The Shell Petroleum Development Company of Nigeria Limited

Pre-FID Investment proposal

Summary Information

Project	Alakiri Flowstation Rehabilitation and Flowlines Replacement Project		
Main commitments/ Requested Amount	**Project Activity**	**This Proposal**	
		Shell share (30%, US$ mln)	**Total JV (100%, US$ mln)**
	Flowlines and structural materials	**0.669**	**2.23**
	FEED update and Detailed Design	**0.21**	**0.7**
	Compressor inspection	**0.03**	**0.10**
	Power system inspection	**0.03**	**0.10**
	Inlet manifold and test skid inspection and rehab	**0.039**	**0.13**
	Geotechnical survey	**0.03**	**0.10**
	Total	**1.008**	**3.36**

Project Cost Phasing		**2012**	**2013**	**Total**
	Inlet manifold rehab and Well Test facility	0.13	0.0	0.13
	Flowlines Replacement and Re-routing	1.8	8.54	10.34
	Compressor Rehab	0.58	0.0	0.58
	Oil Facilities	3.37	11.05	14.41
	Sustainable Community Development	0.09	0.56	0.65
	Total (US$ mln)	**5.97**	**20.15**	**26.12**
Source and form of financing	This investment will be financed with JV funding. The budget is already available in the BP11 plan			

Section 1: The proposal (Management Summary)

This Pre-Investment proposal seeks approval of US$ 3.36mln ($1.0mln SS) to execute the FEED and Detailed Design and some other key activities that would help better define the scope of the Alakiri flowstation and flowlines replacement project. The fund will also be used to commence the procurement of long lead items for the project.

The Alakiri Flowstation, a conventional 30MBPD facility, is located about 18km south of Port Harcourt. The facility had been in operation for about 40 years before it was extensively damaged in 2008 after an armed attack by militants which resulted in the facility being shut down till date. As at the time of the attack, the facility was producing about 2400bpd of Oil and 2.4mmscf of associated gas. Further production of the locked in potentials requires rehabilitation of the production equipment in the field. The rehabilitation works will also provide an opportunity to secure 8.9MMbbl (oil) reserves in the Alakiri field as well as enable production from the nearby Orubiri field (2.2mmbbl reserves).

The total estimate for the project is about $26.12mln ($7.836mln SS) to be expended in 2012 and 2013 out of which $3.36mln is being requested to cover the following activities; $0.7mln for FEED update works, $2.23mln for flowlines and structural materials; $0.46mln for inspection of

compressors, Power system inspection, inlet manifold inspection and rehabilitation. The sum of $0.1mln will be spent on geotechnical survey and EIA. This approval is required to enable the commencement of work pending the approval of the main Investment proposal.

Section 2: Project Background

The original Alakiri flowstation, a conventional piled, single bank, two-stage 30 Mbpd capacity production facility was shut down following severe damage to it in September 2008, after a militant attack. Prior to the attack and consequent station shut down, there were 6 well strings producing (Wells 3L/S, 7L/S, 31L and 11T). The facilities average production at the time was about 2400bopd and 2.4mmscf/d gas. A number of options were considered for restoring production in Alakiri field however, the option of using the materials procured for the Nkali Standard World Class facility was chosen for reasons of capacity, cost, schedule and fitness to the current operating philosophy.
The Standard World Class Facilities (SWCF) Project, originally planned for Nkali Flow Station incorporates new technologies which are expected to help resolve several production operations challenges such as obsolescence and asset integrity issues around operations and the producing facilities. Some of the issues expected to be resolved include:

1. Low system availability and reliability;
2. Large footprint;
3. Continuous gas flaring and
4. The need for remote operations and monitoring capability.

