will be brought in by trucks and dumped in the required area. The material will be spread by a front-end loader or skid steer in lifts of no more than 300mm thickness prior to compaction. The surveyor will confirm all lift depths. Sand material will also be soaked with the use of a water bowser to assist compaction. Once compaction is complete, the Contractor will engage a qualified geotechnical engineering testing agency to perform compaction tests and inspections. Failed areas will be cut, re-filled, and/or recompact until the compaction criteria is met. Once compaction is verified, the next lift may be placed. Upon completion of the structural backfill, final shaping will be done by a motor grader. The surveyor will confirm all final subgrade elevations per the construction drawings.

2.1.9 CONCRETE FOUNDATION

Once the subbase is completed and compacted, installation of the concrete foundation shall commence. Prior to the concrete pour, the Contractor shall submit a mix design to the Project Engineer for review and approval. The Project Engineer will ensure the mix design meets all project technical specifications. The contractor will build and install formworks for the footings,

pits, and exterior limits of the slab. The interior pit forms will be made out of steel (as shown on the construction detail drawings) and stay in place indefinitely. All other forms will be built out of timber. While forms are being built and installed, the Contractor will also build all steel reinforcing cages and mats as specified on the construction drawings and within technical specifications. Before installing the rebar, the contractor will install a thin concrete blind at the base of the slab and footings to avoid the rebar chairs sinking into the soil and keep the rebar mats at the specified elevations within the foundation.

Once the rebar and building precast anchor bolts are installed, the concrete foundation will be poured. The concrete will be placed evenly in layers and layers will be compacted using concrete vibrators. Concrete will be slump tested per the technical specification and trucks with failed slump tests will be rejected. Concrete samples will be taken every 76 cubic meters and tested per ASTM C 39/C 31M and the project specifications. Concrete slab will be finished using vibration screeds, roller screeds, and bull floats. Saw-cut control joints will be cut within 10 hours of concrete pour. The foundation will be moisture cured and joints will be prepared, cleaned, and filled with an approved joint filler. Forms will be stripped and the concrete foundation works will be complete.

2.1.10 METAL BUILDING ERECTION

Once concrete foundation is in place, the building erection will commence. The contractor will use a crane and manlifts to safely erect the metal building. The contractor will begin by erecting all columns, main beams, and x-bracing rods to ensure the structure is stable and prevent the columns from rocking. After the primary steel is installed and square, crane beams and rafters will be installed. The two (2) 3-ton overhead traveling bridge cranes will be installed before the roof purlins are installed. Once the bridge cranes with crane stops, crane rail, and bus bars are installed, the wall girts, purlins, and framed openings for doors will then be erected. Before installing the wall sheeting, the contractor will form up and pour the 8' tall concrete walls around the perimeter of the building as shown on the construction drawings. Once the exterior concrete walls are installed, the contractor will proceed with installing the doors, wall sheeting panels, and roof sheeting panels. Finally, the contractor will install the finishing trim to complete the building installation.

2.1.11 TECHNICIAN OFFICE CONSTRUCTION

After the building is fully installed, the lab technician offices will be construction. The office walls will be constructed of standard 8" CMU blocks. The ceilings will be constructed of 3.5" metal studs and 5/8" thick gypsum board. After the block walls are installed, the office windows and doors will be installed. The Owner will bring in office desks and miscellaneous furniture to complete the offices.

2.1.12 UTILITY INSTALLATION

The contractor will install light fixtures, receptacles, conduit, cable, wiring, and gear per the construction drawings to provide power to the building. This electrical installation includes electrical connections to power the bus bar for the overhead bridge cranes. The power will be provided from the 750kVA pad mount transformer serving the east workshop expansion. Guyana Power and Light (GPL) will be providing power to this transformer. All electrical installations will be inspected and tested per the project technical specifications.

The contractor will also install all conduits and wiring for the telecommunications (including internet access, badge scanners, and security devices) for the building. Guyana Telephone & Telegraph Company (GTT) will be the service provider for telecommunications for this project.

The contractor will tie into the existing 1” water line in the workshop and provide a water connection in the southernmost room of the calibration building containing a small trench. The water for the workshop ties into a 4” diameter main line which runs underground throughout the length of the south apron utility corridor (between the GYSBI fence and the Schlumberger new building construction). The Guyana Water Inc (GWI) meter for this water line is located at the southeast corner of the property just inside of the concrete fence bordering East Bank Road.

