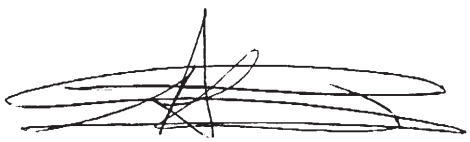
GUIDELINES FOR
EXTENDED WELL TEST (EWT)
IN NIGERIA PETROLEUM INDUSTRY 2019

FOREWORD

The Department of Petroleum Resources (DPR) is empowered by the Provisions of Sections 38 and 44 of the Petroleum Act (CAP P10) Laws of the Federation of Nigeria 2004 to provide Operators with appropriate guidance on statutory requirements to apply and carry out Extended Well Test (EWT) in the Nigerian Petroleum Industry. An Extended Well Test (EWT) is carried out with realistic and definable objectives to obtain essential reservoir rock and fluid parameters required to characterize the reservoir fluid and formation for effective hydrocarbon asset development and depletion plan. This ensures optimal ultimate recovery with minimal adverse impact to people and the environment.

This is the first edition of the Guidelines on Extended Well Test (EWT). The Department of Petroleum Resources shall ensure its implementation to entrench good oil field practices and optimize hydrocarbon recovery for the benefit of all stakeholders.



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THE DIRECTOR OF PETROLEUM RESOURCES

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1.0 INTRODUCTION

Optimal development and exploitation of hydrocarbon resources requires a robust field development and depletion plan, which in turn, requires quality reservoir rock and fluid characterization data. These data are more often obtained through a carefully planned extended well testing and interpretation.

Extended well test here-in after known as "EWT" is a method by which a well is tested over a long period of time to obtain pertinent reservoir and production parameters that are essential for the field development to ensure effective and efficient production of the ultimate recoverable hydrocarbon reserves. The Department of Petroleum Resources considers any well test on continuous flow duration for more than two calendar weeks to be an extended well test.

The DPR may approve extended well test to be carried out during exploration, appraisal or production phases of a field if the Department considers such to be technically justifiable. The Department, therefore, reserves the right to withhold or refuse approval of an extended well test, if the proposed Extended Well Test is not targeted primarily to address the reservoir characterization for reserves production uplift or fails to demonstrate any economic value-addition in hydrocarbon recovery.

The Department of Petroleum Resources is empowered by the Provisions of Sections 38 and 44 of the Petroleum Act (CAP P10) Laws of the Federation of Nigeria 2004 to provide Operators with appropriate guidance on statutory requirements to apply and carry out Extended Well Test (EWT) in the Nigerian Petroleum Industry. An Extended Well Test (EWT) is carried out with realistic and definable objectives to obtain essential reservoir rock and fluid parameters required to characterize the reservoir fluid and formation for effective hydrocarbon asset development and depletion plan. This ensures optimal ultimate recovery with minimal adverse impact to people and the environment.

This first edition of the Guideline seeks to set out rules and procedures for the effective execution of extended well test (EWT) in Nigeria for improved oil field recovery. The issuance of this Guidelines will therefore control indiscriminate well testing without proper definition of the objectives, type and duration.

The issuance of these Guidelines does not in any way absolves the Operator or licensee from compliance with other relevant legislation/ regulation(s).

These Guidelines shall be reviewed, and amendments issued as at and when necessary.

1.1 GUIDELINES DEFINITION AND PURPOSE

(a) Extended well test (EWT) is a field operation carried out on a well over a long period of time to obtain pertinent reservoir and production parameters that are essential for a robust field development to ensure effective and efficient production of the ultimate recoverable hydrocarbon reserves. The Department of Petroleum Resources considers any well test on continuous flow duration of more than two calendar weeks to be an extended well test.

(b) The purpose of this document is to provide a reference material and authorized document guiding the process and execution of Extended Well Test in Nigerian oil and gas industry.

