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Volume 6: Drilling Guideline



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This guideline sets out the approach the Authority is likely to take, taking into account that each application will be assessed on its fact, case-by-case.

This guideline will be reviewed by the Authority from time to time, and amended as appropriate in light of further development, changes in law or practice.

this guideline is supplemental to and not a substitute for any law or regulation, and does not constitute legal advice.

Table of Contents

Abbreviations5

1. Introduction6

2. Authority Approvals7

 2.1 Health, Safety and Environment 7

 2.1.1 Environmental Impact Assessment (EIA) 7

 2.1.2 Safety Case – COMAH 7

 2.1.3 Radioactive Source Lost in Hole – RPO/SHENA..... 7

 2.2 License and Permits 7

 2.2.1 Use of Land for Onshore Drilling 7

 2.2.2 Samples Export..... 7

 2.2.3 Use of Synthetic Oil-Based Mud 7

 2.2.4 Explosives 7

 2.2.5 Disposal of Waste..... 8

3. Well Operation NOWO9

 3.1 Public Notification..... 9

 3.2 Geohazard Survey 9

 3.3 Drilling / Logging Well on Paper..... 9

4. Recording and Reporting10

 4.1 Notice of Rig Mobilization, Arrival and Release..... 10

 4.2 Management of Change (MOC) 10

 4.3 Reporting and Documentation 10

 4.4 Supporting Documents 10

References.....11

Appendices12

 Appendix A 13

 Appendix B 15

 Drilling Program 15

 Daily Drilling Report 17

 Operational Lookahead Forecast Report 17

 Daily Geological Report..... 18

 End of Well Drilling Report..... 18

Abbreviations

In this guideline, the following abbreviations are referred:

JASTRE	<i>Jabatan Alam Sekitar, Taman dan Rekreasi</i> (Department of Environment, Parks and Recreation)
COMAH	Workplace Safety and Health (Facilities) (Control of Major Accident Hazards) Regulations
EIA	Environmental Impact Assessment
EPMO	Environmental Protection and Management Order 2016
LBD	Local Business Development
NOWO	Notification of Well Operations
PMA	Petroleum Mining Agreement
PSA	Production Sharing Agreement
RPO	Radiation Protection Order
SHENA	Safety, Health and Environment National Authority
DFE	Drill Floor Elevation
BOP	Blow Out Preventer
SIMOPS	Simultaneous Operations
SIPRODS	Simultaneous Productions
CPRA	Concurrent Production and Rig Activities
FIT	Formation Integrity Test
LOT	Leak Off Test
MWD	Measurement While Drilling
LWD	Logging While Drilling
NPT	Non-Productive Time
DGR	Daily Geological Report
DDR	Daily Drilling Report
MD	Measured Depth
TVD	True Vertical Depth
AFE	Authorization for Expenditure
BHA	Bottom Hole Assembly
POB	Personnel on Board
ILT	Invisible Lost Time

1. Introduction

The purpose of this document is to provide guidance to the Oil and Gas Operators in Brunei Darussalam in Drilling and Well Operations throughout the stages of exploration-appraisal-development in both onshore and offshore blocks in Negara Brunei Darussalam which includes the regulatory requirement before, throughout and after the drilling operation. Additionally, this document will assist the Operators to prepare the required documentations and submission to the Authority and relevant stakeholders. The Authority shall have the right to be actively involved in all phases of the Operator's planning, preparation and execution of well drilling activities.

All Operator are strongly advised to follow good industrial practices to ensure the safety and successful executions of any drilling activities which adhere to the laws, rules and regulations that are effective in Brunei Darussalam. Operators are fully responsible in any drilling activities as agreed by Authority.

2. Authority Approvals

2.1 Health, Safety and Environment

2.1.1 Environmental Impact Assessment (EIA)

The Operator shall conduct an Environmental Impact Assessment (EIA) and submit it to relevant stakeholders for approval prior to commencement of any drilling activities.

2.1.2 Safety Case – COMAH

The Operator shall submit a Safety Case for the facility as required by the COMAH Regulations and not to operate the facility unless the Operator has a Safety Case Certificate from the SHENA.