The contractor will tie into the existing 1” compressed air line in the adjacent workshop and provide two (2) air outlets for use with small tools.

2.1.13 FINAL COMMISSIONING AND CONSTRUCTION END

The final phase of the construction project includes installing all HSE signage for the facility and a final commissioning and testing. The on-site project manager and contractor’s site superintendent will do a walk through of the building to ensure the metal building is erected per the drawings, cranes are installed per the installation drawings and fully operational, and all lights and power outlets are working. The Owner will hire a 3rd party company (Jaguar Oilfield Services Guyana Inc.) to perform the final inspection and certification of the two overhead bridge cranes. This will complete the construction phase of the project.

2.2 OPERATION

The Source Storage and Calibration Facility will be used to prepare downhole tools that are used for drilling, completion, and well intervention activities in order to optimize the production and maintain continuous flow from a reservoir. The facility will house wireline tools, drilling and measurement tools, and bottom hole assembly tools. These tools all exist and do not involve any raw materials. The tools will be used on the rigs and then returned to the Source Storage and Calibration Building where the sources are retrieved and stored in pits. The downhole tools are then sent to the workshop where they will be cleaned, repaired, inspected, and tested prior to being shipped back to the rig.

2.3 WASTE MANAGEMENT

The Source Storage and Calibration building will be used for the storage and installation of radioactive sources into downhole tools prior to mobilization offshore. The operation of this facility does not require the use of any process related chemicals. General domestic waste (plastic bags, paper wraps, and wood from covering and palletizing the tools) will be about 3.5 metric tons per year. Industrial waste will be oily rags and other cleaning gear which will be about 1.5 metric tons per year and will be processed as hazardous waste.

General waste will go to the Guyana landfill. Wash rags and oily rags are stored in designated oily rag drums with automatic closing lids. Industrial waste will be sent to Tiger Rentals Guyana.

There will be one water connection in the D&M calibration room in which there is a 300mm wide trench forming the shape of a 6.3m x 2.5m rectangle. This will be used for minor washing prior to transporting the downhole tools to the workshop for full cleaning, inspection, and testing. This trench would be cleaned by transferring directly from the trench to a 350-gallon tote with a

diaphragm pump and hose. All waste totes on the Schlumberger site are sent to Tiger Rentals for proper disposal.

The building electrical service (including workshop power) will be backed up by a 500kW diesel powered generator.

Operation of this facility requires handling and storage of radioactive substances. Please find list of radioactive sources below.

Common Sources used by Schlumberger: Gamma Ray Logging Source, Neuron Logging Source



Well Testing

Item	Hazard	Type	Description	Qty	Units	Storage & Handling Document
1	Radiation	Vx Source	Ba133	10	Each	DOC-0031516
2	Radiation	Pip Tag	Cobalt 60	100	Each	100426961D-AA

Well Services

Item	Hazard	Source Model #	Source Serial #	Isotope	Source Original Activity	Qty	Units	Storage & Handling Document
1	Radiation	5192B	B-7697	Cs-137	200mCi-7.4GBq	1	Each	Radiation Standard 18 and B.O.O.K.
2	Radiation	5192B	B-7819	Cs-137	200mCi-7.4GBq	1	Each	Radiation Standard 18 and B.O.O.K.
3	Radiation	5192B	B-7610	Cs-137	200mCi-7.4GBq	1	Each	Radiation Standard 18 and B.O.O.K.
4	Radiation	5192B	B-8045	Cs-137	200mCi-7.4GBq	1	Each	Radiation Standard 18 and B.O.O.K.

Drilling and Measurements

Item	Hazard	Type	Description	Qty	Units	Storage & Handling Document
10	Radiation	Dual source assembly SADN8/ADN4	RNGA-BB	5	Each	D&M Radiation Intouch #5771136
11	Radiation	Dual Source assembly ADN6	RNGA-CE	5	Each	D&M Radiation Intouch #5771136
12	Radiation	Ecoscope DENSITY SOURCE ASSEMBLY	GGLS-DA	4	Each	D&M Radiation Intouch #5771136

Wireline

Part Number	Code	Description	Tools Used	Activity	Quantity	Unit
H143559	GSR-J	Cesium 137 Gamma-Ray source	LDT, LDS, TLD	63 GBq	5	Each
H142108	NSR-F	Americium-241 beryllium	HGNS	592 GBq	5	Each
H329467	GSR-U/Y	Calibration Blanket	HNGS, EDTC, SGT, HNGS	55.5 kBq	5	Each
101648122	PNG-AA/BA/GA	Minitron (Pulse Neutron Generator)	PNX, NEXT, RST	59.2 GBq	6	Each

3.0 PROJECT SIZE

The Source Storage and Calibration Building is 12.2 meters wide x 43.4 meters long.