1.2 LAWS AND REGULATIONS

Extended Well Test is the statutory responsibility of the Department pursuant to the Provisions of Section 44 of the Petroleum (Drilling and Production) Regulations and Section 9 of the Petroleum Act (CAP P10) Laws of the Federation of Nigeria 2004 which states as follows:

Section 44 *The Director, Petroleum Resources may give such directions as may in his opinion be necessary from time to time to ensure the proper exploitation of petroleum and to encourage good conservation practices in any licensed or leased lands; and the licensee or lessee shall comply with any such directions which affect him.*

Section 9 Regulations

(1) *The Minister may make regulations –*

(a) *Prescribing anything requiring to be prescribed for the purposes of this Act;*

(b) *Providing generally for matters relating to licenses and leases granted under this Act and operations carried thereunder, including –*

(i) *Safe working;*
(ii) *The conservation of petroleum resources;*
(iii) *The prevention of pollution of water courses and the atmosphere;*
(iv) *The making of reports and returns (including the reporting of accidents);*
(v) *Inquiries into accidents;*
(vi) *The keeping and inspection of records, books, statistics, accounts and plans;*
(vii) *The measurement of production, and*
(viii) *The measurement of crude oil delivered to refineries*

(c) *Regulating the construction, maintenance and operation of installations used in pursuance of this Act;*

(d) *Regulating refineries and refining operations, and, where two or more refineries are in operation, specifying –*

(i) *The proportion or quantity of crude oil to be supplied to each refinery,*
(ii) *The share of each refinery in the total market, and*
(iii) *The prices of refinery products;*

(e) Regulating the importation, handling, storage and distribution of petroleum, petroleum products and other flammable oils and liquids, and in particular (without prejudice to the generality of the foregoing)-

(i) Prohibiting the importation or exportation of petroleum or petroleum products except at specified ports or places;

(ii) Prescribing the notice to be given (and the person by whom the same shall be given) on the arrival at a port of a ship carrying petroleum or petroleum products as cargo;

(iii) Defining dangerous petroleum and dangerous petroleum products, prescribing anchorages for ships carrying dangerous petroleum or dangerous petroleum products as cargo and requiring those ships to proceed to and remain at those anchorages;

(iv) Regulating the loading, unloading, transport within a port, landing, trans-shipment and shipment of petroleum and petroleum products;

(v) Providing for the licensing of lighters and other craft to carry petroleum and petroleum products within a port;

(vi) Prescribing conditions and restrictions to be imposed upon vessels arriving at a port after having carried petroleum, petroleum products, dangerous petroleum or dangerous petroleum products;

(vii) Providing for the examination and testing of petroleum and petroleum products, and prescribing the tests to be applied to ascertain its flash point and the method of applying those tests; and

(viii) Subject to subsection (2) of this section, regulating the transport of petroleum and petroleum products, prescribing the quantity of petroleum and petroleum products which may be carried in any vessel, cart, truck, railway wagon or other vehicle, the manner in which they shall be stored when being so carried, the receptacles in which they shall be contained when being so carried and the quantities to be contained in those receptacles , and providing for the search and inspection of any such vessel, cart, truck, railway wagon or other vehicle;

(f) Conferring or imposing on public officers for the purposes of this Act powers and duties additional to those conferred or imposed by section 8 of this Act;

(g) Where paragraph (a) of this subsection does not apply; prescribing –

(i) Forms to be used for the purposes of this Act, and

(ii) Fees to be charged in connection with the operation of this Act (including, without prejudice to the generality of the foregoing, fees for the giving of any permission by the Minister and for the supplying of any document or other material, the carrying out of any examination and the doing of any other thing by him); and

(h) Providing for such other matters as in his opinion may be necessary or desirable in order to give proper effect to this Act.

(2) Regulations made under subsection (1)(e)(viii) of this section shall apply only where petroleum or petroleum products are being transported –

On the waters mentioned in item 36(a) and (b) of Part I of the Second Schedule to the Constitution of the Federal Republic of Nigeria 1999; or

(a) By railway or transport ancillary thereto; or

(b) On trunk roads within the meaning of item 62 of that Part of that Schedule.

[Second Schedule, Cap.C23]

2.0 DEFINITION OF TERMS

"DPR" means The Department of Petroleum Resources which is the Regulator of the Nigerian Oil & Gas industry.

"Extended Well Test (EWT)" means a method by which a well is tested over a long period of time to obtain pertinent reservoir rock and fluids parameters that are essential for the field development to ensure effective and efficient production of the ultimate recoverable hydrocarbon reserves. The Department of Petroleum Resources considers any well test on continuous flow duration of more than two calendar weeks to be an extended well test.