The system elements that make up the SWCF are:

- High Efficiency Process Systems using compact in-line separation for liquid/ gas, liquid / solid separations, etc.
- Remote Well Testing facility
- De-sanding facility
- Micro turbine units for power generation using produced gas, also as a way to provide AG solution
- Electric driven Pumps, for improved reliability and availability
- Local and Remote Instrumentation, Control, and Safety Systems for remote monitoring and operations and improved data management and HC accounting.
- The Nkali SWCF was designed to process 5MBPD liquid and 20MMscf/d of gas

Deployment of the SWCF at Alakiri will help achieve the following;

- Reopening the locked in hydrocarbon resources in the field
- Eliminating the need for operational deferment arising from scheduled desanding operations (5mbbl of oil and 16MMscf of gas per year).
- Enable commingling of crude oil with condensate from the NAG plant which will hopefully discourage vandalism on the Alakiri - Bonny leg of the GPHSL by condensate thieves.

The equipments procured for the Nkali project are currently in storage and with additional investment can be deployed in Alakiri for the stated purpose.

Section 3: Project Scope Details
The plan is to deploy the SWCF as designed for Nkali however; the design has to be updated to take care of the peculiarities of Alakiri field. The Nkali design will be will be updated to include a

compression system to enable export of associated gas from the flowstation to export line pressure.
Due to the long absences of production activities in Alakiri, the scope of work also included the replacement of all the flowlines for the well strings to be opened up. There is also an opportunity to integrate the operations of the flowstation and NAG plant and reduce the facility footprint.
A summary of the scope of work planned to be executed under this proposal is as follows:

1. **Oil Facility**
    a. **Design**
        - FEED update to include the need for compression facility (not originally part of the SWCF design)
        - Detail Design (FEED and detail design to be undertaken by the Shell FEED office)

    b. **Civil Works**
        - Geotechnical investigation
        - Civil design and site preparation works

    c. **Process system skid fabrication**
        - Procurement of bulk materials and fabrication of the process skid and inter connecting pipings

    d. **Power System**
        - Installation of three nos microturbine power generators and extension of power system from NAG plant power system to new flowstation compressor system. This will also include the provision of fuel gas from the flowstation to the NAG power supply system.

    e. **E and I Equipment procurement**
        - This includes the procurement of valves, control and safeguarding equipments for the facility.

2. **Compressor Rehabilitation**
    a. Rehabilitation of three nos 2.5mmscf/d capacity reciprocating compressors.

3. **Flowlines Replacement**
    a. Procurement and Replacement of a total of 25km flowline including the rerouting of Orubiri well 7 flowline to Alakiri in 2013.

4. **Inlet manifold Modification**
    a. Refurbishment of the Multiport Select valve type inlet manifold and installation of multiphase flow metering system for well testing application.

5. **SD/SP**
    a. 2.5% of the project cost will be utilised for SD and SP related works for the host communities.

Table 1 below shows a breakdown of the costs.

Table 1: PROJECT COST ESTIMATES

	Item	Cost	Current

		Estimate	request
1	Inlet manifold	0.13	0.10
2	Flowlines	10.34	1.8
3	Compressor	0.58	0.1
4	Oil facilities		
4.1	FEED update and Detail Design	0.70	0.7
4.2	Process skid fabrication	0.70	
4.3	Power system installation	0.40	0.1
4.4	Bulk materials procurement	6.27	0.37
4.5	Control & safeguard system	3.73	
4.6	Civil works	1.42	0.1
5	QA/QC	0.40	
6	Training/Logistics	0.80	
7	SCD/EIA	0.65	0.03
	Total CAPEX	26.12	3.36

Section 4: Value Proposition and Strategic and Financial Context

Value Proposition

The successful implementation of this project will release about 2400bpd of oil production at Alakiri which has been locked in for over 3 years as well as about 1000bpd of oil in Orubiri field. Using the already available SWCF equipment will make the project faster and cheaper.