Schlumberger Guyana has allocated \$156,968,550 GYD (\$750,000 USD) for the construction of this specific project.

During construction, approximately 30 workers will be required at peak times. Under routine operating conditions, approximately 8 workers will be required to operate the facility.

With regards to rates of production, the only thing leaving the building will be tools. These tools are already owned by Schlumberger and will be shipped to and from the rig site on a daily basis.

4.0 NON-TECHNICAL EXPLANATION OF THE PROJECT

Once the Source Storage and Calibration Building construction phase is complete (as outlined in the Construction section of this report), the building will be ready for operations. The source storage and calibration building is situated where SLB will receive incoming downhole tools returned from the rig and where the sources are immediately retrieved and stored in underground pits. The downhole tools are then sent to the workshop where they are cleaned, repaired, inspected, and tested prior to being shipped back to the rig. Downhole tools refer to different types of tools, instruments, and equipment used in the various operations of the production of oil and gas. Some of these different operations are drilling the well, completing the well, and well intervention. Downhole tools can be attached to the drill stem or lowered down using a cabling technology process referred to as wireline. The tools are generally temporarily installed in the well and removed once the work is complete.

The figures below show the proposed layout of the source storage and calibration building.

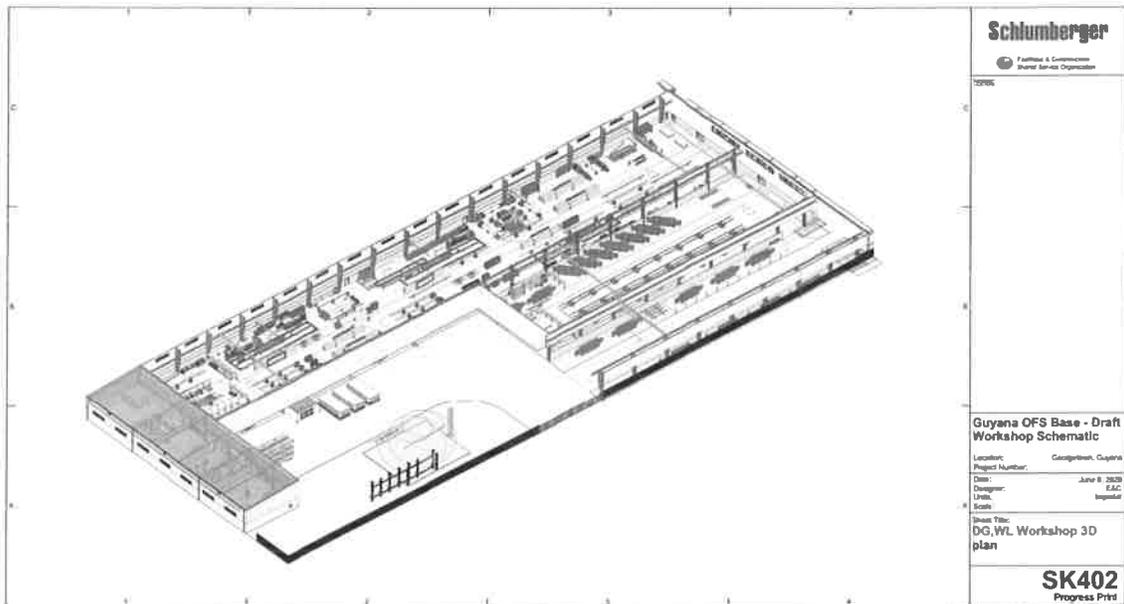


Figure 6: East Workshop and Source storage and Calibration Building

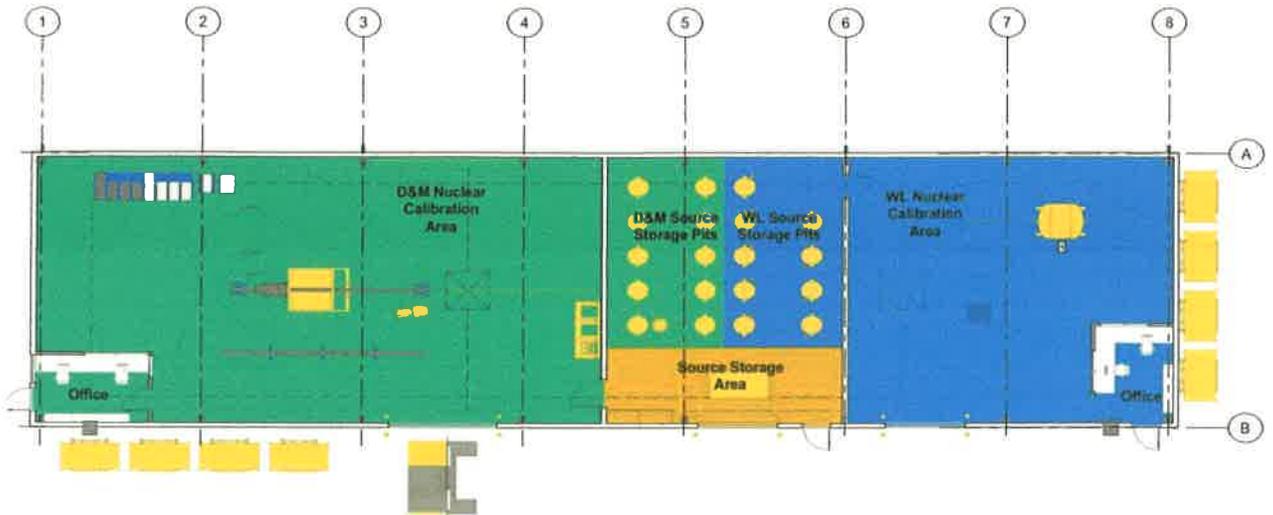


Figure 7: Proposed Source Storage and Calibration Building Plan



Figure 8: Source Storage Area (With Underground Pits)