"Crude Oil Sales Agreement (CSA)" means an agreement between the producer (Seller) of crude oil and buyer for the offtake of the produced crude oil under specified sets of conditions. It also includes an agreement between a producer of crude oil and a third party contracted to sell the produced crude oil on behalf of the producer.

"Crude Oil Handling Agreement (CHA)" means an agreement between a producer and owner of facilities for crude oil evacuation (pipeline network or terminal) for the evacuation of produced crude oil from the field of production to the custody transfer point.

"Crude Oil Assay" means an evaluation carried out to determine the specification of a sample of crude oil used by refiners, traders, and other interested parties to establish the value of the crude oil with respect to its expected component product yield in refining process.

"Drill Stem Test (DST)" means an operation carried out to isolate and test a geological formation during the drilling of a well to determine the pressure, permeability and productive capacity of a well.

"Modular Dynamic Tester (MDT)" means a tool for the measurement of formation pressure and temperature as well as reservoir fluids.

"Pressure Transient Analysis (PTA)" means an assessment test carried out to determine the performance of a wellbore by measuring the pressure and flow rate in the wellbore.

"**Stabilized Flow"** means a flow condition which occurs only when the wellhead pressure and flow rate remain relatively constant for a given period of time during a well test.

"**Composite Well Test"** means a non-extended well test for which the continuous flow does not exceed a period of two calendar weeks, with provision for extension to an Extended Well Test duration.

3.0 PURPOSE OF EXTENDED WELL TEST

(a) The long flow time during the EWT allows for complete well clean up and the measurement of important reservoir parameters like the permeability farther away from the wellbore and semi steady state productivity index. In particular, an EWT is helpful in testing and confirming reservoir continuity, reservoir boundaries, presence of aquifer and or gas cap which has critical importance for well placement, well count, pressure support planning, overall hydrocarbon recovery performance, proved reserves categorization and development project economics.

(b) A reservoir is required to be produced at a constant rate for a long period so that its entire drainage area is affected by the pressure disturbance, which produces a constant change in pressure with time at all radii. This constant pressure change results in parallel pressure distribution across the reservoir resulting in a corresponding constant rate distribution. This is Pseudo-steady-state flow, which occurs at late time obtainable during EWT and required to determine the reservoir extent.

(c) EWT is generally intended to gather enough and detailed reservoir information that will be used to establish the reservoir behavior, assess the productivity and economic viability of a field.

(d) EWT test is also necessary to reduce geological uncertainties and possible attendant development difficulties and financial risks that might come up during the development phase of the field.

(e) The purpose of analyzing extended flow data under finite acting behaviour is to determine the reservoir limit, pore volume and original oil in-place. The objective here is to quantify the pore volume, which is of economic significance. This analysis is only applicable for long duration test when the well is flowing.

(f) EWT is used during production phase to evaluate the impact of a new concept, method or technology on well production within the allowable period of the test as a guide to proper decision on the new development.

(g) Other reasons for EWT may include but not limited to:

(i) determine well deliverability

(ii) evaluate flow efficiency

(iii) characterize formation damage and other sources of skin effect

(iv) determine reservoir pore volume

(v) calculate and confirm initial in-place volumes as input for reservoir simulation.

(vi) obtain representative fluid samples suitable for PVT analysis

(vii) evaluate quality of completion

(viii) evaluate workover & stimulation candidates.

(ix) evaluate reservoir parameters; average pressure in drainage area, vertical/horizontal permeability and gas/oil contacts.

(h) Extended well test may not be necessary if there is sufficient data, including but not limited to near wellbore data from previous production tests, which could be used to assess field economic viability, reservoir characteristics, reservoir continuity, reservoir boundaries, presence of aquifer and or gas cap, well placement options, well count planning, pressure support planning, overall hydrocarbon recovery performance and proved oil/gas reserves.

4.0 APPLICATION FOR EXTENDED WELL TEST

Application for permit to carry out EWT shall be made in writing to the Director of Petroleum Resources at least twenty-one (21) working days before the date of commencement of the operation, stating the objectives of the test and providing relevant documents in support of the application.

