Onshore Nigeria Engineering

(Electrical Discipline Engineering)

Alozie Godfrey- Field Supervisor (Elect) Gbaran- Ubie, Operations

Onumadu, Chibuzo- Principal Electrical Engineer, Discipline Engineering

Provision of Electrical Power from Gbaran CPF Others (SB130C1) to Gbaran Early Production Facility (EPF)

Document Revision: R01

**ECCN: Not Applicable EAR99**

Security Classification: Restricted

This document is made available subject to the condition that the recipient will neither use nor disclose the contents except as agreed in writing with the copyright owner. Copyright is vested in Shell Petroleum Development Company Ltd. © All rights reserved. Neither the whole nor any part of this document may be reproduced or distributed in any form or by any means (electronic, mechanical, reprographic, recording or otherwise) without the prior written consent of the copyright owner.

Up to two lines if required

**Revision History**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **REVISION STATUS** | | | |  | **SIGNATORIES** | | | |
| **Rev.** | **Date** | | **Description** | **Originator** | | **Review** | **Support** | **Approver** |
| 01 | 19 /05/2017 | | Issue for Revision | G. Alozie | | C. Onumadu | K Ofori  S. Anongo | V. Onyia |
| 02 | 08/08/2017 | |  |  | |  |  |  |
|  |  | |  |  | |  |  |  |
|  |  | |  |  | |  |  |  |
|  | | * Preliminary issue will be issued as R01 * Revisions for review will be issued as R01, with subsequent come as R02 etc. * All revisions to this document must be signed by the relevant Technical Authority (TA1, TA2 or TA3) | | | | | | |

**Signatures for this revision**

|  |  |  |  |
| --- | --- | --- | --- |
| **Role** | **Name** | **Signature** | **Date** |
| **Originator** | Alozie Godfrey |  |  |
| **Review** | Onumadu Chibuzo |  |  |
| **Support** | Ofori Kebin  Anongo Sesugh |  |  |
| **Approver** | Onyia Vitalis |  |  |

More field(s) could be added for signature if additional agreement/approval is required.

Provision of Electrical Power from Gbaran CPF Others (SB130C1) to Early Production Facility (EPF)

1. **Back ground Information:**

The primary aim of the Gbaran EPF is to fulfill SPDC’s commitment to the supply of about 80 mmscf/d of fuel gas to the Federal Government IPP (Independent Power Plant) in Gbaran and support future domestic gas markets. The Gbaran EPF lease was initiated to act as a short term supply option for the Federal Government GIPP in Gbaran in order to meet the initially scheduled Federal Government IPP start-up date of September, 2009. The Gbaran EPF was built to industry standard by Exterran and declared ready for gas supply effective 2nd of March 2011. In 2013, the EPF was fully purchased by SPDC from Exterran. The facility is unmanned but visited daily for O&M activities. Logistics support is from Gbaran Ubie Filed Logistics Base (FLB).

The total power requirement for Gbaran EPF is supplied from either two or one Waukesha gas engine driven generators, rated at 563KVA each (G-901&2) – under normal conditions or from one CAT diesel engine driven generator, rated at 800KVA, (G-905) – providing power for the station during black start situation or when the gas generators are down. The power supply is rated 380V, 3 phase 50 Hz. The generators are connected via a synchroscope and to the main switchboard mounted in the MCC. The system design ensures that paralleling of the generators is possible. Distribution is via the main switchboard and its integral sub distribution boards. Power is mainly for lighting, cooling fans, closed drain pumps, FLKO pump motors, Glycol pump motors, blower motors, instrument air compressors, power transformers, Telecommunication equipment and Fresh water pump.

The project seeks to supply electric power to Gbaran EPF from the surplus power on Gas Turbine Generators in Gbaran Central Processing Facility, (CPF) which is to be tapped at Gbaran CPPF Others RMU (SB130C1). The GTGs (3 GTGs site rated at 10.92MW each) are currently loaded at <50%. At the completion of the project, additional load from Gbaran EPF will be 5.4%. Total generators capacity loading shall then be 55.4%. This means that additional future projects which may require electrical power supply shall still be accommodated.

The Gbaran EPF power project is premised on the proximity and availability of surplus electrical power in Gbaran CPF. This will permanently eliminate the need for both the gas and diesel generators currently installed in Gbaran EPF.