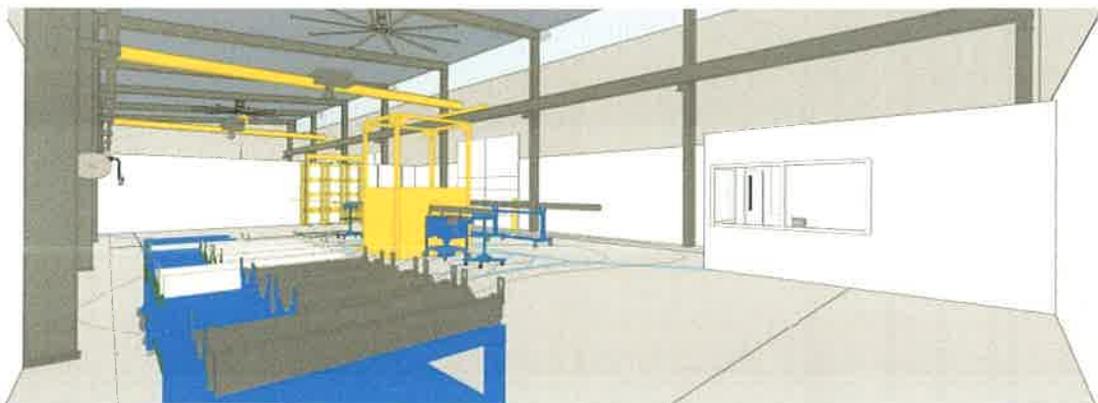


Figure 9: Drilling and Measurements Calibration

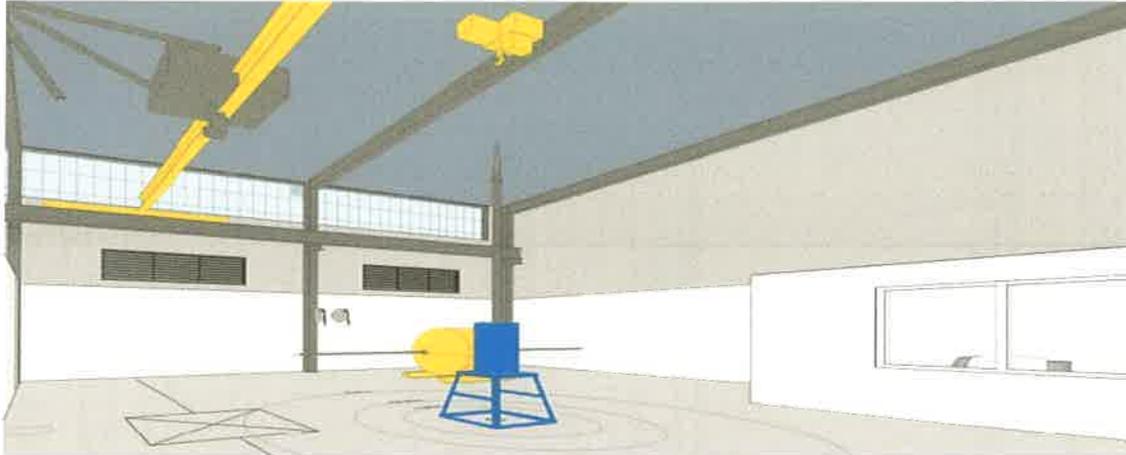


Figure 10: Area Wireline Calibration Area

The calibration operation requires the use of a radioactive source as well as heavy machinery, overhead cranes and possibly forklifts. All personnel involved in this operation will be required to have proper training and certification specific to the location where the calibration will be performed.

The Sources are stored inside a pit that has been designed to avoid exposure to the personnel and provide the security to unauthorized personnel to access it. For this project there are nine (9) circular pits and ten (10) square pits. The circular pits are 762mm diameter and 2.75m deep. The square pits are 762mm x 762mm square and 2.75m deep. The pits are constructed of 300mm thick reinforced concrete walls with a 300mm thick concrete base. They are lined with an interior shell made of 7mm thick carbon steel plate.