The Operator of an Oil Mining Lease (OML) or Oil Prospecting License (OPL) shall ensure that no reservoir, sand is put to test or opened for production unless due approval has been obtained from the Director of Petroleum Resources.

An application for EWT must contain and satisfy the following requirements:

(a) Extended well test can only be considered for a well on which some preliminary tests such as drill-stem or deliverability tests have previously been conducted.

(b) Analyzed result(s) of previous well tests.

(c) If there are doubts on whether an extended test is necessary, the applicant may be required to apply for a Composite Well Test that uses the result of the non-extended test as a condition precedent in the test programme to continue the well testing over an extended period. The result obtained from non-extended well tests shall be analyzed immediately and shall form the basis for the extension of the well test duration to an Extended Well Test. For the purpose of this section, a Composite Well Test is a non-extended well test for which the continuous flow period does not exceed a period of two calendar weeks, with provision for extension to an Extended Well Test duration.

(d) Evidence of payment of the processing fee of $5,000.00 per reservoir; payable to Federal Government Treasury Single Account (TSA) via the "Remitta Platform" or any other payment method as may be stipulated by the Federal Government of Nigeria.

(e) Proposed Extended Well Test programme.

(f) The Operator shall indicate how it intends to handle the volume of the reservoir fluids (water, oil and gas) that will be produced during the test and shall therefore, provide:

i. Means of crude oil evacuation,

ii. Health Safety & Environment (HSE) Plan for the proposed test,

iii. Signed Crude Handling Agreement (CHA) and a signed Crude Sales Agreement (CSA) with third party (for Operators that lacks the necessary crude evacuation & sales facilities and depends on third party provision)

(g) List of all hydrocarbon fiscal measuring, storage and evacuation devices (Meters, tanks and barges etc) to be deployed during the test along with their calibration and proving reports.

(h) Produced water management plan.

(i) For a field that does not have any nearby facilities to handle/store produced oil, an approval for appropriate evacuation plan is expected to have been obtained from DPR's Downstream Division and evidence provided prior to this application.

(j) Proposed Gas utilization plan.

(k) List of proposed Extended Well Testing equipment and layout shall be submitted along with the application and site visit by DPR's nominees for physical inspection and confirmation of the facilities may be required.

(l) For EWT of a producing field meant to evaluate the impact of a new concept, methods and or technology on production, the applicant is required to present the underlying theory and functional principles of the new method or technological device to the Department in the form of training, factory visit and /or technical workshop presentation subject to DPR's discretion. The applicant is required to provide the report of Hazards identification & operability (HAZID, HAZOP) and Failure Mode Effect & Criticality Analysis (FMECA) conducted on the new technological device and duly endorsed by DPR representative(s) who participated in the exercise where necessary.

4.1 EWT AND MULTIPLE STRINGS/RESERVOIRS

EWT approval cannot be granted to more than a string producing from the same reservoir at the same time. If there are doubts in hydrodynamic connectivity/continuity of reservoirs, approval for EWT shall be granted to only one string producing from the supposedly different reservoirs while other strings will serve as control and observation points to ascertain the hydrodynamic connectivity/ continuity of the reservoirs.

4.2 CONTENT OF EWT APPLICATION

EWT application shall contain the following:

(i) **General Data:** Name and Number of well, Well History, Location of OML/OPL, Coordinates.

(ii) **Status of previous data acquisition (CORE, DST & PVT):** A summary of previous data acquisition from the asset in the form of Core, DST and PVT analysis should be presented.

(iii) **Completion Data:** Well completion approval and Well Completion Diagram should also be submitted. This should include size and location of casing and tubing, location of any packers and the depth where pressure is to be measured. Completion intervals proposed for testing should be clearly stated.

(iv) **Reservoir Data:** The target reservoir interval for testing, a BHP measurement program for both flowing and static pressures must be indicated. Summary of the description of reservoir properties (porosity, permeability, saturation) and reserves estimate are required.

(v) **Fluids/Rate Data:** The simulated/expected rate in which the well is to be tested, fluids properties including API gravity should be stated.

(vi) **Pattern Data:** Pattern data should include pattern size and shape, and information about location of other wells (where applicable)

(vii) **Subsurface/Surface Piping:** Application should include structural map of the target reservoir, surface piping layout map and fluid disposal routes.