2.1.3 Radioactive Source Lost in Hole – RPO/SHENA

In the event any radioactive source could not be retrieved safely after several attempts, written notification with justifications shall be made to the relevant stakeholders of the intent to abandon a radioactive source¹.

2.2 License and Permits

2.2.1 Use of Land for Onshore Drilling

The Operator shall seek approval from the relevant stakeholder to use and access of land for onshore drilling. This includes application of permits to restricted area or non-permitted sites and permission or agreement to any affected private residential area.

2.2.2 Samples Export

Operator shall submit application for approval to the Authority at least **two (2) months** prior exporting samples

2.2.3 Use of Synthetic Oil-Based Mud

Any use of oil-based mud (i.e. synthetic oil-based mud) during drilling operation shall seek approval from the relevant stakeholders (align with EPMO requirement).

2.2.4 Explosives

The Operator shall make necessary engagement with the relevant stakeholders and/or government agencies (refer to Appendix A) for the obtaining of explosives permit(s) handling and disposal of explosives

¹ In the case of the operator intent to abandon a well, submission of the proposed Well Plug and Abandonment Program to the relevant team from the Authority is to be undertaken prior to approval of the said programme as stipulated in Volume 11: Decommissioning & Restoration Guideline.

2.2.5 Disposal of Waste

Waste disposal from drilling operations shall be in compliance with approved EIA and Combined Operation Safety Case (COSC).

3. Well Operation NOWO

The Operator shall submit to SHENA the Notice of Well Operation (NOWO), as per COMAH regulations.

3.1 Public Notification

The Operator shall notify the Authority and relevant stakeholders within **fourteen (14) days** prior to commencement of well operations, including via mass media i.e. newspapers and national (RTB) broadcasts. A communication plan to address all the different stakeholders to the project shall be in place.

The plan should consist of:

1. Details
2. Schedule
3. Concerns

3.2 Geohazard Survey

In the event, there are no valid Geohazard Surveys conducted at the stipulated drilling area, Operator shall conduct Geohazard Survey as per requirement for NOWO submission for approval.

3.3 Drilling / Logging Well on Paper

Operators shall conduct Drilling Well on Paper (DWOP), or Logging Well on Paper (LWOP) as per good industrial practice and Operators to notify and submit to the Authority the presentation materials and outcome that will be presented to ensure alignment with the approved NOWO and Drilling Programme.

4. Recording and Reporting

4.1 Notice of Rig Mobilization, Arrival and Release

Notice of Rig Mobilization, Arrival and Release shall be prepared by the Operator and submitted in writing to the Authority and relevant stakeholders **at least two (2) days** prior to arrival and release of rig².

4.2 Management of Change (MOC)

During operations, the Operator may implement significant variations or Management of Change (MOC) which may deviate from the original approved programme as deemed necessary pertaining to technical and/or HSE matters. However, the Operator has to notify the Authority and SHENA immediately and the Authority may seek clarification on the variations.

4.3 Reporting and Documentation

The Operator shall submit to the Authority the following reports which shall contain information which includes but is not limited to what has been specifically described in Appendix B:

- Drilling Program
- Daily Drilling Report (for Exploration and Appraisal wells)
- Operational Lookahead Forecast Report (for Exploration and Appraisal wells)
- Daily Geological Report
- End of Well Drilling Report

Operator shall be able to allow real-time drilling operation accessible to the Authority upon request. Authority will notify the Operator the requirement of the real-time drilling operation **within 60 days** prior to spud to allow preparation and setting up of the system.

4.4 Supporting Documents

The Authority may request any additional information related to the drilling operations at any time and the Operator shall submit the information within agreed timeline.