Any movement of a radioactive source is clearly documented to keep the traceability of the status and location of radioactive source. Therefore, any movement of a radioactive source from the pit or to the pit is written and signed by the employee who performed the activity in Radioactive Control Book.

An example of a radioactive pit where sources are stored is shown below in Figure 11.

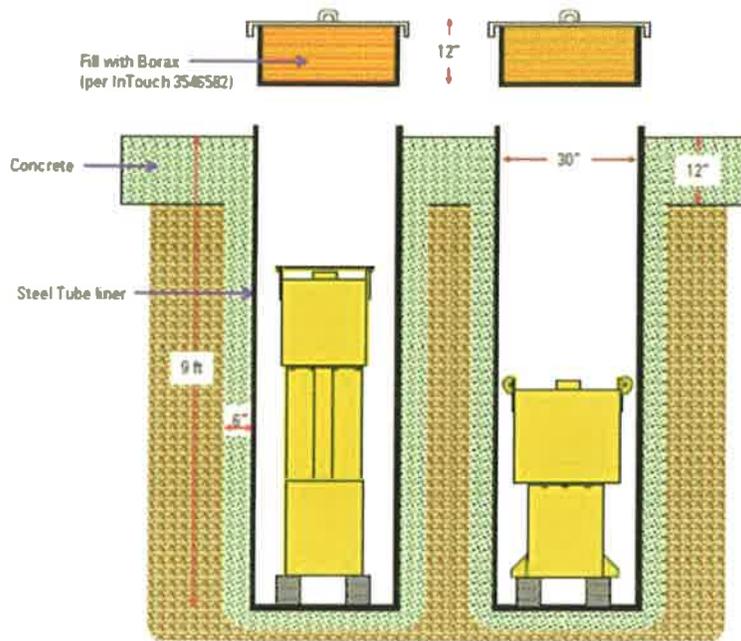


Figure 11: Radioactive Pit

Downhole tools are calibrated using known conditions. A typical calibration takes 2 hours, where the radioactive sources will be installed into the downhole tool for 1 hour of the duration. When the radioactive sources are in the tools, the area will be restricted to only the personnel directly calibrating the tools. Survey of the radioactive level of the area will be performed prior to the calibration and post calibration.

Figure 12 illustrates the set up for a Drilling and Measurement tool calibration.