4.3 EWT EQUIPMENT/ TEST CRUDE OIL EVACUATION FACILITIES:

(a) The operator shall ensure that all equipment required for the Extended Well Test (EWT), such as Mobile Testing Unit shall have prior approval and certification for use by the Department of Petroleum Resources. Such facilities shall include but not limited to the following:

a) Flow rate measurement devices
b) Pressure measurement devices
c) Thermometers
d) Fluid sampling equipment
e) Line heaters
f) Separation facilities
g) Storage facilities

(b) (i) The equipment used should be able to safely control well pressure such that, downstream of the well testing manifold is sufficiently protected against overpressure.

(ii) The operator shall also ensure that any equipment used for EWT in an offshore location should have an Emergency Shut-in Valve that may be operated from the surface and automatically closes during emergency to prevent uncontrolled well flow.

5.0 EWT PLAN AND PROCEDURE

Prior to the commencement of extended well test, the Operator should be able to demonstrate to the DPR that all equipment is fully operational. The responsibility for ensuring that the systems are correctly tested and functional lies with the Operator. The following procedure should be followed:

(i) Prior to the start of EWT, the Operator must designate within their organization, a staff that will co-ordinate the testing procedure.

(ii) Critical flow should always be maintained across the choke during the test.

(iii) The separator flowmeters should be calibrated prior to the test.

(iv) Pressure test equipment should be examined prior to test and the equipment certification including traceability of components, data books and service records must be up to date.

(v) Instrument calibration should also be done in the presence of DPR. Prior Calibrations of the flowmeters in the test separator should have been done. Should significant differences exist between the site check and the main calibration, a full re-calibration should be undertaken.

(vi) Each part of the system should be pressure tested to a pressure in excess of the maximum expected pressure that the equipment will experience during the test but must not exceed the pressure rating of the particular piece of equipment.

(vii) An optimum operating pressure envelope for the test separator may be determined taking into consideration expected upstream choke pressure, crude oil stabilization requirements, intake pressure requirement of test facilities downstream the test separator, design pressure of separator and other considerations related to safety

(viii) At higher pressures, up to the maximum operating pressure of the separator, the choke becomes redundant. Critical flow should be maintained at the choke to avoid flow through the separator to the pressure gauges to obtain quality test data.

(ix) Except otherwise directed, the Director of Petroleum Resources or any officer(s) designated by him/her shall be present during an Extended Well Testing to ensure adequate data acquisition in line with the Checklist of **Appendices A & B**.

6.0 EWT DATAACQUISITION AND SAMPLING

6.1 EWT DATA ACQUISITION

Extended well test involves the testing of a well for a long period with intermittent shut-in to obtain pressure and rate information. It therefore consists of the drawdown and buildup test phases.

(a) **DRAW-DOWN:** It involves the continuous measurement of flowing bottom hole pressure at gauge depth while the well is flowing. A pressure drawdown test is simply a series of bottom-hole pressure measurements made during a period of flow at constant producing rate. Usually the well is shut-in prior to the flow test for a period sufficient to allow the pressure to equalize throughout the formation, i.e., to reach static pressure. Important reservoir parameters can be determined by flowing a well at a constant rate while measuring the wellbore pressure as a function of time. This is called drawdown testing and it can utilize information obtained in both the transient and pseudo-steady-state flow regimes.

The purpose of the drawdown testing is to determine the reservoir characteristics that will affect flow performance.

(b) **BUILD-UP:** It involves the continuous measurement of flowing bottom hole pressure at gauge depth while the well is shut-in. Pressure buildup testing requires shutting-in a producing well while recording the resulting increase in the wellbore pressure as a function of shut-in time. The most common and simplest analysis techniques require that the well produce at a constant rate for a flow period, either from startup or long enough to establish a stabilized pressure distribution, before shut in.

(c) The major information derived from pressure draw-down and build-up test are Reservoir limit and shape**,** Permeability, Fracture length, Skin and Reservoir pressure. The general data checklist for extended well test is shown in **Appendix A** as a guide to complete data acquisition.