**2. Problem Definition:**

Power outage has become very regular in EPF due to obsolete Waukesha generator sets. In EPF, availability of power is critical as loss of power leads to plant trip and increased Opex on diesel cost (Circa $93,000) GHG emissions, external corrosion on flow lines due to unavailability of power to CP transformers, loss of communication, loss of portable water supply and security exposure at night due to lack of illumination.

1. **Issues/Impact**

Waukesha generator sets are obsolete and as such break down regularly resulting in the following impacts to the business:

1. Production loss
2. High OpEx of PM/CM Maintenance running cost for installed generators.
3. Flowlines exposure to external corrosion due to unstable electrical power to CP transformers.
4. GHG emissions from diesel and gas engines
5. Loss of communication and other electrical power dependent equipment.
6. Huge OpEx cost on AGO. circa $93,000 per annum

**Project Scope**

The project will involve installation of 11KV/380V step down transformer, excavation of trench of 0.5m x 1m, **50 meters** length from Gbaran CPF Others, RMU (SB130C1) to Gbaran EPF and laying of 3C x 70 mm2 and 4C x 95mm2 armored cable with 70mm2 Parallel Earth Conductor (PEC). Finally testing and commissioning of the facility.

**Cost Savings:**

1. Achieve annual cost savings of circa > $93,000 per annum on AGO alone.
2. Reduce man hour cost and maintenance spares spent on Waukesha and CAT generator sets, circa $58K per annum.
3. Reduce PM and CM cost of approximately $25K per annum
4. Potential savings will be achieved at the completion of the project including savings from deferment, averted damages to equipment and improved equipment availability.

**Other Justifications/ Benefits:**

1. Improve power supply availability and reliability
2. Meet contractual agreement between SPDC and NIPP by sustaining gas production of circa 80mmscf/d from Gbaran EPF to NIPP.
3. Reduction in GHG emissions
4. Improve uptime for telecommunication equipment.

**Technical Solutions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Options** | **Activities-** | **Pros** | **Cons** | **Cost** |
| A | Do nothing | None | Production Loss, High OpEx: Potential process safety impact: Risk of continued Running of the facility with unreliable Waukesha generator sets | Annual loss of circa **$176k** |
| B | Connect power from Gbaran CPF Others, RMU (SB130C1) to Gbaran EPF | Availability of RMU, HV/LV cables | Unavailability of power transformer (11KV/380V) | Circa **$120k** on transformer and labour |
| C | Tap power from SS102 (LV Sub-station) to Gbaran EPF | Identify and source materials from surplus project materials | Risk of poor design; High voltage drop; Sub-standard material | Circa $200k for breaker, labour etc |

**Conclusion:**

1. **Option B:** Connect power from Gbaran CPF Others, RMU (SB130C1) to Gbaran EPF based on design calculation is the preferred immediate option, considering the current available load in Gbaran EPF.

The options selected will achieve a cost savings circa **$176k excluding the cost saving on transformer to be resourced from KI** , on diesel consumption, maintenance costs, deferment from facility trips, improved plant availability and improved asset integrity reliability.

Also total Cost saving = design cost + equipment+ opex . SEDO cost will ca. 250k; Transformer cost 11kv/415 500KVA check SAPn ( NGN 5m Convert to dollars) . But this is going free issued from KI

= $176k +250K + 5000000/305 = $xxx

**TECHNICAL REVIEW SUMMARY**

**Team members**

Chibuzo Onumadu – Principal Electrical Engineer

Tokoni Amasiemeka – Senior Electrical Engineer

Anongo Sesugh – Field Team Lead (Elect), Gbaran

Alozie Godfrey – Field Supervisor (Elect), Gbaran

Ogbuehi Charles – Field Supervisor (Elect), Gbaran

Mohammed, Abdul – Field Technician (Elect), Gbaran

**Meeting Dates:**

Bi-Weekly. Starting 24.06.2017

1. **REFERENCES**

Attachment 1: EPF Load List see the updated load list/ Transforme size cal.attached to email .



Attachment 2: MTO List.

 update the correct size of required transformer based on the calculation.

Attachment 3: Calculations.



Attachment 4: SLD for EPF- No attachment

Attachment 5: SLD for SB130C1 Gbaran Others. No attachment