² Sufficient for the Operators to notify the Authority at least via email on any rig movement activities

References

In this guideline, the following references are referred:

Reference 1	Workplace Safety and Health (Facilities) (Control of Major Accident Hazards) Regulations (COMAH)
Reference 2	Volume 5: Exploration Guideline
Reference 3	Volume 11: Decommissioning and Restoration Guideline

Appendices

In this guideline, the following appendices are referred:

Appendix A	Coordinate Reference System and Map Projection Standards
Appendix B	Drilling Program Daily Drilling Report (for Exploration and Appraisal wells) Operational Lookahead Forecast Report (for Exploration and Appraisal wells) Daily Geological Report End of Well Drilling Report

Appendix A

The Operator shall engage all relevant stakeholders and government agencies for the purposes of this Guideline, including but not limited to the following:

Generic	
Item	Stakeholders
Cultural Data/survey data	Survey Department, Ministry of Development
Employee/workers Crew change	<ul style="list-style-type: none"> • Department of Labour, Ministry of Home Affairs for work permit and visa • Department of Immigration, Ministry of Home Affairs for work permit and visa • In-Country Development (ICV) Division, Department of Energy, for work visa • Department of Civil Aviation for crew change across border via Chopper
Telecommunication	Authority for the Info-communications Technology industry (AITI)
Halal Certification	Ministry of Religious Affairs (KHEU)
Clearance of Medicines for clinic	Department of Pharmaceutical Services, Ministry of Health
Emergency cases	<ul style="list-style-type: none"> • Ambulance/Hospitals • Royal Brunei Police Force • Brunei Fire Department • Search & Rescue
International Border crossing	<ul style="list-style-type: none"> • Ministry of Foreign Affairs • Ministry of Defence
Survey equipment clearance	<ul style="list-style-type: none"> • Department of Royal Customs and Excise Department, Ministry of Finance and Economy (MOFE) • Marine Ports Authority
Explosives handling, storage and transportation	<ul style="list-style-type: none"> • Royal Brunei Police Force • Royal Brunei Technical Service • Marine Port Authority

Onshore Drilling	
Item	Stakeholders
Basecamp Construction	<ul style="list-style-type: none"> • Land Department, Ministry of Development • Public Works Department, Ministry of Development
Bunker Construction	<ul style="list-style-type: none"> • Land Department, under Ministry of Development • Ministry of Defence
Restricted or non-permitted sites	<ul style="list-style-type: none"> • Ministry of Defence for not permitted or restricted military area • Istana Asset Maintenance for Palace area • Ministry of Primary Resources and Tourism for forest reserve area • Town and Country Planning, Ministry of Development • Prison Department for prison restricted area
Usage of public lightworks	Department of Electrical Services (DES)
Usage of public road and infrastructure	Public Works Department, Ministry of Development
Agricultural/farm area, crop compensation	Agriculture and Agri-food Department, Ministry of Primary Resources and Tourism
Environmental	<ul style="list-style-type: none"> • Safety, Health and Environment National Authority (SHENA) • Ministry of Health for water quality
Community	<ul style="list-style-type: none"> • Local communities and relevant agencies
Offshore Drilling	
Item	Stakeholders
Vessel	<ul style="list-style-type: none"> • Marine Ports Authority • Marine Police, Royal Brunei Police Force • Royal Brunei Navy • Department of Fisheries, under Ministry of Primary Resources and Tourism
Environmental	<ul style="list-style-type: none"> • Safety, Health and Environment National Authority (SHENA) • Department of Fisheries, under Ministry of Primary Resources and Tourism

Appendix B

Drilling Program

The Drilling Program shall include but not limited to the following information (submission to the Authority and SHENA 21 days prior to spud date as per COMAH Regulation):