(d) Horizontal permeability is normally calculated from the bottom-hole pressure response measured by down-hole pressure gauges. This Guideline, in line with global field practices recommends the calculation of permeability from pressure build-up with shut-in carried out after a period of stable flow. Horizontal permeability obtained from the test shall be compared with permeability derived from core data (if available).

(e) The initial reservoir pressure can be measured by MDT or RFT and can also be measured from an initial build-up period after a short flow at the beginning of the test. Reservoir pressure is also calculated from build-ups following later flow periods. All these globally recognized methods of estimating initial reservoir pressure are acceptable. Any other method proposed by an operator shall be demonstrated to the Department to be more or at least of commensurate accuracy with the known methods.

6.2 SAMPLING

Collection of representative hydrocarbon fluid samples is very important in an extended well test operation. Results from the analysis of these samples shall be used for the following purposes:

(i) Pressure-Volume-Temperature (PVT) analysis
(ii) Pressure Transient Analysis (PTA)
(iii) Estimation of in place volumes and recoverable reserves
(iv) Evaluation of development and artificial lift strategies
(v) Sizing of permanent production facilities
(vi) Confirming reservoir pressure support requirements.
(vii) Crude Oil Assay

6.3 SAMPLING QUALITY:

The quality of samples collected is crucial to the accurate evaluation of the fluid property. Representative samples can be collected as follows:

(i) Down-hole sampling using electric line, or slick-line conveyed samplers.

(ii) Collection of monophasic samples upstream of the choke manifold.

(iii) Collection of recombination samples from the test separator.

(iv) Collection of dead oil crude samples in the tanks for crude assay.

(v) Any other sampling method as may be approved by the Director of Petroleum Resources

7.0 DURATION OF EWT

(a) A reservoir flow stabilization period is a critical factor to determine the length of time required for extended well test operations. This may be inferred from analysis of previous pressure transient tests together with available geological interpretation from seismic and other well data. If such information is not available, it may be assumed that the well will behave in a manner similar to neighboring wells in the same pool, for which the data are available. In this case, the test duration can be derived from such analogue wells provided that the Radius of Investigation are equivalent.

(b) The radius of investigation has several applications in extended well test analysis and design. The radius-of-investigation concept provides a guide for well-test design because it allows for the estimation of the time required to achieve the desired depth of investigation in a formation. It also provides a means to estimate the time required to achieve "stabilized" flow; that is, the time required for a pressure transient to reach the boundaries of a tested reservoir. For oil wells, time to reach pseudo-steady state normally is in the order of a few days to months. Where possible, the radius of investigation method shall be used to estimate the appropriate test duration for EWT using suitable models.

(c) Without prejudice to 7(a) & 7(b) above and in order to ensure uniformity and fairness in the application of this Guideline, the duration of an extended well test shall be a maximum period of three (3) months in the first instance, renewable for another maximum three (3) month period.

8.0 EXTENDED WELL TEST REPORT

8.1 INITIAL EWT REPORTS

The operator shall submit daily, weekly and monthly well test report to the Department of Petroleum Resources. The daily & weekly report shall provide a summary of the well test operations for the preceding day or week, details of the current operations and the planned work for the ensuing day or week in line with the general EWT planned operations. The daily, weekly and monthly well test report shall be in the format shown below:

PERIODIC REPORT OF EWT RESULTS:

Service Contractor: **Date:** **Block:**

Field Name: **Well Name:** **Interval Tested:**

A) Summary of Operations from……. to…….. (Hrs): On……..(Date)

(i)
(ii)
(iii)

B) Production Details (to include the following):

B	Production Details (to include the following):											
Date	Choke (64ths)	THP (psig)	THT (^{o}F)	Psep (psig)	Tsep (^{o}F)	Oil (bopd)	Gas (MMscfd)	GOR (SCF/STB)	Water (bwpd)	Cumulative Oil (bbls)	Cumulative Water (bbls)	Cumulative Gas (MMscf)

C. Additional Information

Sample information (source, sampling time and condition, results - gravity, density, salinity, pH, resistivity at stated temperature). Bottom hole pressures and temperatures.

Quick look result interpretations. BSW, H_2S, CO_2, gas gravity, oil density, cumulative volumes produced.

