PETRONAS

UPSTREAM DATA MANAGEMENT GUIDELINE FOR PETROLEUM ARRANGEMENT CONTRACTORS (PACs)

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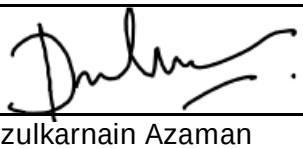
Signature	
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AMENDMENT SUMMARY

The Amendment Summary must be updated after each revision. The details must include the revision number, description (e.g. pages or paragraphs that have been revised), date of revision approval, and approver's designation and signature.

Rev.	Description	Date	Designation of Approver

Notes:

a) Document Custodian to update the Amendment Summary as and when amendments or new revisions are received.
b) For partial amendments, the relevant page(s) will be labelled with a lowercase letter (e.g. 1a) in the revision column.
c) For the description of any amendments made, the Document Custodian should indicate whether it is a modification, update or deletion.

PREFACE

Proper data management practices and their elements throughout a data lifecycle, from creation right up to disposal, are important for self-sustaining data management and continuous data improvements. Currently, there is no single reference on data management practices available to Data Managers for Petroleum Arrangement Contractors (PACs) in Malaysia.

By having a reference, it will govern and streamline data management practices for PACs, in alignment with and reference to Governing Standards for Malaysia Petroleum Operations and existing PETRONAS data standards and guidelines.

The Upstream Data Management Guideline (UDMG) for PACs promotes self-regulated data governance and assurance, which may minimise risk exposure and the potential impact of data breaches and mismanagement.

It is a living document and will be reviewed as and when required.

LANGUAGE CONVENTION

In this document, the recommendations for a course of action are made with varying degrees of emphasis. As a rule,

a) **'shall'** indicates a course of action with a required, mandatory status within the Business Units or Assets. The English language equivalent or interchangeable term for "shall" is "must."
b) **'should'** indicates a preferred course of action.
c) **'may'** indicates a possible course of action.

In this document, the collective expression of Group is used for convenience in contexts where reference is made to the PETRONAS Group in general. These expressions are used where no useful purpose is served by identifying the particular Business Units or Assets.

ABBREVIATIONS

Abbreviation	Description
AA	Approving Authority
AoS	Area of Specialization
API	Application Programming Interface
BI	Business Intelligence
CA	Confidentiality Agreement
CCI	Contractor's Compliance Index
CDS	Corporate Data Store
CFIHOS	Capital Facilities Information Handover Specification
CRUD	Create, Read, Update and Delete
DDA	Due Diligence Audit
DMBoK	Data Management Body of Knowledge
DMKA	Data Management Knowledge Areas
DRP	Disaster Recovery Plan
DWBI	Data Warehousing and Business Intelligence
E&P	Exploration & Production
ELT	Extract, Load and Transform
ER	Entity-Relationship
ETL	Extract, Transform and Load
GDPR	General Data Protection Regulation
I&I	Integration & Interoperability
IaaS	Infrastructure-as-a-service
ISP	Industry Service Providers
LoF	Life of Field
M&D	Modelling & Design
MBR	Malaysia Bid Round
MIRS	Malaysia-Petroleum-Management Information Release System
MoC	Management of Change
MPM	Malaysia Petroleum Management
NDA	Non-disclosure Agreement

Abbreviation	Description
ODBC	Open Database Connectivity
ODU	Online Data Uploader
OSDU	Open Subsurface Data Universe
PaaS	Platform-as-a-service
PAC	Petroleum Arrangement Contractors
PBE	Pre-Budget Expectation
PDPA	Personal Data Protection Act
PDS	Project Data Stores
PDU	Product Delivery Upstream
PPDM	Professional Petroleum Data Management
PPGUA	PETRONAS Procedures and Guidelines for Upstream Activities
PSC	Production Sharing Contract
QCR	Quarterly Commitment Reporting
R&M	Reference & Master
RCA	Root Cause Analysis
REST	Representational State Transfer
SaaS	Software-as-a-service
SAS	Shared Access Signature
SLA	Service Level Agreement
SME	Subject Matter Expert
SMFT	Secure Managed Transfer File
SOAP	Simple Object Access Protocol
TRC	Technical Review Committee
WPB	Work Programme & Budget

GLOSSARY

Term	Definition
Data Attributes	It is the lowest level of the data hierarchy and must carry a value. It is a specification that defines a property of an object, element, or file. It may also refer to or set the specific value for a given instance of such
Data Classification	A data management process where organisations categorise various information assets based on the sensitivity of the document's contents and the audiences that should have access to said documents.
Data Creator/Acquirer	A role that creates and/or acquires data. It can be either human or machine. Data Creator is to ensure that all data created, acquired, and/or applied adheres to PETRONAS data framework, standards, guidelines, and procedures. Data Creator is accountable for the quality and security/privacy of the data created. When data is generated by machine, accountability for the above lies with the respective Data Owner.
Data Domain	A set of data characteristics that represent a business domain. Data are grouped according to data subject areas based on the business value chain.
Data Entity	A collection of a related set of data attributes maintained in an organised form that serves as a purpose of summarising or analysing the data.
Data Group	A collection of related sets of data categories within the boundary of a data group.
Data Integrator	The intermediary between data consumer and data creator, who captures the data in usable form. It also refers to a person who carries out enabling functions in the handling of technical data (e.g. data management professionals, IT professionals, and document controllers).

Term	Definition
Data Manager	A person who is responsible for enforcing data standards and policies for effective data management, implementing secure procedures for data handling and analysis, and supporting others in the daily use of data systems.
Data User	Refers to a person who receives and uses the entitled data as input to their work; individuals, groups, or applications that access and apply data in practical business situations.
Digital Data	Refers to data that may exist in both structured (e.g. data residing in databases) and unstructured format (e.g. MS Excel, Word documents, PDF etc.).
Confidentiality Agreement	Any confidentiality agreement or non-disclosure agreement executed by PACs and third-party service provider to protect the confidentiality of PETRONAS' data and information.
Enterprise Architecture	Information assets and components of an enterprise, their interrelationships, and business rules regarding transformation, principles, and guidelines.
Record	Information created, received, and maintained as evidence of any business activities in pursuance of a legal obligation, tax, accounting purpose, historical, corporate memory, or business requirement.
Physical Data	Refers to data generated or provided in physical forms (e.g. physical documents, tapes, geo-samples, and physical media).
Service Level Agreement	An agreement between a service provider and its internal or external customers that documents what services the provider will furnish and defines the service standards the provider is obligated to meet.

Term	Definition
Software-as-a-Service	Relates to System Assets hosted in the Cloud. SaaS is usually a multi-tenanted/shared application service provided by a Third-Party application vendor.
Stakeholder	A person or an organisation that can affect, be affected by, or perceive itself to be affected by a decision or activity.
Structured Data	Data that resides in a fixed field within a record or file. This includes data contained in relational databases and spreadsheets.
Subject Matter Expert	Individuals with a deep understanding of a particular job, process, department, function, technology, machine, material, or type of equipment.
Subsurface	Refers to engineering and operations activities that happen under land/seabed; may include but are not limited to geology, geophysics, petroleum engineering, etc.
Surface	Refers to engineering and operations activities that happen above land/seabed; may include but are not limited to well drilling, construction, process engineering, operation, facility management, etc.
Unstructured Data	Information that is not organised in a pre-defined manner or does not have a pre-defined data model. Unstructured data cannot be stored in the form of rows and columns, similar to the data stored in databases.
Upstream	The exploration and production of crude oil and natural gas.
WPB-Go!	A digital platform that enables an improved and effective way of working between MPM and PAC to manage the end-to-end Work Programme & Budget (WPB) processes covering the annual WPB and Budget Revision submission, review, and approval.
Vendor	PACs' suppliers who provide services or materials as procured.

REFERENCE DOCUMENTS

No.	Document Title {Document name, Document code (if available), Document Approved Date}
1	PETRONAS Upstream Data Management Guideline (UDMG), WW ALL X X X 04 001 I, 2022 (for internal PETRONAS only)
2	Upstream Data Security Procedure, 2023 (for Internal PETRONAS only)
3	Governing Standards for Malaysia Petroleum Operations (previously known as PPGUA), 2023
4	Petroleum Arrangement Contracts e.g. Production Sharing Contract (PSC), Small Field Risk Service Contract (SFRSC)
5	PETRONAS Public Cloud Guideline for Petroleum Arrangement Contractors (PACs), 2021
6	PETRONAS Guidelines on Upstream Hydrocarbon Fingerprinting, MPM/HSE/GD/18/01, 2018
7	Prospect and Well Naming Standards for Malaysia Operations, 2022
8	Data Management Body of Knowledge (DAMA-DMBok) 2nd Edition, 2017
9	DAMA International, 2017
10	The Open Group, 2018

1 INTRODUCTION

Data is defined as facts and statistics collected for analysis or reference and stored in physical or digital form. Data in physical form is the data presented in a physical manner (e.g. physical documents, geo-samples, seismic tapes, fluid samples), whilst data in digital format, either structured or unstructured, is digitised data that can be stored and processed electronically.

All data generated and acquired as a result of technical oil and gas activities, from exploration to product distribution, is described as facts and statistics collected for analysis or reference that are stored in physical or digital form.

Data as a vital component must be of exceptional quality, trusted, and reliable in transforming Malaysia's Exploration & Production (E&P) Data Management outfit into a digitally empowered business and a data-driven organisation. Therefore, data must be governed by a centralised guideline that outlines the best data management practices and requirements. This is to ensure Upstream businesses can achieve reliable data and safeguard data as an asset.

Several sections of the Upstream Data Management Guideline for Petroleum Arrangement Contractors (PACs) include references to their respective knowledge area procedure document that explains the process, methodology, technique, criteria, approach, matrix, metric, and guidance to be adopted and adapted for implementation and operationalisation.

