

NIGERIAN DEPARTMENT OF PETROLEUM RESOURCES (DPR) REGULATIONS

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LAGOS.
NIGERIA

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D P R

DEPARTMENT OF PETROLEUM RESOURCES.

**PROCEDURE GUIDE FOR THE DESIGN AND
CONSTRUCTION OF OIL AND GAS SURFACE
PRODUCTION FACILITIES.**

MARCH 2001.

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This guide is issued pursuant to the provision of the Regulations 36 and 39 of the Petroleum (Drilling and Production) Regulations of 1969.

1.0 SCOPE

The Procedure guide shall apply to all Oil and Gas surface production facilities in Nigerian Petroleum Industry.

2.0 APPLICABLE GOVERNMENT POLICIES

Local Content (30%):

Local content of project execution shall be of at least 30% of the total financial commitment of the project.

Nigerianisation (Technology transfer):

Project Management structure shall be composed in a manner that shall reflect the indigenisation policy of the government.

Zero-Flare compliance:

The Project gas utilization plan shall comply with the government directive on the eradication of Gas flaring.

Fiscalisation / Metering

LIQUID

Dynamic measurement shall be the primary mode of liquid petroleum measurement at custody transfer points with the static measurement used as a back up.

GAS

Refer to Part IV of Procedure Guide for quantitative and qualitative measurement of (crude Oil) Petroleum at custody transfer point.

GREEN HOUSE GASES

The use of green house gases- Chloro-Flouro Carbon (CFCs) e.g. the use of Helon in fire fighting systems is prohibited in line with DPR environmental guideline and standards for the Petroleum Industry.

Use of Chemicals

The use of chemicals for oil and gas production operations shall comply fully with the requirement of the national environmental guidelines and standards for the petroleum industry and in accordance with DPR's environmental guidelines.

3.0 GENERAL REQUIREMENT FOR PROJECT EXECUTION

3.1 DPR's participation in all facilities studies and reviews leading to an option selection shall be Mandatory.

3.2 There shall be three (4) stages of approval for any project execution, namely:

1. Conceptual Design
2. Detailed Design
3. Pre-commissioning/Oil & Gas surface facility operating Permit.
4. Decommissioning.

3.2.1 Conceptual design approval

This shall form the basis of any project implementation. It shall include the process of presentation and review of conceptual drawings, general project scope, concept and preliminary Environmental Impact Assessment (EIA) report/or Intent. The concept shall be that which has been accepted during the option selection review and shall clearly define the project philosophy. The application for conceptual design approval shall be accompanied with the following;

- (i) A copy of an approved Field Development Plan (FDP).
- (ii) A copy of letter of approval of preliminary EIA Report. *approval by who.*
- (iii) Preliminary Layout of facilities and interconnection piping.
- (iv) Simplified process flow diagrams and general equipment layout.
- (v) Metering manifold and its ancillary facilities where applicable and throughput capacities. For the design of metering manifold (See DPR Procedure Guide for Quality and Quantity Determination at Custody Transfer Points).
- (vi) All other drawings considered relevant for the review of the application shall also be submitted.
- (vii) All other information, which could contribute to clarify the overall intent of the facility and work-scope of the project, shall be forwarded.
- (viii) List of contractors being considered for the contract award shall be forwarded to DPR.

Document submitted shall be prepared using the SI units.

In the event of any modification on the approved work-scope / concept, an approval must be obtained for the change.

The Department shall participate in all technical bid evaluation reviews for surface facility development projects (DPR accreditation). The operator shall therefore give notice of technical bid review meetings proposed for all surface facility development projects to the Department.

3.2.2 DETAILED DESIGN APPROVAL

The application for a detailed design approval shall be accompanied by the following, among others:

- (i) A draft Environmental Impact Assessment (EIA) report.
- (ii) A Hazard and Operability Studies (HAZOP) report.
- (iii) Approved for Construction (AFC) drawings with HAZOP items incorporated in the drawings.