8.2 FINAL EWT REPORT

i. A final EWT report should be submitted at most twenty-one (21) days after the well test is completed. The final well test report should include input from all the professionals involved in the EWT operation and the well test analysis, including Petro-physicists, Geologists, Test Engineers / well site Petroleum Engineers as well as the Reservoir Engineers. The report should contain detailed account of the test exercise, especially with respect to the operations (Operational summary with details of equipment performance), formation evaluation, pressure analysis, production accounting and general results analysis in line with the test objectives. It shall state key observations and make useful recommendations to improve the management of the tested assets.

ii. The following should be incorporated into the final well report:

- The location of the well
- The test duration (clearly stating the test startup & end dates)
- Zones flowed and not flowed
- List of the test objectives and their achievement status with the test.
- Formation Evaluation Results
- Log Interpretation Results
- RFT Pressure Results
- Summary of Well Test Results
- Analysis of EWT and Detailed Result
- Conclusions and Recommendations

Please see Appendix C for graphical guide to final EWT Reporting.

9.0 REQUIREMENTS FOR THE RENEWAL OF APPROVED EWT.

Application for the renewal of an Extended Well Test may be considered for another three months upon fulfilment of the following requirements:

i. A written application to the Director of Petroleum Resources requesting for the extension of the approved EWT and stating the justification for the extension.
ii. Submission to the Department a full report of the EWT which shall include analyses of draw down/build- up test and total volume of crude oil from test for review.
iii. The applicant makes a technical presentation to the Department on the completed test providing justifications for the renewal of the test
iv. Provision of evidence of payment of royalty and all necessary taxes on produced volume of hydrocarbon from the previous test.
v. Provision of evidence of payment for penalty of any gas flared.
vi. Payment of renewal application fee of ten thousand US Dollars (₦10,000.00) only.
vii. Any other documents as may be required by the Director of Petroleum Resources

10.0 SANCTIONS

(a) It should be noted that the approval for an extended well test along with the associated equipment for disposal of the reservoir fluids namely water, oil and gas is not an approval to commence full production in the particular field. Therefore, any production beyond the approved EWT period is an infringement of this Guideline as stipulated in 10.0(c) below.

(b) It should further be noted that approval to carry out Extended Well Test is different from the approval of Field Development Plan (FDP) which is a framework on how a field is intended to be developed and produced, usually granted by DPR prior to the drilling of development wells in accordance with Section 37 of the Petroleum (Drilling & Production) Regulations, 1969 as amended. Therefore, producing the field after the EWT without an approved FDP is a violation of Extant Regulations.

(c) At the end of EWT, the Operator is required to obtain approval for FDP and Technical Allowable Rate from the Department to be able to commence full scale production status for the field or reservoir. Any production beyond the approved time limit or any EWT conducted without approval from the DPR constitutes an infringement of this Guideline. The defaulting Operator shall forfeit the volume of crude produced during the period of violation or its monetary value equivalent to the Federal government of Nigeria.

Appendix A: *The general data requirement for extended well test*

Well completion data	Rate Data	Pressure Data	Pattern Data	Testing Equipment & Disposal System
•This should include size and location of casing and tubing, •location of any packers. •well Completion schematic •Sand control mechanism in-place	•Spot checks on the rate for several days before testing. Rate should be stabilized before testing. •Record detailed description of the rate behavior during testing. •record rates and properties of all fluids flowing at the well.	•Gauge should be run to the depth where pressure is to be measured. •Continuously recorded bottom-hole measurements are usually essential to good well test analysis. •Trends before testing •wellbore storage data. •Pressure just before testing—record the pressure observed just before the test is started. •Skin factor calculations and log-log plots depend on this information. •dynamic & static pressure data	•Such data should include pattern size and shape, and information •about location of other wells.	•To explain test behavior, one should include a diagram of wellhead •and surface piping. •Fixed or Mobile testing equipment which should include. •Metering system •Sampling devices •Fluid disposal route

Appendix B: *Checklist of reported data from Extended Well Test*

S/N	DATA	SUBMITTED	NOT SUBMITTED
1	GENERAL DATA		
2	CORE, DST & PVT		
3	RESERVOIR DATA		
4	RATE DATA		
5	PATTERN DATA		
6	SUBSURFACE/SURFACE PIPING		
7	PRESSURE MEASUREMENT		
8	EWT EQUIPMENT/DISPOSAL FACILITY		