1.1 Objectives

This guideline has been established with the following objectives:

i. As a guide and reference for Data Managers of the PACs operating in Malaysia.
ii. To govern and streamline data management practices for PACs, in alignment with and reference to Production Sharing Contract (PSC), Governing Standards for Malaysia Petroleum Operations, and existing PETRONAS data standards and guidelines.
iii. To encourage proactive and self-regulated data governance and assurance to PACs.
iv. To promote self-sustained data management and facilitate its continuous data improvements for PACs.
v. To minimise risk exposure and any potential impact from data breaches and mismanagement.

1.2 Scopes

The scope of the Upstream Data Management Guideline for PACs covers, but is not limited to:

i. All data created, acquired, and/or purchased within Upstream Business Operations;
ii. Raw, processed, derived, and interpreted data;
iii. Model;
iv. Physical and digital data;
v. Components of the data management ecosystem; and
vi. Cloud Initiative.

This guideline shall be read along with the following governing documents:

i. Petroleum Arrangement Contracts e.g. Production Sharing Contract (PSC); and
ii. Governing Standards for Malaysia Petroleum Operations.

1.3 Intended Audience

The document serves as a guideline for the Data Manager of PACs to manage data and its elements throughout the data lifecycle, from creation right up to disposal.

1.4 Document Category

This document is categorised as a guideline, as shown in Table 1-1 below.

Table 1-1 Document Category Definitions

Level	Document Category	Definitions	This Document (Y/N)
1	Policies	Rules, principles that are adopted or designed by an organization to achieve long term goals	
	Commitment	A set of an agreement or pledge to do something in the future	
	Conduct & Ethics	A well-written code of conduct clarifies an organization's mission, values, and principles, linking them with standards of professional conduct	
	Other Directives	A general rule, principle, or piece of advice form as recommendation or guidance based on practices, lesson learnt, experiences for standardization of practices	
2	Framework	The ideas, information, and principles that form the structure of an organization or plan	
	Management System	A set of defined expectation on policies, processes and procedures requirement used by an organization to ensure that it can fulfil the tasks required to achieve its objectives	
	Standards	A document designed to be used as a rule, guideline, definition, or characteristic set by recognized body or authority for common	

Level	Document Category	Definitions	This Document (Y/N)
		and repeated use on activities or their results	
	Guidelines	A general rule, principle, or piece of advice form as recommendation or guidance based on practices, lesson learnt, experiences for standardisation of practices	Y
	References	The use of a source of information in order to ascertain something	
3	Manual	A comprehensive and step-by-step guide to a particular matter and explain details what is given and required.	
	Procedures	A series of actions conducted in a certain order or manner.	
	Work Instructions	A document that provides specific instructions to carry out an Activity	
	Checklists	A set of checklists to guide the inspection, audit and assurance or any form of checks at activities level	
	Templates	A standard form of template for the use to facilitate the activities or support the issuance of output as a record	

1.5 Security Classification

This document is identified as OPEN or TERBUKA. All information that may be disclosed to external parties is unlikely to result in any harm. In other words, the act of sharing the document with external parties will have negligible impacts on PETRONAS if it is wrongly exposed to external parties.

1.6 Revision Cycle

This document may be revised at least once every five (5) years or when it is deemed necessary.

2 UPSTREAM DATA MANAGEMENT

The Upstream Data Management Guideline (UDMG) for PACs refers to the PETRONAS Upstream Data Management Guideline. It should serve as an overarching data management reference and guidance for handling, managing, and operating Upstream data for Petroleum Arrangement Contractors (PACs).

This section outlines the guiding principles of eleven (11) Data Management Knowledge Areas (DMKA) that form essential parts of the data management function and its activities. The eleven (11) DMKAs are as follows:

a) **Data Governance**

Provides direction and oversight for data management by establishing a system of decision rights over data that accounts for the needs of the organisation.

b) **Reference and Master Data**

Includes ongoing reconciliation and maintenance of core critical shared data to enable consistent use across systems of the most accurate, timely, and relevant version of truth about essential business entities.

c) **Metadata**

Includes planning, implementation, and control activities to enable access to high-quality, integrated Metadata, including definitions, models, data flows, and other information critical to understanding data and the systems through which it is created, maintained, and accessed.

d) **Data Quality**

Includes the planning and implementation of quality management techniques to measure, assess, and improve the fitness of data for use within an organisation.

e) **Data Security**

Ensures that data privacy and confidentiality are maintained that data is not breached, and that data is accessed appropriately.

f) **Data Operations**

Includes the design, implementation, and support of stored data to maximise its value. Operations provide support throughout the data lifecycle, from planning to disposal.

g) **Data Architecture**

Sets the blueprint to translate business needs into data and system requirements for managing data from collection to transformation, distribution, and consumption by aligning with organisational strategy.

h) **Data Modeling and Design**

The process of discovering, analysing, representing, and communicating data requirements in a precise form is called the data model.

i) **Data Integration and Interoperability**

Includes processes related to the movement and consolidation of data within and between data stores, applications, and organisations.

j) **Data Warehousing and Business Intelligence**

Includes the planning, implementation, and control processes to manage decision support data and enable knowledge workers to get value from data via analysis and reporting.

k) **Document and Content Management**

Includes planning, implementation, and control activities used to manage the lifecycle of data and information found in a range of unstructured media, especially documents needed to support legal and regulatory compliance requirements.

On top of the 11 DMKAs, Data Capability is also included in this section for PACs to upskill themselves in data management areas through subscriptions to industrial professional bodies, especially personnel who manage data.

2.1 Upstream Data Governance

Upstream Data Governance is defined as the exercise of authority and control (planning, monitoring, and enforcement) over the management of Upstream data.

The Data Governance function guides all Upstream data management functions. The purpose of Data Governance is to ensure that Upstream data is managed properly according to data policies and best practices.

Data Governance focuses on how decisions are made about data and how people and processes are expected to behave in relation to it. The scope and focus of a particular Upstream Data Governance programme will depend on organisational needs, but most programmes include:

a) **Strategy**: Defining, communicating, and driving execution of the Upstream Data Strategy and Data Governance Strategy.
b) **Policy**: Setting and enforcing policies related to Upstream data and Metadata management, access, usage, security, and quality.
c) **Standards and quality**: Setting and enforcing Data Quality and Data Architecture standards.
d) **Oversight**: Providing hands-on observation, auditing, and correction in key areas of quality, policy, and data management.
e) **Compliance**: Ensuring the organisation can meet Upstream data-related regulatory compliance requirements.
f) **Issue management**: Identifying, defining, escalating, and resolving issues related to Upstream data security, data access, data quality, regulatory compliance, data ownership, policy, standards, terminology, or data governance procedures.
g) **Data management projects**: Sponsoring efforts to improve Upstream data management practices.
h) **Data asset valuation**: Setting standards and processes to consistently define the business value of data assets.

Data governance needs to align directly with organisational strategy. The more clearly it helps solve organisational problems, the more likely it is for people to change their behaviours and adopt governance practices. Drivers for data governance most often focus on reducing risks or improving processes.

a) Reducing Risk

i. **General risk management**: Oversight of the risks Upstream data poses to the organisation, including response to legal and regulatory issues.
ii. **Data security**: Protection of Upstream data assets through controls for the availability, usability, integrity, consistency, auditability, and security of data.

b) Improving Processes

i. **Regulatory compliance:** The ability to respond efficiently and consistently to regulatory requirements.
ii. **Data quality improvement**: The ability to contribute to improved business performance by making Upstream data more reliable.
iii. **Metadata Management**: Establishment of a business glossary to define and locate data in the organisation; ensuring the Metadata is managed and made available to the organisation.
iv. **Efficiency in development projects**: Address issues and opportunities in Upstream data management across the organisation through governance of the data lifecycle.
v. **Vendor management**: Control of contracts dealing with Upstream data, such as cloud storage, external data purchases, sales of data, and outsourcing data operations.

Data governance requires an ongoing programme focused on ensuring that an organisation gets value from its Upstream data and reduces risks related to it. A Data Governance team can be an organisation with specific accountabilities. To be effective, the roles and activities within data governance need to be well understood. They should be built around an operating framework that functions well in the organisation. A data governance programme should take into account the distinctive organisational and cultural issues and the specific Upstream data management challenges and opportunities within the organisation.

2.2 Upstream Data Standard

The Upstream Data Standard sets the standard representation as rules, guidelines, and specifications that describe how data should be stored and for the consistent collection and interoperability of that data across various systems, sources, and users.

Data Standards are a means to provide consistency in the definition, data usage across the Upstream business, seamless interoperability, and minimising dependency on applications.

The importance of Data Standard are as follows:

a) **Data Discovery**: Helps for searching, filtering, and sorting purposes.
b) **Consistency Across Systems**: Multiple databases or applications will have the same name or term.
c) **Uniqueness for Naming and Classification**: Minimising ambiguity and reducing duplication.
d) **Enable Interoperability**: Seamless integration.
e) **Relevant and Meaningful**: Ensuring that the data are represented and interpreted correctly.
f) **Way of Working**: Data standards are created to be widely used across the business.