Approved for Construction (AFC) Drawings forwarded shall include:

- Piping and Instrumentation Diagrams (P&ID) and Process Flow Diagrams (PFD), showing the detailed Material Balance and reservoir fluid chemical composition.
 - SAFE charts.
 - Cause & Effect Diagrams.
 - Electrical one-line diagram
 - General facility layout diagram
 - Safety equipment layout diagram
- (iv) List of companies being considered for the fabrication and installation activities in Nigeria with copies of companies' valid DPR accreditation permits.
 - (v) A Safety track record of the proposed Fabrication Company on similar jobs carried out in Nigeria.
 - (vi) Curriculum Vitae (CV) of the principal personnel of the proposed Inspection Company.
 - (vii) Quality Control / Quality Assurance plans of the Fabrication Company.

Participation of the Department at the following engineering milestone reviews is mandatory.

- Management review meetings
- P&ID review
- HAZOP review
- SAFE chart review
- Other Safety Reviews

For this purpose a minimum of four weeks notice shall be given to the Department.

Arrangements shall be made for the participation of the Department's representative at these reviews, and all relevant review documents shall be submitted for appropriate in-house review.

Should the operator desire to carry out model studies on either the facilities, construction materials or the scaled model of the facility itself, it shall notify the Department, four weeks before such studies are due to take place, giving information on the location and scope of the studies.

The Department shall reserve the right to participate in all aspects of the model studies and the subsequent data interpretation.

All engineering (Design work) activities are to be carried out in compliance with the provisions of the following relevant codes and standards:

- Procedure Guide for the Design, Construction and Commissioning of Oil and Gas Surface Facilities. (2000).
- Oil and Gas Pipeline Regulations (1995)
- Mineral Oil Safety Regulations (1997)
- Environmental Guidelines and Standards for the Petroleum Industry in Nigeria. (1999)
- Procedure Guide for the Determination of Quality and Quantity of Liquid Petroleum at Custody Transfer Points.
- API RP 2A, API RP 14C, NACE 0176, AWS DI. 1, API RP 14E, API RP 520, API RP 1104 and any other equivalent international codes and standards.

3.2.3 PRE-COMMISSIONING APPROVAL

This approval covers all the activities carried out in the phase of Construction, Fabrication, Erection, string tests and the introduction of hydrocarbon which normally precedes the Commissioning of any surface facility.

3.2.3.1 Fabrication

The company to be selected to carry out the fabrication and installation of any facility shall be duly accredited as stipulated in the (Petroleum Drilling and Production) Amendment Regulation 1988. Noncompliance shall attract appropriate sanctions.

All fabrication and welding procedures shall generally follow the relevant specifications in the under-listed documents or their internationally recognized equivalents.

- (i) American Welding Society-Structural Welding Code DI. 1-88 and its subsequent revisions.
- (ii) American Institute of Steel Construction (AISC) specification for the Design, Fabrication and Erection.

- (iii) API 1104, seventeenth and subsequent editions for welding of pipelines and related facilities.

The operator shall provide the Director with the following information before the commencement of fabrication:

- (i) The name of the contractor and the fabrication program.
- (ii) The yards in which the facilities would be fabricated.
- (iii) The arrangements made for the statutory monitoring of the various stages of the fabrication by officials of the DPR.
- (iv) The name and job references of the company appointed as quality control inspectors for the job and the curriculum vitae (CV) of its principal technical staff.

At the completion of fabrication, the quality control inspection company shall compile a report confirming that all materials used were strictly in accordance with approved specifications as verified through steel mill certificate and that all the processes of fabrication were in accordance with the approved standards and codes of practice. The report shall also include all equipment functional test carried out in the yard and test results as available.

The approved inspection method shall be by the non-destructive testing (NDT).

Consequently, inspection and certification of all welded parts of the structure shall be by any of the following techniques as applicable viz.:

- (i) Dye Penetrant Technique
- (ii) Magnetic Particle Technique
- (iii) Radiographic Technique
- (iv) Ultrasonic Technique

A comprehensive report of the inspection so carried out shall be forwarded to the Department through the operator.

3.2.3.2 Installation and Erection

These shall comprise the processed of load out and transportation to location and site erection. The methods and procedure to be used in carrying out these operation shall be in accordance with the provisions of the appropriate sections of API RP 2A and other relevant internationally recognized equivalent codes.