REMARKS/RECOMMENDATIONS……

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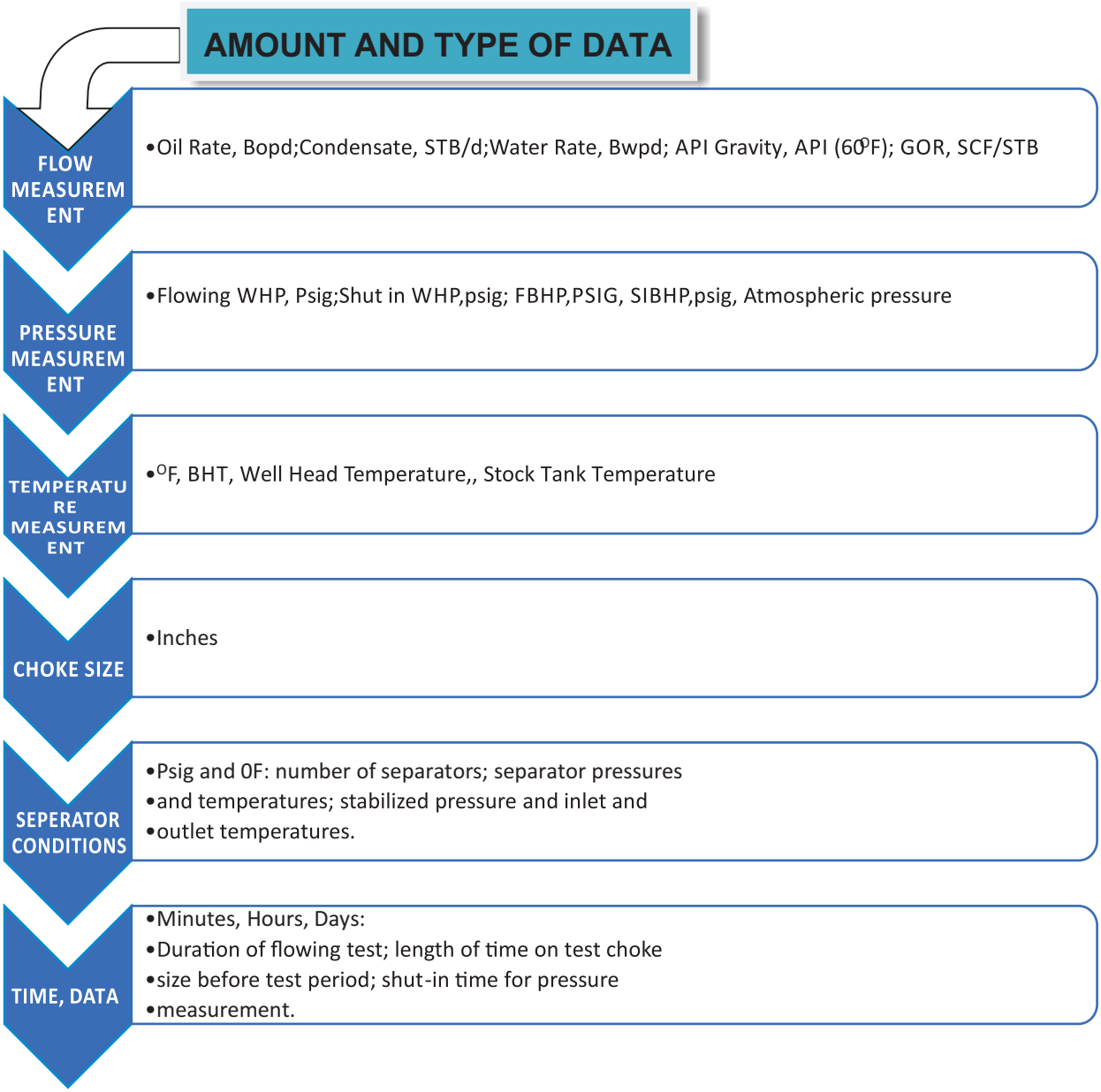
Appendix C: *Graphical Guide to Reporting EWT*



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