2.2.1 Upstream Data Standard Components

Upstream Data Standards is classified into five (5) components as shown in Figure 2-1 below:

a) Naming convention
b) Data content
c) References
d) Industry standard
e) Assurance and compliance

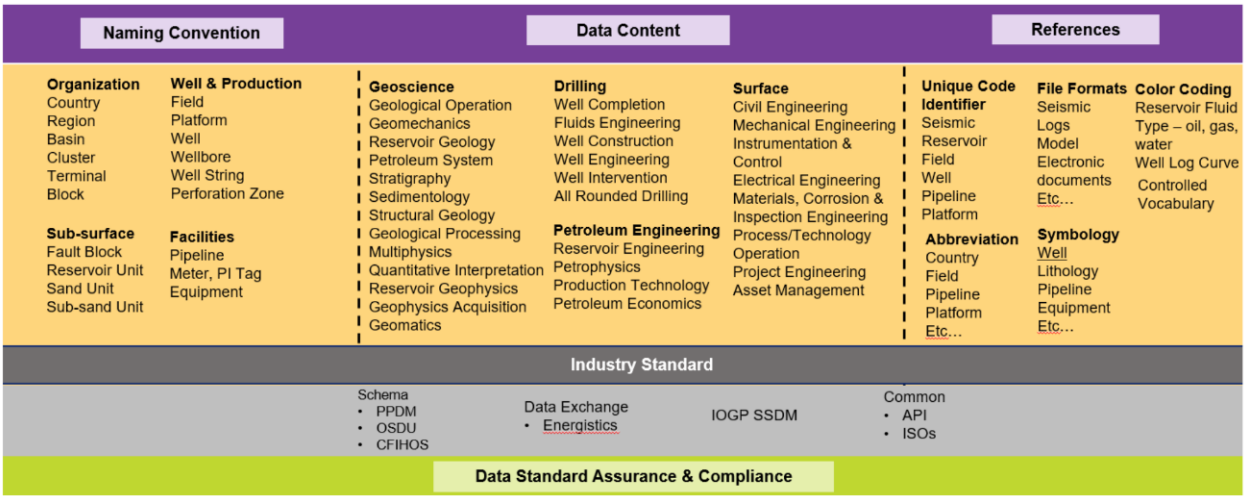

Figure 2-1 Upstream Data Standard Components

2.2.1.1 Standard of Naming Convention

A standard naming convention is a convention or set of rules for naming things or objects. Naming conventions allow useful information to be deduced from the names based on regularities and ensure that each name is unique. The naming convention acts as the foundation for all existing and future Upstream data that will be built, ensuring consistency and accuracy throughout the data lifecycle or process. PACs may refer to PETRONAS existing naming guidelines to have standardised document naming. Table 2-1 shows an example of the Well Name Convention:

Table 2-1 Example of Naming Convention

Well Name Component	Field/Area Name	-	Platform Suffix	Well Number	Wellbore Type	Wellbore Sequence Number
Format	Variable Length	-	A B ... ZZ	1 2 ... 999	RDR ST L	1 2 ... 999

(Source: PETRONAS Upstream Well Naming Guidelines)

2.2.2 Standard of Data Content

The standard specifies the data domain, structure, attributes, labels, and attribute-level standards (e.g. business or technical definitions, business rules, data type, and unit of measurement) for the dataset as a whole. The standard shall be adopted at the time of data collection and storage.

2.2.2.1 Standard of Reference

This standard defines the rules for reference data, coding/symbology, and structuring/organising data for use in a given context. It ensures that when the applications read the data, the information and its context are preserved. The standards are also associated with a file format, such as LAS or DLIS format for well log files.

2.2.2.2 Industry Standard

The common areas that should refer to the Industry Standard are the data schema (data model), data exchange, and data integration. These Industry Standards are Professional Petroleum Data Management (PPDM), Open Subsurface Data Universe (OSDU), and Capital Facilities Information Handover Specification (CFIHOS) for data schema and Energistics' WITSML, PRODML, and RESQML for data exchange. It is important for Upstream data management to adopt the Industry Standard as a reference for its database and application implementation.

2.2.2.3 Assurance and Compliance

Data Standards shall be regularly monitored for compliance. An assurance programme or plan is recommended to ensure the data is compliant with the available Data Standards.

2.2.3 Upstream Data Standard Implementation Guide

The following is the implementation guide for Upstream Data Standards:

a) Enforcing Data Content standards throughout the Data Life Cycle, from data capture to data archive and embedding in the work process.
b) Standardisation is based on the intended purpose (e.g. Project, Analytics, Operational).
c) Focusing on the type of data domain or data category to be standardised (e.g. Geology, Petroleum Engineering, Process Engineering).
d) Prioritise the data based on criticality and effort:
    i. It shall be tailored according to business needs. Business needs can be for immediate needs or long-term needs.
    ii. It shall provide an impact on the quality. This can be assessed by determining if the standard is frequently used or less frequently used.
    iii. It shall have an impact on the usage/interoperability of data. This can be assessed by determining if the standard is frequently used or less frequently used.
    iv. It shall be implemented immediately for new data and in phases for legacy data, as per the first three (3) principles stated above.
e) Initiative-taking mindset, for example, using Data Standard to prevent data errors rather than correcting them:
    i. Data Standard adoption and operationalisation shall be regularly monitored to ensure compliance.
    ii. Implementation should be based on the availability of the approved Data Standard.

The three (3) Data Standard categories (naming convention, data content, and references) can be applied in the following data areas, as shown in Figure 2-2. This diagram shows that the developed Data Standard is applicable to multiple data areas.

a) **Digital Data** – Any form of data that has been stored in a database.
b) **Purchased Data** – Data is purchased from a data supplier and delivered in the required form.
c) **Physical Data** – Any form of data that is in physical appearance, such as a core, well log, etc.
d) **New Technology Data** – Any new system or application to be procured.

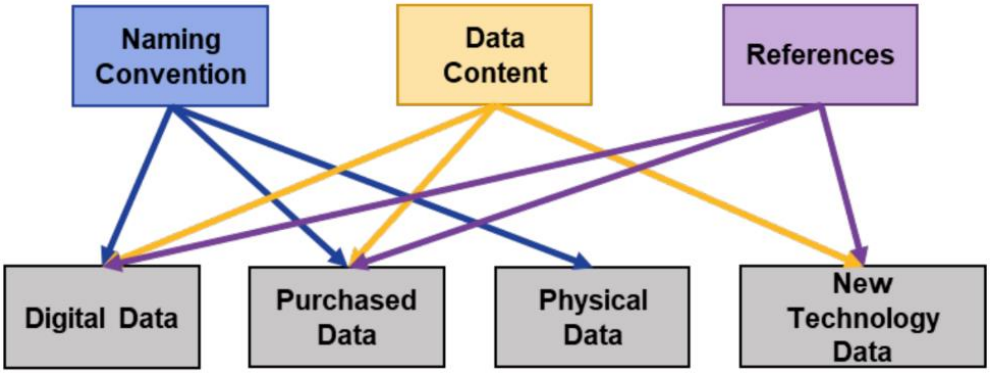

Figure 2-2 Data Standard Application in Various Data Areas

The summary of Data Standards application in data areas is as follows:

a) **Naming Convention** – Applicable to digital, purchased, and physical data.
b) **Data Content** – Applicable to digital, purchased, and new technology data.
c) **References** – Applicable to digital, purchased, and new technology data.

2.3 Upstream Reference & Master Data Management

Reference & Master (R&M) is a source of common business data used across multiple systems and processes. It is the consistent and uniform set of identifiers and extended attributes that describe the core entities of the enterprise and the nouns of the business.

Reference & Master (R&M) data management is the management of shared data to reduce the risks associated with data redundancy and the costs of data integration.

The implementation of R&M Data Management is to ensure that the data is trusted, and that data integrity is properly governed across multiple systems, applications, and processes.

The five (5) guiding principles for R&M Data are as follows:

a) R&M Data Management is intended to provide the organisation with a single version of truth for R&M Data and provides guiding principles for recommended processes and methodologies to develop and maintain R&M Data.
b) The development and implementation of R&M should be based on R&M Building blocks, and all four (4) building blocks should be maintained at the same level of growth for well-balanced R&M Data.
c) R&M Data Hierarchy Data should be used as a reference for developing and maintaining R&M Data.
d) Respective Subject Matter Expert (SME) participation during the new development of R&M Data is required to ensure that it is aligned with business needs.
e) R&M Data should be stored and maintained in a main identified database with a proper Create, Read, Update, and Delete (CRUD) process.

2.3.1 Upstream R&M Data Building Blocks

Successful implementation of R&M Data Management shall be approached and maintained from a strategic, tactical, and operational perspective.

The building blocks of R&M should consist of:

a) **Upstream R&M Data Governance (Strategic)** – a programme that provides proper governance and stewardship for R&M.
b) **Upstream R&M Data Process (Tactical)** – the process of including the stakeholders' requests or inputs, deliverables, roles, and resources in developing the R&M. Data consolidation, data validation, 'Golden Record' development, data source endorsement, data registration, and maintaining the Upstream R&M for Upstream usage are included in the overall Upstream R&M Process.
c) **Upstream R&M Data Content (Operational)** – the content that includes the master data, reference data, the sanitisation process, and collaboration between the parties involved.
d) **Upstream R&M Data System (Operational)** – there are four (4) implementation methods for R&M Data, namely registry, consolidation, coexistence and centralised.

2.3.2 Upstream R&M Data Selection Criteria

Master Data is a key business information that supports the transactions. To select the data that qualifies as a Master Data, the following criteria should be met:

a) Data related to either one of the below:
    i. Places; location, geography, sites (i.e. basin, field)
    ii. Parties (i.e. customer, service company, PAC)
    iii. Assets (i.e. well, generator, platform)
b) Data selected is used for interoperability between systems, applications, or databases.

Reference Data is a subset of a Master data that is used to classify other data. To select the data that qualifies as a Reference Data, the following criteria should be met:

a) Any data used solely to categorise other data;
b) It establishes a permissible value; and
c) It facilitates consistency.