1. Demonstration of Compliance Status to Authority Requirements
 - 1.1. COMAH
 - 1.1.1. NOWO (Regulation 9 – Schedule 6)
 - 1.1.2. Safety Case & Hazard Assessment (Regulation 15 – Schedule 4)
 - 1.1.3. Information to public (Regulation 24 – Schedule 7)
 - 1.2. EPMO (Regulation 9 – Schedule 1 & Schedule 2)
2. Executive Summary
 - 2.1. Project Summary
 - 2.2. Objectives of the Well
 - 2.3. Planned Operational State of Well Post Planned Activity
 - 2.4. Changes from Well Technical Specifications
 - 2.5. Deviations from Standards
 - 2.6. Operations Outline
 - 2.7. Location Summary
 - 2.8. Conductor Status
3. Hazards and Controls
 - 3.1. Hazards Register
 - 3.2. Project Risk
 - 3.3. Well Related Risk
 - 3.4. Well Control Equipment and Test Summary
 - 3.5. Description of Activities with MAH Potential
 - 3.6. Emergency Response Plan Summary
4. Health and Environment
 - 4.1. Occupational Health
 - 4.2. Environmental Impact and Waste Management
 - 4.3. Hazardous Substances
 - 4.4. Potential Impact on Personnel, Public, Property and Environment
5. Special Equipment and Procedures
 - 5.1. Long Lead Item
 - 5.2. SIMOPS/CPRA Activities
 - 5.3. Limits on Work Unit Capability
 - 5.4. Special & Contingency Equipment
6. Well Design and Operating Envelope
 - 6.1. Well History
 - 6.2. Current Well Status and Schematic

- 6.3. Seabed and MetOcean Condition at Location
 - 6.4. Surface Location Definition
 - 6.5. Depth Referencing & Elevation of Drill Floor Over Well
 - 6.6. Well Trajectory and Target information
 - 6.7. Prognosis Cross-Section
 - 6.8. Depth of Well and Proposed Completion Target in True Vertical Depth (TVD) and Measured Depth (MD)
 - 6.9. Directional Drilling Plan including Anti-collision Plan and Distance to Nearest Well Bore
 - 6.10. Geologic Strata, Fluids and Associated Risks
 - 6.11. Estimated Formation Pressure and Fracture Gradient
 - 6.12. Casing Programme and Casing Design Criteria
 - 6.13. Wellhead and BOP Configuration Diagram
 - 6.14. Well Operating Envelope
 - 6.14.1. Pressure Tests
 - 6.14.2. Kick Tolerance
 - 6.14.3. FIT/LOT
 - 6.15. Drilling Fluid Summary
 - 6.16. Cementing Program
 - 6.17. Evaluation Requirements
 - 6.17.1. LWD Logging Tool Requirements
 - 6.17.2. Wireline Logging Tool Requirements
 - 6.17.3. Mud and Gas Logging Services
 - 6.17.4. Coring
 - 6.18. Bit Selection and Hydraulic Programme
 - 6.19. Planned Final Well Schematic
 - 6.20. Abandonment Plan/Side-track Plan/Completion Plan
 - 6.21. Relief Well/Well Barrier Plan
 - 6.22. Contingency Plan for Operational Problems
 - 6.23. Authorisation for Expenditure (AFE) and Time Estimate Breakdown
 - 6.24. Estimated Depth vs Days and Depth vs Cost Chart
7. Attachments

Daily Drilling Report

The Daily Drilling Report (DDR) shall contain but not limited to the following information (to be submitted on daily basis during operation) – for Exploration and Appraisal wells:

1. Well name, DDR numbering sequence, Date, Rig name, Operator, Drilling Contractor
2. Well Data: Surface location well coordinates, Depth reference level including water depth, Spud date, Current drilled depth (MD & TVD), Current hole-casing information (size, pressure, formation), cost (cost to date, AFE, daily cost) etc
3. HSE Summary – Last Incident, Date, Days, KPI, Safety Summary, MOC
4. HSE Drills – Drills/Tests, Data, Days Since Last Drill, TBT
5. Operations Summary – 24 Hour Summary, Update to 6 Hour, 24 Hour Forecast
6. Time Summary – Details of Operation (0000-2400 Hours), Details of Operation (0000-0600 Hours)
7. NPT Summary
8. Wellbore Deviation Survey – Depth (MD & TVD), Inclination, Azimuth, N/S, E/W, Tool for last 24 hours progress
9. Fluid Details – Mud data, pump data, shaker data
10. Gas Concentrations and Fluid Losses
11. Bulk Summary - Fluid and Chemical Stock on Board including daily usage
12. Bit Details
13. Bit Operations
14. Bottom Hole Assembly (BHA) Sensor Details
15. Drillstring Components and Details
16. Personnel on Board (POB) record
17. Remarks – Weather record, Logistics update
18. Time-Depth and Cost-Depth graphs – Actual vs Planned