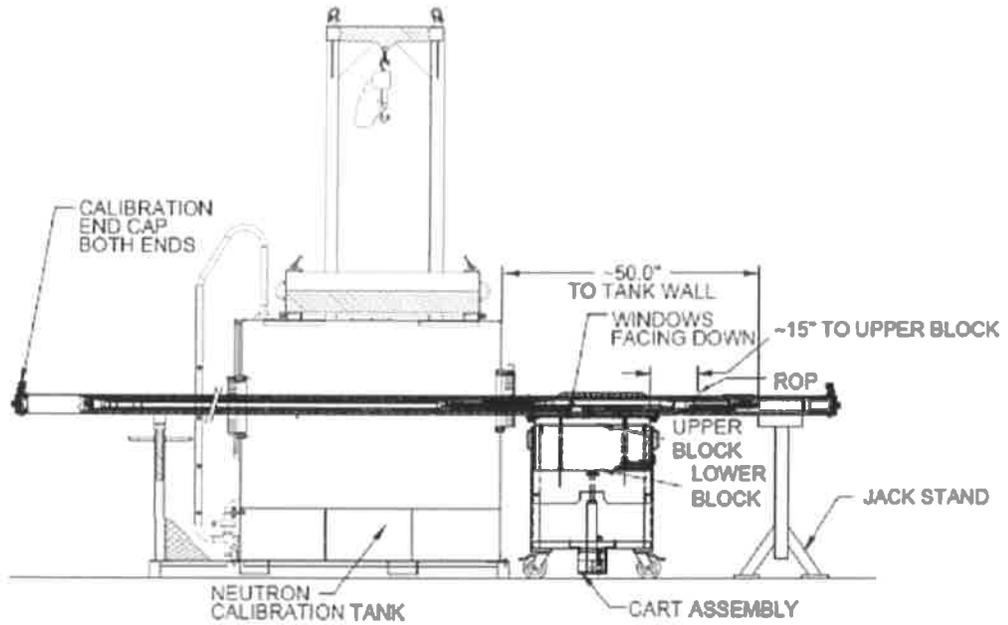


Figure 12: Drilling and Measurement Tool Calibration

5.0 DURATION

5.1 CONSTRUCTION DURATION

The expected duration of construction works is 128 days and detailed as follows:

- Earthworks (5 days)
- Construct concrete pits (10 days)
- Concrete slab & footing installation (30 days)
- Metal building erection (15 days)
- Concrete wall & CMU block wall construction (21 days)
- Bridge crane installation (3 days)
- Electrical installation (30 days)
- Security device installation (7 days)
- HSE signage installation (4 days)
- Final site cleanup & commissioning (3 days)

5.2 OPERATING DURATION

Operations of this facility along with the workshop facilities is expected to be greater than 20 years.

6.0 ENVIRONMENTAL EFFECTS

6.1 LAND/SOIL

Since the site is an existing industrial site which has already been disturbed and cleared, no impacts are expected to land/soil at the site. All calibration activities will take place inside the building (or at nighttime with minimal personnel around).

6.2 AIR

The activities within this facility will produce no odors or air emissions.

6.3 WATER

No impacts are expected to ground and surface water resources on the site or in the general vicinity of the proposed site.

6.4 MITIGATION MEASURES

Schlumberger will continue to monitor dust and noise generation as they already do for the existing workshop and drilling fluids facility. All equipment and machinery will be properly maintained to specifications to minimize noise.

Ludlum Survey Meters will be used to monitor radiation around the building.

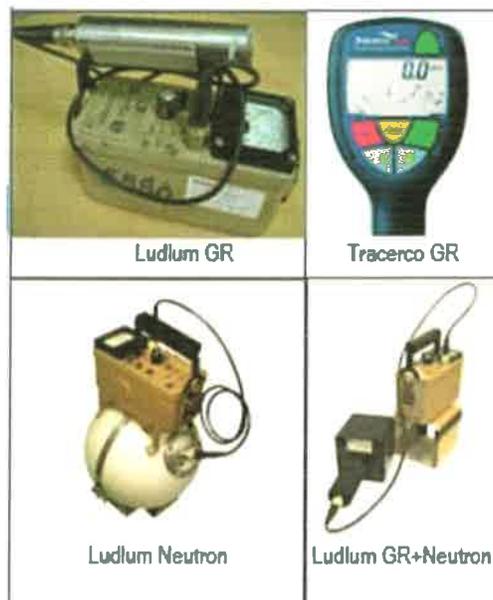


Figure 13: Ludlum Survey Meter

A Radiation Officer is assigned to this site. All personnel working with sources must wear a dosimeter badge which detects & measures exposure to radiation.