2.3.3 Upstream R&M Data Hierarchy

The Upstream R&M Data hierarchy was established to visualise the overall structure of the Upstream asset hierarchy geographically, as depicted in Figure 2-3 below:

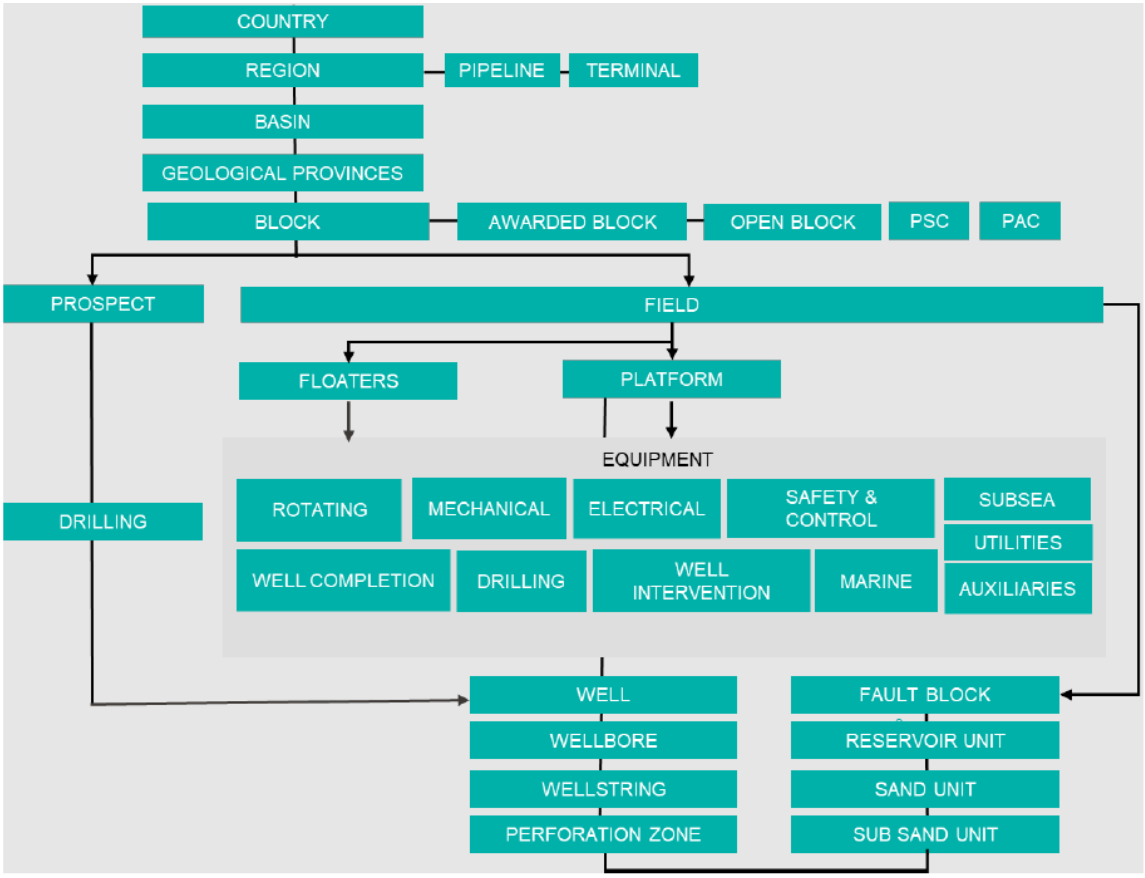

Figure 2-3 Upstream R&M Data Hierarchy

2.4 Upstream Metadata Management

Upstream metadata management covers the planning, implementation, and control activities. This enables access to high-quality, integrated metadata, including definitions, models, data flows, and other information critical to understanding Upstream data and the systems through which it is created, maintained, and accessed.

Upstream metadata is information about the data collected that describes various facets of an information asset to improve its usability throughout its life cycle. It is required to understand data, context, quality, structure, and accessibility. Upstream metadata is also structured information that describes, explains, locates, or otherwise makes it easier to retrieve, use, or manage data.

Organisation may implement metadata management on identified data stores. The metadata should be monitored regularly, and any new metadata or new data entity should be updated in the metadata repository, taxonomy, and business glossary.

The importance and benefits of metadata are:

a) Provides a standard way to search for and access the data.
b) Collect and integrate metadata from various sources.
c) Ensures data quality and security.
d) Re-use and data sharing are facilitated.
e) Data is more easily discovered.
f) May expand the scale of study or analysis.
g) Provides an organisational understanding of business terms and usage.
h) Can address unanticipated questions about data.
i) Diverse data may be integrated.
j) Ensures interoperability of data.

2.4.1 Upstream Metadata Management Types

The types of Upstream Metadata Management are as follows:

a) **Business Metadata**

Focuses on the content and condition of data, which also includes details related to data governance. The non-technical names and definitions of concepts, subject areas, entities, attributes, attribute data types and other attribute properties, range descriptions, calculations, algorithms, and business rules; valid domain values and their definitions.

Example: Stakeholders contact information (e.g. data owners, data stewards), definition, or glossary.

b) **Technical Metadata**

Provides information about the technical details of data, the systems that store data, and the processes that move data within and between systems.

Example: Physical database table and column names, database object properties, access permissions, data access rights, data type, and length.

c) **Operational Metadata**

Describes the details of processing and accessing data.

Example: Logs of job execution for batch programmes, error logs, history of extracts and results, reports and query access patterns, frequency, and execution time.

2.4.2 Upstream Taxonomy and Metadata Management

A taxonomy is a structured set of names and descriptions used to organise information and documents in a consistent way. It classifies the information domain, where terms are arranged into a hierarchy. This allows related terms to be grouped together and categorised in ways that make it easier to find the correct term to use, whether for navigating, searching a website, or describing an object. To achieve this, the terms need to be stored as metadata. Figure 2-4 shows the relationship between taxonomy and metadata.

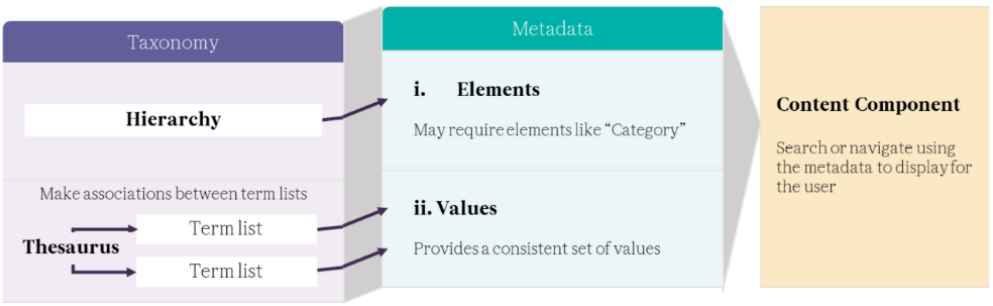

Figure 2-4 Relationship between Taxonomy and Metadata

The following are two (2) types of taxonomy:

a) **A hierarchical classification** of entities of interest to an enterprise or organisation, enabling users to browse and search via the paths in the hierarchy.

b) **A faceted taxonomy** provides multiple perspectives or characteristics as metadata for tagging information, enabling users to search and navigate along multiple paths.

The Upstream Data Taxonomy is as shown in Figure 2-5 while Figure 2.6 shows an example of a data taxonomy for Petroleum Engineering.

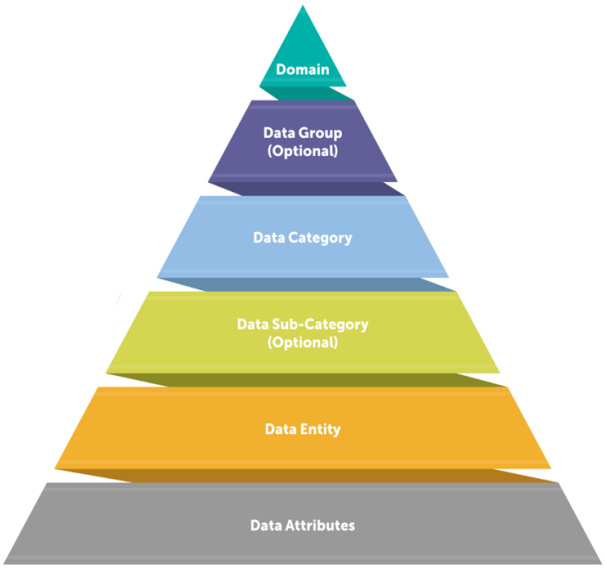

Figure 2-5 Upstream Data Taxonomy

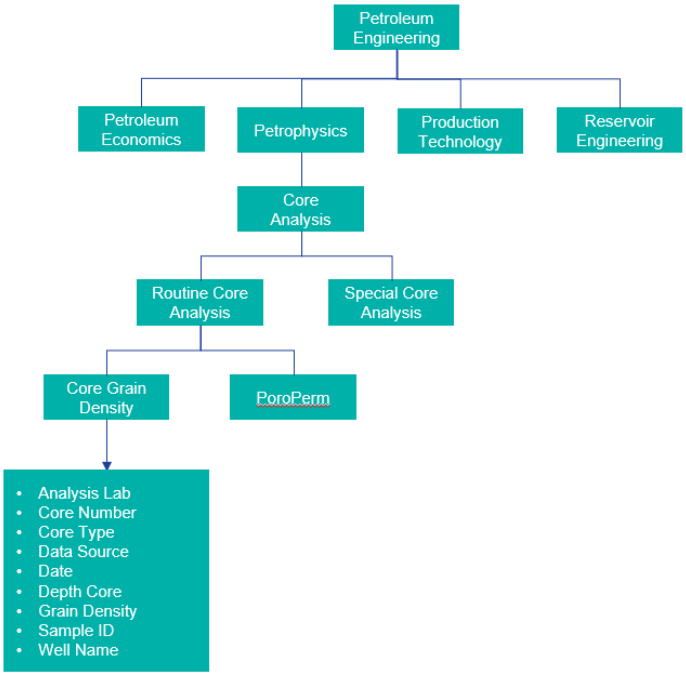

Figure 2-6 Example of Data Taxonomy for Petroleum Engineering

2.4.3 Guiding Principles of a Good Taxonomy

The following are the guiding principles of a good taxonomy:

a) Simple and implementable in the enterprise.
b) The term sets (controlled vocabularies) are used from authoritative or industry sources where possible.
c) No overlapping and clearly bounded terms are used in the hierarchy.
d) Clearly define each facet and term for clarity and consistency.
e) Each facet represents a unique concept.
f) Allow for customisation at the workgroup level.

