Power interconnectivity from Etelebou Manifold to Etelebou Flow Station

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**Revision History**

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| **REVISION STATUS** | | | |  | **SIGNATORIES** | | | |
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| 01 | 20 /04/2017 | | Issue for Revision | G. Alozie | | C. Onumadu | K Ofori | V. Onyia |
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|  | | * 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**

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| --- | --- | --- | --- |
| **Role** | **Name** | **Signature** | **Date** |
| **Originator** | Alozie Godfrey |  |  |
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| **Approver** | Onyia Vitalis |  |  |

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

Power interconnectivity from Etelebou Manifold to Etelebou Flow Station

1. **Back ground Information:**

Etelebou flow station is an SPDC production station located in some 120km northwest of Port-

Harcourt (OML 28), situated about 3 km East of Gbaran in Bayelsa. It was discovered in 1971 and started producing in 1973 as a double bank 2-stage (HP - LP) separation station with a nominal capacity of 40Mbpd gross liquid and 40MMScf/d gas. The current average production is ca 2514 bopd and 1.3mmscfd gas that is being currently flared (No AGG). It is one of the four flow stations currently existing in the Kolocreek district facility.

The station had undergone environmental upgrade but most of the productions are diverted to Gbaran Ubie Gas plant. Crude transfer is via 2 Cat gas engine driven double acting duplex pumps (one runs, other on standby). 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 the flow station is supplied from one gas engine driven generator G3306, 80KVA (G0101) – under normal conditions or from one diesel engine driven generator 80KVA D3304 (G0102) – providing power for the station when the gas generator is down. The power supply is rated 415V 3 phase 50 Hz. The generators are connected via an automatic mains failure (AMF) panel to the main switchboard mounted in the generator house. The system design ensures that paralleling of the generators is not possible. Distribution is via the main switchboard and its integral sub distribution boards. Power is mainly for lighting as well as FLKO pumps, closed drain pumps, CP transformers, ultrasonic flare meters, Telecommunication equipment and Sumo pump.

The project seeks to supply electric power to Etelebou flow station from the surplus power on Gas Turbine Generators in Gbaran Central Processing Facility, (CPF) which is to be tapped at Etelebou RIF. The GTGs (3 GTGs site rated at 10.92MW each) are currently loaded at <50%. At the completion of the project, additional load from ETELEBOU RIF 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 Etelebou RIF & Etelebou flow station Electrical power interconnectivity project is premised on the proximity and availability of surplus electrical power in Etelebou RIF. This will permanently eliminate the need for both the gas and diesel generators currently installed in Etelebou flow station.

**2. Problem Definition:**

Power outage has become very regular in Etelebou Flow station due to obsolete CAT generator sets (G3306 and D3304). In Etelebou flow station, availability of power is critical as loss of power leads to 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**
2. CAT generator sets are obsolete and as such break down regularly resulting in the following impacts to the business:
3. No stable electrical power in Etelebou flow station.
4. High OpEx of PM/CM Maintenance running cost for installed generators at the station.
5. Flowlines exposure to external corrosion due to unstable electrical power to CP transformers.
6. Compliance with SOx and GHG standards
7. Unavailability of ROCI collaboration tools due to power loss.
8. Flow station incessant trips due to clogging of instrument lines with crude oil from use of instrument gas instead of instrument air.
9. Loss of communication and other electrical power dependent equipment.
10. Huge OpEx cost on AGO. circa $93,000 per annum

**Project Scope**   
The project will involve excavation of trench of 1.5ft x 2ft and length 300 meters from ETELEBOU RIF to ETELEBOU flow station and laying of 4C x 95mm2 armored cable with 70mm2 Parallel Earth Conductor (PEC) to improve flow station earthing system. 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 CAT generator sets (G3306 and D3304), 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 averted damages to equipment and improved equipment availability

**Other Justifications/ Benefits:**

1. Improve power supply availability and reliability
2. Sustain Oil and gas production of circa 2531 BOPD from Etelebou flow station.
3. Compliance with SOx and GHG requirements
4. Improve ROCI collaboration tools reliability and availability.
5. Improve uptime for telecom equipment.

**Technical Solutions**

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| --- | --- | --- | --- | --- |
| **Options** | **Activities-** | **Pros** | **Cons** | **Cost** |
| A | Do nothing | None | Loss of Revenue, High OpEx: Potential process safety impact: Risk of continued Running of the facility with unreliable CAT generator sets | Annual loss of circa $176k |
| B | Use the spare 125A MCCB on SB140E1 | Available equipment size adequate | Risk of unavailability of this spare for future expansion | No cost |
| C | Retrofitting vacant spare on SB140E1 | Identify and source from surplus project materials | Risk of poor design/installation/Sub-standard materials | No cost |

**Conclusion:**

1. **Option B short term:** Using the available 125A MCCB based on design calculation is the preferred immediate option, considering the current available load in Etelebou Flow station.
2. **Option C selected for the long term:** As part of the future project for conversion of Etelebou FS from instrument gas to instrument air by Asset engineering, the upgrade of Etelebou FS switch board and the retrofitting of the spare Etelebu RIF SB140E1 using 250A MCCB to cater for the increased load. (Asset Engineering focal point Jimba Olugbenga, already engaged)

The options selected will achieve the cost savings circa **$176k,** on diesel consumption, maintenance costs, deferment from station trips, and asset integrity improvement.

**TECHNICAL REVIEW SUMMARY**

**Team members**

Chibuzo Onumadu – Principal 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 24.03.2017

1. **REFERENCES**

Attachment 1: Etelebou Manifold/Flow station Load List



Attachment 2: MTO List.



Attachment 3: Calculations.



Attachment 4: SLD for Etelebou Manifold and Flow station.