The Department shall be formally notified of, the confirmed date of completion of erection for the conduct of statutory pre-commissioning inspection.

3.2.3.3 Application for oil and gas facility operating permit.

Application for the above shall be lodged accompanied with the following document:

- (i) Fabrication inspection report as outlined in 3.2.3.1
- (ii) A brief outline of all the equipment functional tests and verifications carried out and performances results as available.
- (iii) Other pre-commissioning tests and verifications carried out on the structures and its ancillary facilities. A pre-commissioning inspection of the facility shall be carried out as the final statutory technical verification exercise before the grant of approval for the operational commissioning of the facility.

3.3 ENVIRONMENTAL PROTECTION

3.3.1 NOISE

Noise level at any point of the facility emanating from the engines and fluid velocities in the pipelines shall not exceed 85 dB. It mean tolerable limit.

In areas of the facility where this level is exceeded, wearing of earmuff shall be mandatory.

The noise level in living quarters shall not exceed 45 dB.

3.3.2 FLARING

Flare stack design shall generally conform with the provisions of API RP 14C and shall specifically ensure the following

- Maintenance of flame stability to avoid excessive and unnecessary flame extinguishments or blow out.
- Avoidance of flashback in the flare system.
- Complete combustion for smoke suppression.

Flare stack shall be located such that the maximum heat radiation exposure of personnel complies with the stipulations of the National Environmental Guide for the Petroleum Industry. (640 KW/hr.m²)

3.3.3 SAFETY SHUT-DOWN SYSTEMS

Initiation of an ESD should activate audible and visual alarms at the main control point.

Alarms should be displayed in such a way that the location and the source of initiation of the ESD can be readily identified at the main control point. Power supplies for the ESD logic system should be arranged such that automatic changeover to a standby supply is available in the event of failure of the normal supply.

3.3.4 HYDROCARBON CONTAINMENT

The facility shall be equipped with adequate provisions for the containment and handling of spillage and potential contaminants

3.3.5 DRAINAGE.

The facility shall be configured in such a way that there will be an efficient drainage and system with adequate provision for handling and disposing drained liquids in accordance with the Environmental Guideline and Standard for the Petroleum Industry in Nigeria.

3.3.6 EFFLUENT HANDLING

The facility shall be equipped with adequate effluent treatment systems to achieve the specifications contained in the environmental guidelines and standards issued by the department.

3.3.7 ATMOSPHERIC VENTING

In the event where it is operationally necessary to vent any hydrocarbon carrying vessels into the atmosphere, venting shall be safely done through flame/spark arrestors to area that are considered safe.

3.4 SAFETY CONSIDERATIONS

3.4.1 ESCAPE ROUTE

There shall be provided a minimum of two (2) escape routes from each area of the facility that is continually manned and these routes shall be clearly marked with arrows and illuminated exit signs at strategic locations on the facility. All escape doors shall open outwards.

3.4.2 SHUT DOWN PHILOSOPHY

All emergency shut down and alarm systems shall have a dual actuation device, preferably of independent pneumatic or electric type trigger systems or of other acceptable fail-safe designs.

3.4.3 LIGHTNING PROTECTION DEVICES

The facility shall be provided with adequate lightning protection.

3.4.4 FIRE AND GAS DETECTION

Fire detection system shall be provided at strategic points of any facility. The system should be capable of indicating the presence of a fire both audible through an alarm and visibly at a control point or t any point which is continually manned.

Gas detection and fire alarm systems shall generally be provided at strategic points for all facilities.

3.4.5 FIRE FIGHTING

All facilities shall be provided with necessary fire fighting equipment for possible containment of fire accidents.

Minimum fire fighting requirement to be provided shall be made up of the following:

Fire monitors strategically positioned

Automatic fire deluge for process areas and separators

Auto CO2 flood

Dual agent hose reel skid, Aqueous film forming fluid (AFFF) hose reel and dry chemical extinguishers where relevant in accordance to the Underwriters Laboratories (UL) specifications.

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