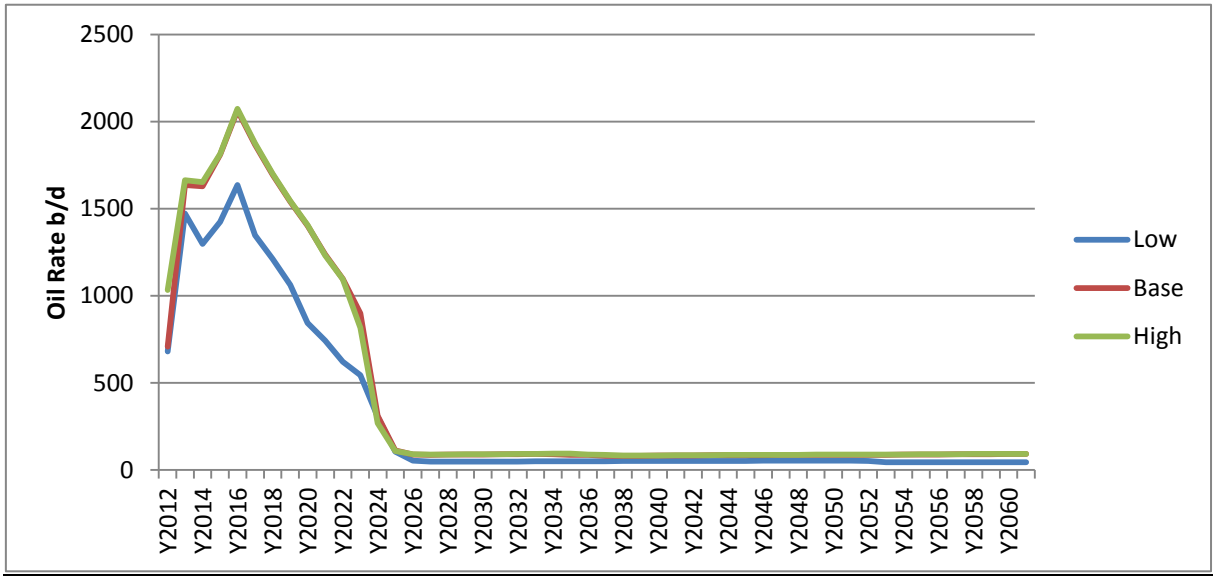

Figure 1: Alakiri Field Production Forecast

The Standard World Class Facilities incorporate new technologies which offer remote monitoring and control and the system is aimed at providing a sustainable platform for SPDC's present and future facility developments by:

- Reducing process inefficiencies thereby improving production
- Reducing deferment by improved availability and reliability of production systems

- Reducing OPEX due to obsolescence by improved systems availability and reliability, and minimizing logistics needs
- Reducing staff exposure through remote monitoring and operations
- This development is in line with the current production operation philosophy

Summary of Economics

The Alakiri Flowstation Rehabilitation and Flowlines replacement project was evaluated on forward looking basis using the 50/50 level II cost estimate. The detailed results are shown in table 2 below.

Table2: Economics Grid (MOD 100% JV)

Case Name	Base Case	Sensitivities					
	HV-RT12	High CAPEX (+30%)	1-Yr Prod Delay	High Reserve	Low Reserve	Ring-Fence	Licence Expiry 2019
NPV0% ($mln)	24.4	15.6	14.7	16.3	10.5	15.7	9.8
NPV7% ($mln)	14.5	8.8	7.9	9.6	6.3	9.3	6.7
VIR7%	1.97	0.91	1.07	1.30	0.85	1.26	0.91
RTEP	72%	38%	35%	53%	40%	49%	47%
Max Oil rate (Mbopd)	0.6	0.6	0.6	0.6	0.5	0.6	0.6
Max Gas Prd rate (MMscf/d)	1.2	1.2	1.2	1.2	1.0	1.2	1.2
Tot Oil Prod (MMstb)	2.3	2.3	2.3	2.4	1.7	2.3	1.4
Tot Gas Prod (Bscf)	4.0	4.0	4.0	4.0	3.1	4.0	2.7
Tot OPEX ($m)	19.7	19.8	20.7	19.8	17.7	19.7	8.5
Tot CAPEX excl Aband ($m)	7.6	9.9	7.6	7.6	7.6	7.6	7.6
UDC0% ($/boe)	2.9	3.8	2.9	2.9	4.0	2.9	4.7
UTC0% ($/boe)	9.7	10.6	10.1	9.6	12.5	9.7	9.4
UTC7% ($/boe)	9.5	10.7	10.2	9.4	11.7	9.5	10.4
UTC10% ($/boe)	9.9	11.3	10.7	9.7	12.1	9.9	10.9