2.5 Upstream Data Quality

Data Quality is fundamental to DMKA and should be implemented for an organisation to measure data health, address data issues, ensure data is fit for consumption, and meet the needs of consumers. Data quality management aims to achieve and sustain good-quality and reliable data to support organisations in making accurate and timely decisions.

Data quality should be implemented on all data and establish a baseline data quality score. The data quality rules should be checked and validated on a regular basis. The quality of the measurement of the data should be monitored regularly.

2.5.1 Upstream Data Quality Principle

The four (4) guiding principles for Upstream Data Quality are as follows:

a) The guiding principle outlines six (6) data quality dimensions as stipulated in 2.5 Upstream Data Quality, 2.5.4 Upstream Data Quality Dimension to denote the risk and confidence of data from different dimensions.
b) The business rules should be derived from data standards, subject matter expert inputs, industry standards, and best practices.
c) Data quality performance should be monitored to observe its trend over time. The data quality score and its details shall be visualised for monitoring by the organisation's data management team.
d) Data remediation should be based on root causes. The root cause should adopt and adapt the fishbone technique with six (6) focus areas.

2.5.2 Upstream Data Quality Management Process Cycle

Upstream Data Quality should adopt the Data Quality Management Cycle for continuous improvement of data quality, as shown in Figure 2-7 below:

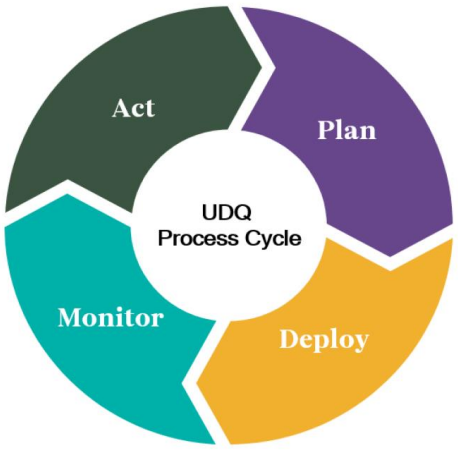

Figure 2-7 Data Quality Management Cycle

The Data Quality Management Cycle consists of four (4) phases and is described as follows:

a) The planning phase is where data quality objectives and requirements shall be defined; data groups, data types, data quality rules, and data attributes.
b) In the deployment phase, data quality profiling and assessment shall be carried out by collecting data, analysing the quality based on the data quality business rules, and calculating data quality scores to determine the data quality status and actionable insights.
c) The monitoring phase shall use monitoring insights (or a reporting dashboard) to facilitate operationalising the data quality performance metrics. The following insights shall be used to perform the assessment process:
    i. Management Data Quality Insights
    ii. Actionable Data Quality Insights
d) The action phase shall include converting data quality insights into actions aimed at improving and preventing the recurrence of data quality concerns.

These activities shall consist of Root Cause Analysis (RCA) and Data Remediation.

2.5.3 Upstream Data Quality Landscape

The Upstream Data Quality should include the definition of the Data Quality Landscape that serves as a foundation for identifying, measuring, and monitoring data quality scores, as well as prescribing and tracking corrective actions (RCA and Data Remediation).

The objectives of the Upstream Data Quality Landscape are as follows:

a) To provide a granularity of upstream data quality performance based on data classification and hierarchical structure.
b) To provide data-quality insights with defined granularity.
c) To prescribe data requiring corrective actions with the defined granularity.
d) To provide visibility on the quality performance of asset level.

The data quality landscape should include data classification and asset structure. Data classification contains the data attributes and hierarchy. The asset structure is the complete structure necessary to enable data quality at the source by visualising the quality of data obtained from multiple assets that describe the geographical location of a country, region, and field assets.

2.5.4 Upstream Data Quality Dimension

There are six (6) quality dimensions which Upstream Data Quality may be measured against, which are described in the following Table 2-2:

Table 2-2 Data Quality Dimension Definitions and Remarks

Quality Dimension	Definition	Remarks
Completeness	The degree to which the complete data set is available or the data attributes are populated.	There are two (2) approaches to completeness: • To ensure that certain attributes always have assigned values in a data set. • To ensure all appropriate rows in a data set are present. For instance, a complete list is required in tabular form of all marker tops, vertical and lateral uncertainty, and fluid fill predictions for all zones to be penetrated (or avoided).
Validity	The degree to which data conforms to a valid structure.	An example of this is that, for a heavy oil crude type, API gravity should be ranged between 22 °API and 10 °API.
Accuracy	The degree to which data correctly describes the 'real world' object or event.	The Exploration & Production (E&P) business is highly reliant on accurate data because of the high risks involved. For instance, planning a well using inaccurate formation pore pressure data could result in serious complications – formation fracture or borehole stability – which could lead to

Quality Dimension	Definition	Remarks
		fatalities and cause significant damage to equipment and the environment while drilling the well.
Consistency	Uniformity in the representation of data when compared against a golden representation.	This effectively ensures that data values in one data set are consistent with values in another data set. The expectation is that similar data values drawn from separate data sets must not conflict with each other.
Uniqueness	The degree to which data records are not duplicated/redundant.	Uniqueness is the inverse assessment of the level of data duplication, and it ensures that only one data set is being used or referred to in decision-making. For instance, a validated version of production volume is used for forecasting and reserve estimation.
Timeliness	Time expectation for accessibility and availability of Information.	This measures how fresh the data is, as well as its correctness in the face of possible time-related changes, which is particularly essential in the Oil & Gas industry.

2.5.5 Upstream Data Quality Rules

The Upstream Data Quality Rules should be registered, defined, and stored in a business rules library.

The following factors should be considered to establish data quality business rules:

a) **Approach**

The sources or inputs for business rules should be collected from:

i. Industry-standard organisations (e.g. PPDM, OSDU);
ii. Subject matter experts; and
iii. Technical data standards, guidelines, and frameworks.

b) **Upstream Data Quality Governance**

The Upstream Quality Rules Governance should be defined and governed via both the centralised and decentralised modes, depending on the tasks:

i. **Quality Rules Input & Requirements (Decentralised)**

All Personnel can propose to add new quality rules, modify existing quality rules, and delete irrelevant quality rules. The governance for this component shall be decentralised to give everyone an opportunity to be involved.

ii. **Governance process**

This component shall be centralised to provide standardisation for the process.

iii. **Execution**

The execution component shall be decentralised, as data quality shall be executed at Source Data Stores.

iv. **Review and Acceptance**

This component shall be centralised for the Upstream data management and assurance to streamline governance across Upstream.

2.5.6 Upstream Data Quality Profiling and Assessment

Upstream Data Quality Profiling and Assessment is the process that should be adopted to review and assess data quality status according to quality rules and dimensions.

The process of data quality profiling and assessment should consist of the following:

a) **Identify a data set for review**
   The data sets that contain a set of data attributes from selected data entities in a particular data store are assessed and identified.

b) **Catalogue the business uses of the data set**
   The data quality status of the data sets is reported.

c) **Perform empirical analysis using the data profiling technique**
   Certain data quality issues and exceptions should be flagged.

d) **List all potential anomalies**
   To list all potential anomalies for review.

e) **Review the anomalies with the Subject Matter Experts (SME)**
   To determine if the listed anomalies represent a true data issue.

f) **Prioritise the criticality of anomalies**
   To produce the final data quality profiling report to prioritise the criticality of the anomalies.

2.5.7 Upstream Data Quality Monitoring

The Upstream Data Quality guideline defines the adoption of the traffic light approach to perform data quality monitoring by exception. Upstream Data Quality Monitoring should cover two (2) levels of quality details, as described below:

a) **Management Data Quality Insights**

Data Quality Performance metrics reports an overview that provides a high-level view of overall Upstream Data Quality performance.

b) **Actionable Data Quality Insights**

Data Quality Performance details reports in accordance with six (6) data quality dimensions (refer to 2.5 Upstream Data Quality, 2.5.4 Upstream Data Quality Dimension) at data entity and attribute level.

2.5.8 Upstream Data Quality Root Cause Analysis

Root cause analysis is a tool or approach used to determine the root causes of problems caused by individuals (human error, insufficient training), physical (equipment failure, inadequate facility), or organisational factors (faulty process design, poor structure).