• Current type of SLB dosimeter is Landauer Luxel OSL:

Personal dosimeter	Control dosimeter	Area dosimeter
Radiation worker exposure	Background	Public exposure

- Dosimeters - regulatory requirement:
 - for the protection of the individual employee
 - for the protection of the company
- Local requirements – additional
- Wear period: 1 quarter (male) / 1 month (female)
- Return within **14 days** at the end of wear period together with Control dosimeter
- Report lost, forgotten or damaged badges to your Supervisor immediately to get replacement
- Dosimeter records must be retained for 10 years

• Can detect Beta, Gamma and X-ray, Neutron radiation

• Minimum detection level 1 mrem (GR)

Figure 14: Dosimeter Badge for Radiation Detection & Measurement

7.0 SPECIAL REQUIREMENTS FOR FACILITIES

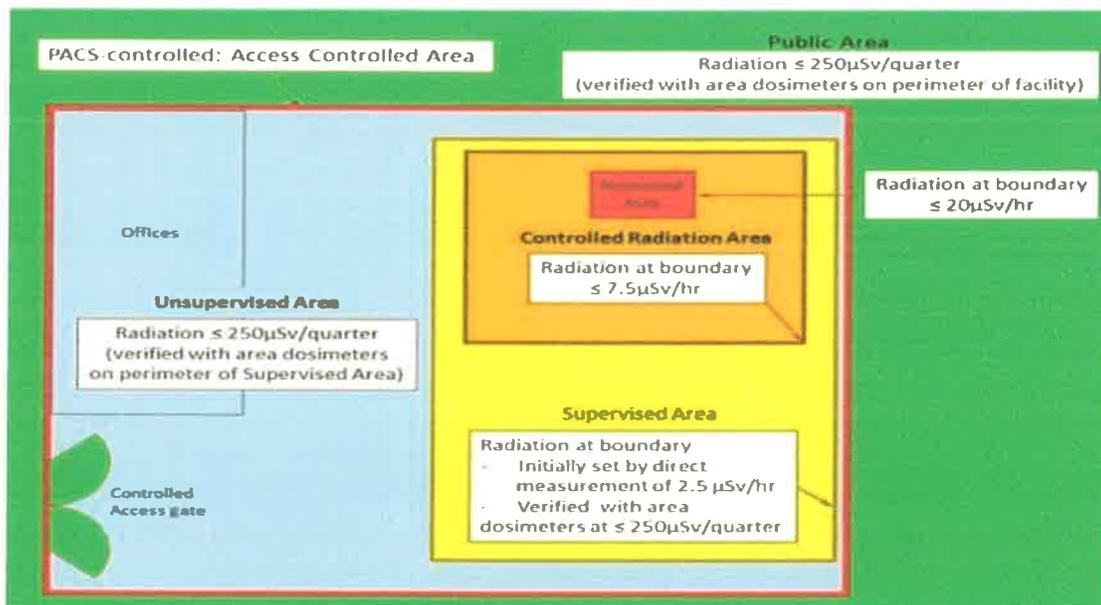
Storage of Radioactive Materials is subject to the proper licensing as required by applicable regulators. This includes the right to store in permanent facilities and also during movements and temporary storage outside Schlumberger facilities (e.g. well-sites, offshore installations). All radioactive material shall be secured when at a Schlumberger facility, during transport or shipment, and at well-sites and other temporary locations to prevent unauthorized removal.

Security requirements are based on the 3D principle of Deter, Detect, and Delay

Deter – Physical and electronic security measures that provide a serious deterrent to intrusion

Detect – Alarm Systems and CCTV to provide and verify detection of an attempted intrusion

Delay – Physical security measures that delay the intruder for a sufficient length of time for a response force to arrive



HazMat locks and keys are a primary security measure and control of access to radioactive logging sources. All HazMat keys are strictly controlled and inventoried in precisely the same way as radioactive sources:

- Individually identified by type and serial number
- Registered in RMIS
- Inventoried every three months and photo inventoried every 12 months
- Assigned to authorized individuals with training and security clearance to handle radioactive material