Operational Lookahead Forecast Report

The Operational Lookahead Forecast Report shall contain but not limited to the following information (to be submitted on daily basis during operation) – for Exploration and Appraisal wells:

1. Well name
2. Rig name
3. Minimum 7 days Lookahead, Detailed Operational Forecast
4. POB forecast
5. Personnel movement to and from site
6. Equipment movement/crew change to and from site
7. Transportation movement to and from site, including the name of vessels (for offshore operation)

Daily Geological Report

The Daily Geological Report (DGR) shall contain but not limited to the following information (to be submitted on daily basis whenever deemed necessary):

1. Basic Well Information: Well name, DGR numbering sequence, Date, Rig name, Operator, Geological Contractor, Coordinates, DFE, Days since spud, Planned & actual days, Depth (MAH & TVD) from 0600-1800 hours, Casing with depth, current operation, current formation, Last LOT/FIT etc.
2. Operations Summary (0600 – 1800 hours)
3. Highlights (0600 – 1800 hours)
4. Mud data
5. Bit type
6. Planned Operation
7. Geology Summary (sampling interval and spots)
8. Correlation and data acquisition
9. Gas Summary
10. Produced Gas
11. Oil Shows
12. Formation Tops: Actual vs Prognosed
13. Survey data
14. LWD and MWD Summary
15. Finding Remarks
16. Formation cross-section including correlation – as attachment
17. Formation Evaluation log – as attachment

End of Well Drilling Report

The End of Well Drilling Report shall contain but not limited to the following information (to be submitted within three (3) months after Exploration, Appraisal, or completion of Development well):

1. Well Summary: Well parameters detail which include well name, rig name and type, location (surface and sub-surface location grid and geographical coordinates), water depth, DFE, spudded date, completed date, Actual drilling days vs Plan drilling days, Actual cost vs AFE cost, casing scheme, drilling depth details (MD and TVD), maximum angle reached, well trajectory, type of well head, well utility, performance indicators etc.
2. Well Objective
3. Final Well Status/Result including Basic Reservoir/Geological Details
4. Well Operation Summary:
 - 4.1. Geohazards
 - 4.2. Pre-Drill
 - 4.3. Drilling Summary Hole-to-hole drilling operation
 - 4.4. Directional drilling record and wellbore trajectory
 - 4.5. Wireline logs and its interpretation (cored intervals should also be shown)

- 4.6. Time-Depth and Cost-Depth graphs (Actual vs Planned)
- 4.7. Actual Cost (Final Estimated Well Cost) vs AFE
- 4.8. Survey data: Surface-TD coordinates, Reference datum, Deviation data
- 4.9. BHA including Drill bit performance
- 4.10. BOP: Schematic, specification and test record
5. Drilling Fluid data: Mud/Brine composition and properties, Mud-Pressure graph (Actual vs Planned), Losses data, breakdown amount of chemical consumed, Type and Density of Fluid left in the hole
6. Casing and Cementing: Casing tallies, cementing report including cementing recipe, properties, test and breakdown of chemical consumed
7. Pressure test: Leak Off Test (LOT), Fracture Induction Test (FIT)
8. Well Control record
9. Stuck pipe and Fishing record
10. Completion data: Perforation guns assembly, Completion assembly, Perforation and Gravel-packing report
11. Down/Lost Time: Non-Productive Time (NPT) and discussion on Invisible Lost Time (ILT)
12. Suspension or Abandonment report including plugs specification and breakdown of chemical consumed
13. Final Well Schematic including Xmas tree and fluid in-hole
14. Wellsite set-up
15. Drilling and Wellsite organization
16. Data Acquisition Summary
17. HSSE Summary
18. Rig-Up and Rig-Down
19. Findings and Learnings from After Action Review (AAR)
20. DDR and DGR compilation for all wells
21. Attachments: Rig Specification, Mudlogging services report, Cementing report etc.