The Upstream Data Quality guideline adopts the Fish Bone methodology, as shown in Figure 2-8 below:

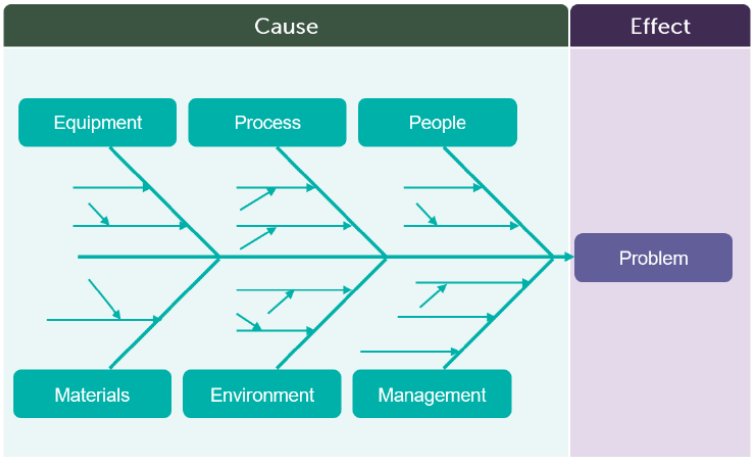

Figure 2-8 Fish Bone methodology

The process is crucial to identifying recurring or systemic data quality non-conformances. The Root Cause Analysis Steps shall be as follows:

a) **Define the problem** – is where the Problem Statement is stated.
b) **Collect Data** – is where a list of Proofs and Impacts of the problem is gathered.
c) **Identify possible causal factors** – is where a list of Possible Causes is identified.
d) **Identify the root cause(s)** – is where the Root Cause(s) is identified.
e) **Recommend solutions** – is where solutions and an implementation plan for rectification are recommended.

2.5.9 Data Remediation

Data Remediation is the process of cleansing data, repairing data/system/rules, and improving data from a record set, table, or database. The resolution should be documented in a knowledge library for future reference. The Upstream Data Quality guideline adopts data remediation at the root causes based on six (6) focused areas as below:

a) Business process;
b) Data governance standards, guidelines, or procedures;
c) Data template as per data governance standards;
d) Business rules;
e) Data quality at source (acquisition, entry, and loading); and
f) Data remediation at source.

2.6 Upstream Data Security

Upstream Data Security is defined as the planning, development, and execution of security policies and procedures to provide proper authentication, authorisation, access, and auditing of data and information assets.

Upstream Data Security ensures that data is managed consistently with the organisation's risk strategy to protect the confidentiality, integrity, and availability of information. It is the practice of protecting Upstream data from unauthorised access, unauthentication, corruption, or theft throughout its entire lifecycle. It dictates the safe and correct way of handling data throughout all stages of the data lifecycle while ensuring the right people have the right access to critical business knowledge.

Upstream Data Security Procedure serves as a procedure for PETRONAS Upstream to manage data in a secured manner to ensure important data roles, operation activities, ecosystems, processes, procedures, and standards are applied effectively.

All Upstream Business Operations are accountable for compliance and therefore, shall ensure that individuals involved in Upstream Data Management comply with the directions of this procedure.

Data security for businesses is very important in terms of ensuring business continuity, preventing data breaches, and preventing unauthorised access. The importance of Upstream Data Security are as follows:

a) **Data Accessibility:** By giving the right access of Upstream data to the right people, it enables a more efficient way to perform business functions and promotes faster decision-making. In supporting data liberalisation, Upstream Data Security provides the default access that ensures that authorised people can get access to the right data seamlessly.
b) **Data Protection:** Ensure Upstream data is safeguarded and protected from potential risks like cyberattacks and natural disasters that might give significant impact on the organisation's operations, finances, and reputation. With a proper definition of PACs Data Classification in place, it would prevent unauthorised transmission or dissemination of Upstream data to unauthorised party that could be done intentionally or unintentionally.

c) **Business Continuity:** Upstream Data Security ensures business continuity and the ability for continuous use of Upstream data should any event of disaster or data security incidents occur. By having good Upstream data management, this would ensure that business continuity plan is in place and a proper data backup and recovery is defined and implemented.

2.6.1 Upstream Data Security Classification

Upstream Data Security Classification defines data security classes according to their content and sensitivity. Appropriate security measures shall apply to protect the data based on its security classification.

All Upstream data shall be classified, and the default data security classification shall be Internal Use unless specified otherwise by the organisation.

2.6.2 Upstream Data Retention

Upstream Data Retention refers to how long data is kept available. Retention is the process of ensuring that organisations keep and store their records and data in a safe and secure manner for archival, data retrieval, reporting, record-keeping, disaster recovery, and billing purposes before their disposal.

It is incorrect to assume that all data will reside forever in primary storage. Data that is not actively needed to support application processes should be archived to some sort of secondary storage on a less expensive disk or tape, perhaps on a separate server. Data that is obsolete and unnecessary, even for regulatory purposes, should be purged or disposed of. Some data may become a liability if kept longer than necessary.

Upstream Data Security affects data retention plans, as some data needs to be retained for specific timeframes for legal reasons. Failure to retain data for the appropriate length of time can have legal consequences. Likewise, there are also regulations related to the purging or disposal of data.

2.6.2.1 Upstream Data Retention Guiding Principle

The Upstream Data Retention Guiding Principle defines that all Upstream data (digital and physical) that is classified under the Exploration, Development & Production data shall be retained permanently unless otherwise stated in the exception list.

The exceptional list is as follows:

a) **Exception 1**: Upstream Data that has contractual legal life shall be retained within the legally allowed period or contract legal life.
b) **Exception 2**: Upstream Data for activities at an international location shall comply with the host country's law and requirements and contract restrictions.
c) **Exception 3**: Physical data may warrant disposition upon digitalisation.

Referring to Exception 3, physical data may warrant disposition upon digitalisation and approval from the respective Approving Authority except for geological samples.

2.6.2.2 Upstream Data Retention Implementation Requirements

The requirements for Upstream Data Retention shall be implemented and complied with by all systems and databases, including physical data. The requirements for Upstream Data Retention are, but not limited to, the following:

a) The Upstream Data Retention Guiding Principle shall be implemented and complied with.
b) The database/system must have the capability to scale up the storage to support permanent or defined data retention; otherwise, it needs to have proper archival storage.
c) All data must be able to be retrieved at any point of interest and must be readable.

2.6.3 Upstream Data Backup and Recovery

Data Backup and Recovery are two different concepts, where a backup is storing a copy of the entire data in the database, while data recovery is the technique of restoring the lost data from the storage mediums that have been backed up. An efficient data backup and recovery plan are crucial in protecting Upstream data to ensure business continuity.

In the event of a disaster or adverse event that impacts Upstream data, the backup and recovery mechanism shall be activated to ensure business continuity and the ability to continuously use the data. A recovery plan shall cover scenarios that could result in the loss or corruption of data, such as:

a) Corruption or loss of data
b) Loss of database server (on premise)
c) Loss of data storage facilities
d) Corruption or loss of Cloud server

2.6.3.1 Upstream Data Backup and Recovery Guiding Principles

Upstream Data Backup and Recovery Guiding Principles are rules that describe how Upstream data needs to be handled, stored and backed up to ensure an efficient data backup and recovery plan. Below are the main guiding principles for Upstream Data Backup and Recovery:

a) Upstream data must be backed up on a regular basis and in a systematic manner.
b) Backup data must be separated from the current (primary) server and offsite, except for Geosample.
c) Backup data needs to be tested based on a defined schedule.
d) Data backup frequency depends on the system's criticality.
e) For the SaaS business model, the data SLA for data backup and restoration shall be defined.

The guiding principles are applicable for both physical and digital data that reside on the premise or in the cloud. The respective accountable party shall

comply with Upstream Data Backup and Recovery Guiding Principle to safeguard Upstream data and ensure Upstream business continuity.

2.6.3.2 Upstream Data Backup & Recovery Implementation Requirements

The requirements for Upstream Data Backup & Recovery shall be implemented and complied with by all systems and databases, including physical data. The requirements for Upstream Data Backup & Recovery are, but not limited to, the following:

a) Upstream data must be backed up on a regular basis and in a systematic manner. Data backup frequency must be defined properly according to database or system criticality, and the common backup schedule is daily, weekly, monthly, and yearly basis.
b) Except for Geosample, other Upstream physical data shall be kept at least in two (2) copies, either in digital or physical copy.
c) Upstream data backup and recovery testing schedules must be defined based on database/system criticality:
    i. The testing on data backup and recovery must be conducted as scheduled.
    ii. The backup and restored data shall have the same exact volume as the original data.
    iii. The backup and restored data shall be able to be accessible and readable.

2.6.3.3 Disaster Recovery Plan (DRP)

Disaster Recovery (DR)/Disaster Recovery Plan (DRP) are the strategies and plans for recovering and restoring the organisations' technological infrastructures, facilities, data, and capabilities after a serious interruption.

a) **Physical data**

Upstream physical data operations such as geomagnetic tapes/media and technical documents are managed by PACs.

b) **Digital data**

Upstream Data is currently being stored in individual database/system that are located either on premise or external cloud server provided by Cloud Service Provider (CSP).

In the preparation of disaster occurring and affecting the system, Disaster Recovery Plan (DRP) shall be defined to safeguard Upstream digital data on a cloud server, ensuring no disruption to business operations.

2.6.4 Upstream Data Security 4A Assurance

Upstream Data Security Assurance is categorised into four (4) main elements known as the four (4) A's, namely Access, Authorization, Authentication and Audit, for effective Upstream Data Security regulatory compliance. The definition of Upstream Data Security 4A Assurance is described in Table 2-3 below:

Table 2-3 Upstream Data Security 4A Assurance Description

Access	Access means to actively connect to a system and be working with the data. It also indicates that the person has a valid authorisation for the data.
Authorization	The individual's privileges to access data appropriate to their role. Access Control System checks each time a user logs in to see if they have a valid authorisation token.
Authentication	Authentication is the validation of a user's access. When a user tries to log into a system, the system needs to verify that the person is who he or she claims to be in compliance with the approved credential.
Audit	The security review actions and activities to ensure compliance with regulations and conformance with the organisation's regulations, policies, standards, procedures, and guidelines.