Economics Assumptions

- Oil PSVs of $50/bbl @SV-RT12; $70/bbl @RV-RT12 and $90/bbl @HV-RT12 with applicable offsets applied.
- SPDC Domestic aggregate 2012 gas price based on the Nigeria Gas Master Plan (NGMP).
- Oil was taxed under PPT (PPT tax rate of 85%).
- Gas assumed to be taxed under CITA with Associated Gas Framework Agreement (AGFA) incentives.
- ARPR 31/12/2011 Fixed and Variable Opex for Alakiri Flow Station is applied.
- SCD Opex provided by the project team
- Gas Flare Penalty of US $3.5/mscf was applied and is non-tax deductible
- GHV of 1000Btu/scf
- Abandonment cost of 10% of total project RT CAPEX
- NDDC levy of 3% total expenditure.
- Education tax of 2% assessable profit.

Section 5: Risks, Opportunities and Alternatives
Risks

The principal risks associated with this project and key mitigation measures are:

	Risks	Action to Mitigate
1	Non-Compliance with NCD regulation	Plan to engage NCD team on NCD guideline. Contracting strategy will be structured to ensure compliance with regulation.
2	Inadequate Pump capacity for FS and NAG condensate.	SODA tam plans to rehabilitate existing pump and procure an additional pump PMT will explore the possibility of using pump procured for Obigbo PWRI in the event the above did not happen.
3	Delayed delivery of Screw compressor ((are yet to be delivered by vendor.))	Vendor has been informed of the intension to deploy the equipment in Alakiri
4	CALTEC unwilling to be involved in project	Caltec are the OEM for the process system. They have been informed of the Alakiri development and would be required to review and possibly supply new ejector internals and take part in the commissioning process
5	Available gas exceed compression capacity	There are three available compressors with combined capacity ranging from 2.6 to 5.2 depending on configuration and level of modification required. The design will allow the XXHP gas to bypass the compressor hence increase the gas handling capacity of the facility. In the future additional compressors can be procured to accommodate more gas production.
6	Limited capacity of SWCF (Capacity is only 5Mbopd.)	5Mbpd is the name plate capacity. The system can accommodate 6Mbpd
7	Facility too small to produce all Alakiri wells.	Same as 6 above. All producing wells and some hitherto closed in wells in addition to Orubiri 7S can be produced through the proposed SWCF
8	Constraint of 5MMscf processing capacity.	See 5 and 6 above
9	Delays in delivering Long Lead time items.	This would be addressed by the appropriated procurement strategy such as using OEM reps and offering incentives for quick delivery or via the use of alternatives materials (eg RTP in place of CS flowlines) with shorter lead time. Early engagement of the CP team is critical to reduction in lead time.
10	Joint venture partners approval to go ahead with the project.	JV partners are in support of this project indicated by the approval of the budgetary provision for the project in BP11. However, the PMT will continually inform the partners of the work progress and carry their views and concerns on board.
11	Use of new equipment and non familiar technology.	Train operation personnel early and incorporate into commissioning team.

Opportunity
As at the time the facility was shut down, it was producing about 2400bpd of oil and 2.4mmscf of associated gas. Opportunity exists to re-start oil production (2400bpd) faster, cheaper and more compliant to current operations philosophy by utilising already procured hydrocarbon processing equipments which are already in SPDC storage.

This project also presents the opportunity to unlock the production of the nearby Orubiri well 7S (1000bpd) which is currently locked in due to non availability of export line (GPHSL). It is planned to re-route this well (Orub 7S) to Alakiri. The Standard World Class Facilities incorporate new technologies which offer remote monitoring and control and are expected to resolve several production operations challenges such as obsolescence and asset integrity issues and producing facilities.

Alternatives
A number of options were considered for releasing the locked in hydrocarbon potential in Alakiri field, listed below;

1. ***Replacing the damaged equipments***

The majority of the equipments at the Alakiri flowstation are well past their design life, the facility was commissioned in 1970. This, couple with the severity of the fire related damage and the challenges of meeting the demands of the current production philosophy based on ROCI, makes the option of replacing the damaged equipment a very expensive venture to undertake given the volume of oil at stake. There is also the additional requirement of compression facility for the flowstation for the option to work.