2.6.4.1 Upstream Data 4A Assurance Implementation Requirements

The requirement for Upstream Data Security 4A Assurance shall be implemented and complied with by all systems and databases, including physical data in Upstream Ecosystems.

i. **Access**

Proper access to Upstream data within databases, systems and/or physical copies shall be granted to the entitled party.

ii. **Authorisation**

a) Authorisation shall be granted to the entitled party based on user profiles that are in compliance with the defined PACs Data Security Classification.

b) The user role and access security matrix shall be defined, documented, and complied with. Below is the sample of user roles and access matrix for PACs reference:

Table 2-4 Sample of User Roles and Access Matrix

User Role	User Role Description	Access
Super Admin	This user can manage all data and respective database system	• Edit, add, download, and view all data • Manage user activity (e.g., give permission, assign admin, audit user logging activity)
Admin	This user can manage all data	• Edit, add, download, and view all data • Able to approve Super User and User access to specific data
Super User	This user is entitled to restricted data	• View and download restricted data
User 1	This user is entitled only to assigned data	• View and download entitled data
User 2	This user is entitled only to assigned data	• View only

c) The database or system shall define idle time out and shall be complied with.

d) Surface User profiles should be prohibited from downloading Subsurface domain data, and vice versa.

iii. Authentication

Compliance with strong password criteria, for example, as follows:

a) Contains 10 to 14 characters.

b) Contains at least one of each character of Uppercase, Lowercase, Number and Symbol.

c) Passwords cannot be the same as usernames.

iv. Audit

a) The database or system must have Audit trail capability:

i. Metadata such as created by, created date, modified by, modified date, etc.

ii. User activity logs and monitoring.

b) Proper Audit activities to be undertaken are as follows, but not limited to:

i. Monitor PACs Data Security Classification implementation as per data security procedures developed by PACs.

ii. Review user roles and login activities twice per year. The user's access rights should be reviewed at regular intervals and upon changes, such as promotion, demotion, or termination of employment.

iii. Deactivate access for expired or non-applicable roles immediately.

iv. Monitor Upstream Data Retention compliance.

v. Monitor Data Backup and Recovery execution as per the defined schedule.

The proper implementation of Upstream Data Security 4A Assurance would ensure Upstream data is monitored and meets all governance requirements for safeguarding Upstream data.

2.6.5 Upstream Data Cyber Security

Please refer to Governing Standards for Malaysia Petroleum Operations, Volume 5, Data, Digital and Technology, Section 5.4, Cloud Adoption & Cyber Security for further details on Upstream Data Cyber Security.

2.7 Upstream Data Operations

Upstream Data Operations refers to the planning, control, and support for data assets to maximise their value throughout the data lifecycle, from creation and acquisition to archival and purging.

Upstream should follow the Upstream Data Operation guide to protect and ensure the integrity of data assets, manage data availability throughout its lifecycle, and optimise the performance of database transaction activities.

This section serves as a guide for Upstream in performing data operation activities right from data creation or purchase, data preparation, data QAQC (data quality check), data upload into the respective corporate database, data processing, data disposal, and archival. Figure 2-9 below is an example of Upstream Data Operations Activities.

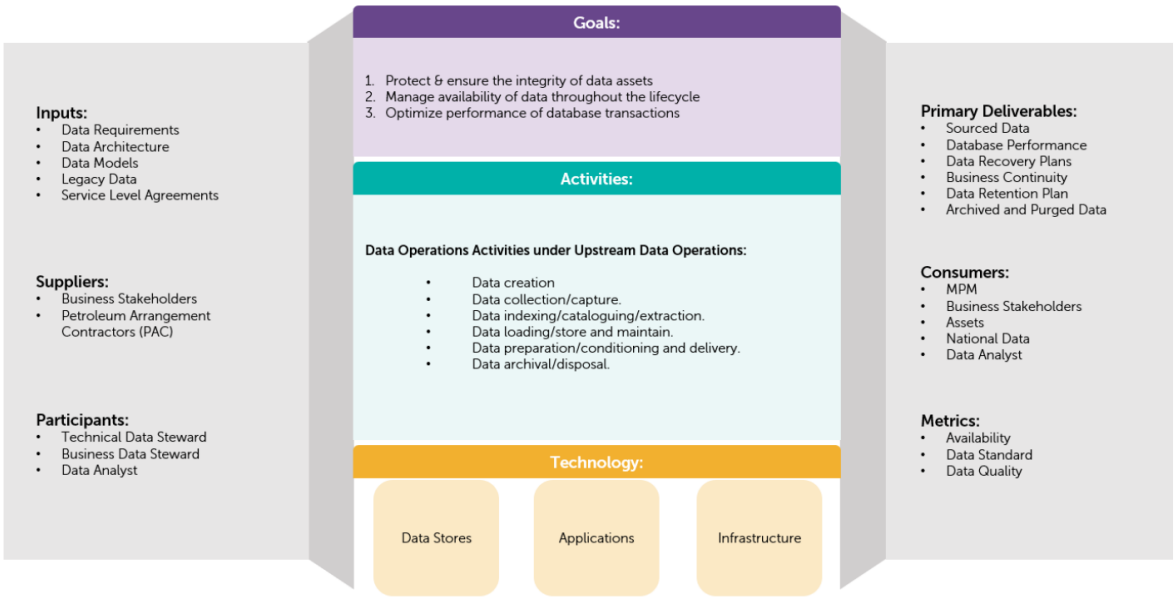

Figure 2-9 Upstream Data Operations Activities

2.7.1 Data Operations Guiding Principles

The five (5) guiding principles of Upstream Data Operations management are as follows:

a) **Identify and Act on Automation Opportunities** - Automate database development and operations processes, develop tools and processes that shorten each process cycle, reduce errors and rework, and minimise the impact on the operation. This improvement shall be made concurrently with Data Modelling and Data Architecture.

b) **Understand and Appropriately Apply Best Practices** - Database standards and best practices shall be applied and be flexible enough to deviate from them if given acceptable reasons for these deviations. Database standards shall never be a threat to the success of a project.

c) **Do more with less** – Improve operational efficiency with best practice data management programmes and advanced technology and tools.

d) **Build with Reuse in Mind** - Develop and promote the use of reusable data objects that prevent applications from being tightly coupled to the data model or database schemas. The end goal is to enable the data objects to be readily used in data operations activities.

e) **Set Expectations for the Upstream Data Operations team** – To ensure a good understanding of Upstream Data Operations on the expectations about roles and responsibilities, Business Process Workflow, standards and the Service Level Agreement (SLA).

2.7.2 Data Operations Lifecycle

Upstream Data Operation Lifecycle is the sequence of stages for a particular unit of data (physical and digital/model) that goes through six (6) processes from its initial creation to capture/collection, QA/QC, indexing/cataloguing, loading/storage, conditioning/preparation, and delivery to its eventual archival and/or disposal at the end of its useful life. Figure 2-10 shows the Upstream Data Operations Lifecycle in detail.

Figure 2-10 Upstream Data Operations Lifecycle

a) **Create/Acquire -** This phase denotes the point of entry of technical data into the company environment. Data is either created by employees or acquired by/from external parties and sources.

b) **Data Collection/Capture/Classify/Approve -** This phase denotes the requirement to classify and approve the technical data based on user entitlement. User entitlement and selection of control treatments shall depend on the risk and security level of the technical data.

c) **Data Indexing -** This phase denotes the requirement to extract, inventory and organise the data in a structured manner, along with the relevant information.

d) **Data Loading/Store or Maintain -** This phase denotes the requirement to properly store and maintain technical data as a PETRONAS asset. No technical data created and/or acquired shall belong to any specific

individual, position, or business unit within PETRONAS. All technical data shall be made available at the PETRONAS level.

e) **Data Prep/Data Conditioning/Delivery -** This phase denotes the process of consolidating, curating, and making it available for business use. Data Users are responsible for ensuring that all data and insights created from the re-used data are captured as new technical data is generated.

f) **Data Archival/Disposal -** This phase archives and disposes of inactive and expired data to ensure the fitness of technical data for its usage and optimise storage and maintenance resources. Data Creators and Acquirers are responsible for identifying the data's active and retention periods of each technical data. Data disposal for expired technical data shall be conducted jointly by the Data Integrator and Data Creator or Acquirer.

2.7.3 Data Creation

The data creation stage is where data is being produced by Upstream activities. The produced final data will then be submitted to PETRONAS via the following:

a) Digital submission
   i. Secure Managed Transfer File (SMFT)
   ii. Online Data Uploader (ODU)

b) Physical submission
   i. PETRONAS Geoscience Centre, the data submission one-stop center

2.7.4 Data Collection/Capture

In this stage, submitted digital unstructured data or documents will be consolidated or captured in dedicated staging storage. Staging storage is only accessible to the Upstream Data Operation team. Data in staging storage shall be deleted from staging storage once QA/QC and data loading into respective database activities are completed.

2.7.5 Data Indexing/Cataloguing/Extraction

Data indexing/cataloguing/extraction is a process where metadata representing the unstructured data and documents is captured into a system. Well-organised data cataloguing ensures visibility over all data.