2. ***HGOR Wells re-routing***

Another option considered is to have some of the high GOR wells with sufficient energy re-routed to the nearby NAG plant. This option would only provide a limited gain, as majority of the wells cannot meet the inlet condition at the NAG plant. However the cost of doing this is minimal and can be justified based on the economics.

3. ***Installing SWCF***

The third option considered take advantage of the availability of the materials procured for the Nkali SWCF project to rehabilitate the damaged Alakiri facility. Success here would mean that some key milestones of the Shell group's facility for the future concept would have been achieved. The SWCF also have the advantage of a shorter development time and is compliant with the ROCI spec facility. The original design of the SWCF did not include compression so compression facility will be included for Alakiri.
Part of the compression challenge can be met by utilising the fuel gas booster compressors originally procured for the Shell IA power plant which is no longer used for its original design intent.
Deploying the SWCF to Alakiri has an added advantage in that the equipments are on ground and can be installed and commissioned between six to nine months.

Section 6: Corporate Structure and Governance
The existing corporate structure and governance arrangements of SPDC-JV, with SPDC as operator still subsist for this investment.

Section 7: Functional Support and Consistency with Group and Business Standards
This proposal complies with Group Business Principles, Policies and Standards. Functional support for this proposal will be provided by Finance, Social Performance, Supply Chain Management, HSE, Operations, Legal, Treasury and Tax functions.

Section 8: Project Management, Monitoring and Review
This project is being matured in line with established processes and shall undergo all necessary Value Assurance and improvement practices, aligned to the risks, size and complexity of the project. There is an identified SPDC Decision Executive, Business Opportunity Manager, Project Manager for this project

Health, Safety and Environmental (HSE) Management
The HSE aspect of this Project will be managed in line with the SPDC HSSE & SP Control Framework. Further HAZID (Hazard Identification) and HAZOP (Hazard & Operability) Reviews will be carried out during the design update to ensure that all Process Safety issues and hazards are captured early and designed to ALARP (as low as reasonably practicable). Also, an Independent Design Review (IDR) shall be conducted to ensure that technical HSE risks are designed to ALARP. A Hazards Register shall be developed to manage all identified hazards through the life of the project.

A Construction HSSE Case shall be developed in line with SPDC's HSSE Management System. Prior to site mobilisation, also a Concurrent Activity Plan shall be developed to ensure safe concurrent brown field Operation and Construction activities.

Section 9: Budget Provision
Budgetary provision was made for this project in the SPDC 2012 JV budget. However, additional funding over the budgetary provision may be required if we are to achieve our target objective.

Section 10: Disclosure
Materials disclosures, if any, will be done in line with the Shell Group and SPDC Disclosure policies and guidelines.

Section 11: Financing
This investment will be financed with JV funding and Shell Share capital expenditure will be met by SPDC's own cash flow.

Section 12: Taxation
There are no unusual taxation features at this stage.

Section 13: Look Ahead
Based on the latest Level 2 schedule, key milestones are as follows:

Activity	**Start Date**
Front End Engineering & Detailed Design	July 2012
Placement of order for Long Lead Items	August 2012
Commence compressor rehab works	August 2012
Commence skid fabrication work	September 2012
Commence site preparation works	February 2013
Commence flowlines works	March 2013
Hook-up & Commissioning	June 2013

Section 14: Key Parameters
GM, Onshore/Shallow Offshore Projects approval is required for a pre-FID investment of $3.36mln ($1.0mln SS) to enable the execution of Alakiri Flowstation Rehabilitation and Flowline

rerouting project. The amount will be used to undertake FEED work, mechanical inspection of compression and power system, inlet manifold rehabilitation, geotechnical survey and EIA.. These pre-investment activities are required to help fully define the project as well as commence procurement of long lead materials

Section 15: Signatures

This Proposal is submitted to the GM, Onshore/Shallow Offshore Projects SPDC for approval.

Supported by:	For Business approval:
Chris Nwoke	Olagunju Toyin
Date ..../..../....	**Date ..../..../....**

Approved for Issue: _____

Okee, Elechi
Manager, Central Engineering