2.7.6 Data Loading/Store and Maintain

All final data shall be appropriately kept in storage according to specific requirements. Unstructured data or documents shall be uploaded, stored, and maintained in a structured system to ensure the data can be easily accessible. Figure 2-11 below is an example of a structured hierarchy for unstructured data in a repository:

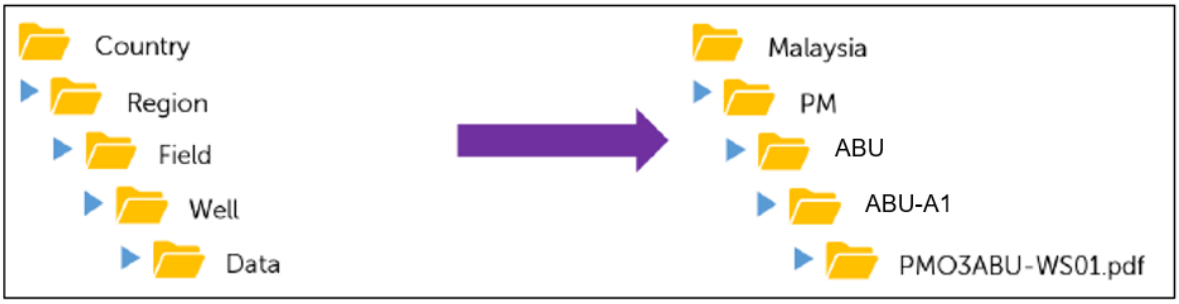

Figure 2-11 Example of Hierarchy for Unstructured Data in Repository

2.8 Upstream Data Architecture

Data architecture is defined as the process of designing and maintaining master blueprints that meet the data needs of the enterprise. Referring to The Open Group (2018) and DAMA International (2017), there are four (4) architecture domains that are generally recognised as the subgroups of an overall Enterprise Architecture, all of which are as follows:

a) **Business Architecture**

It is defined as the identification of how an enterprise generates value for stakeholders and end customers, which includes elements such as business models, processes, capabilities, services, events, strategies, and vocabulary through establishing the requirements for the other domains, and the role of business architects and analysts and business data stewards (DAMA International, 2017, p. 101-102). Business architecture relates business elements to business goals and elements of other domains. Whereas business capabilities represent a particular ability that a business may possess or exchange to achieve a specific purpose (The Open Group, 2018).

b) **Data Architecture**

It describes how data should be organised and handled, which includes elements such as data models, data definitions, data mapping, specification, data flows, and structured data APIs through managing data created and required by business architecture, and it is the role of data architects, data modellers, and data stewards (DAMA International, 2017, p. 101-102).

c) **Application Architecture**

It describes the structure and functionality of applications in an enterprise, which include elements such as business systems, software packages, and databases through acting on specified data according to business requirements, and it is the role of application architects (DAMA International, 2017, p. 101-102).

d) **Technology Architecture**

It describes the physical technology required to enable systems to function and generate values, which include elements such as technical platforms, networks, security, and integration tools through hosting and execution of the application

architecture, and it is the role of infrastructure architects (DAMA International, 2017, p. 101-102).

This is alternatively known as the BDAT architecture domain. Each architecture domain has influence and imposes constraints on other domains, and thus all domains must address development direction and requirements collaboratively. Figure 2-12 is an example of an architecture domain. In view of Data Architecture being the second element of BDAT, it is essential to understand the fundamentals of each element and the relationship between them.

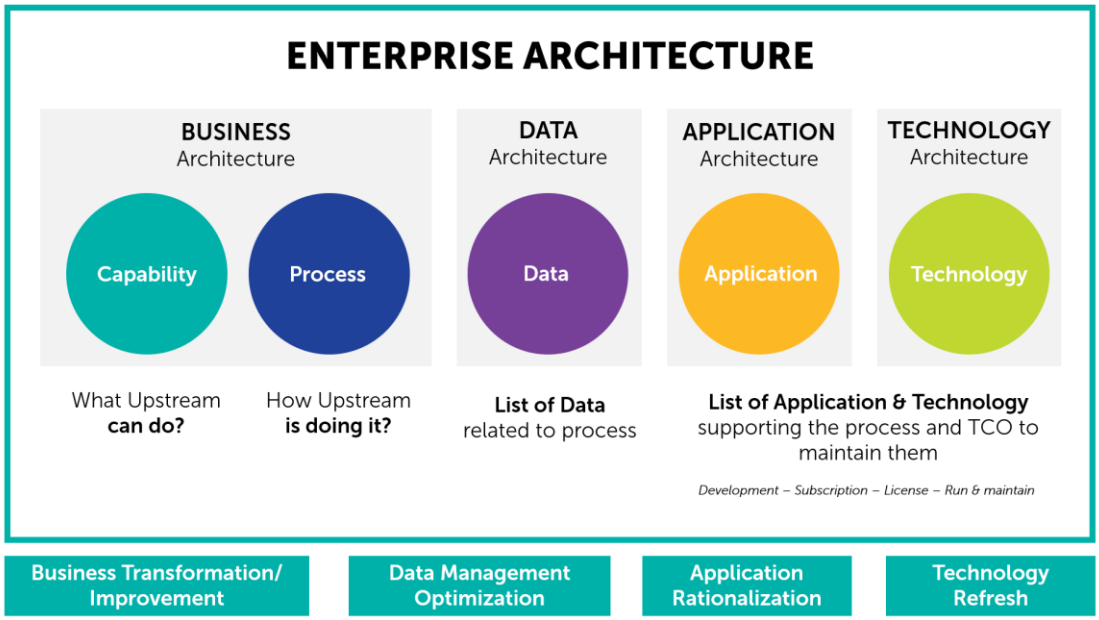

Figure 2-12 Four Tiers of Enterprise Architecture

2.8.1 Upstream Data Architecture Guiding Principles

Data architecture will be used to guide data integration, control data assets, and align data investments with business strategy, as per DAMA International (2017).

There are four (4) data architecture guiding principles, which are as follows:

a) **Availability & Accessibility**

Data should be shareable and accessible throughout Upstream based on entitlement (data security level). Malaysia data should be governed as per Governing Standards for Malaysia Petroleum Operations and international data should be governed as per each country's data restriction policy or country regulations.

b) **Data Standards**

Upstream data should use common vocabulary and data definitions. All Upstream data needs to be defined consistently throughout Upstream, and the definitions are understandable and available to all users.

c) **Trusted Data**

All data objects or derivatives should originate from a data source. In Upstream, all governed data is located within the Upstream unified data platform (e.g. OSDU).

d) **Data Interoperability**

Data should be decoupled from any proprietary application. All Upstream data should be able to integrate with any applications as stated in 2.10.2 Upstream Data Integration Methods.

2.8.2 Upstream Data Architecture Goals

Data architecture goals are referred to in DAMA International (2017), DMBOK Chapter 4, Data Architecture, as follows:

a) To identify data storage and processing requirements.
b) To design structures and plans to meet the current and long-term data requirements of the enterprise.
c) To strategically prepare organisations to quickly evolve their products, services, and data to take advantage of business opportunities inherent in emerging technology.

2.8.3 Upstream Data Architecture Layout

Upstream Data Architecture consists of five (5) elements, which are the Data Source, Data Staging Area, Data Warehouse, Data Mart, and Data and Knowledge Ecosystem. The following is the Data Architecture Layout as shown in Figure 2-13.

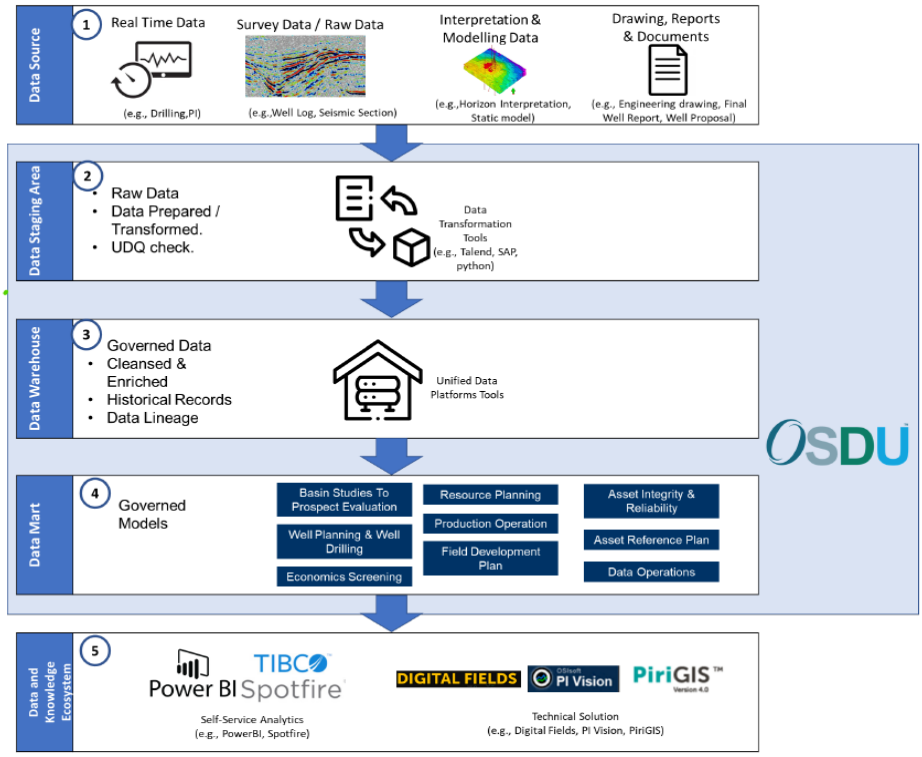

Figure 2-13 Upstream Data Architecture Layout

a) **Data Source**

A data source is defined as the initial location where data is born or where physical information is first digitised. However, even the most refined data may serve as a source, provided another process accesses and utilises it (Talend Inc., n.d.). In Upstream, the data source is comprised of but not limited to real-time data, technical data, interpretation and modelling data, and reports and documents.

b) **Data Staging Area**

A data staging area is a location for the extract, transform, and load (ETL) effort to take place, as mentioned in DAMA International (2017). Data should be prepared and transformed according to the business rules before it is moved to the data warehouse.

c) **Data Warehouse**

A data warehouse is a single integration point for a corporate data store (an integrated database of operational data) to support management decision-making and strategic analysis and planning, as described in DAMA International (2017).

d) **Data Mart**

Data Mart is a subset of a data warehouse designed to support a particular category of analysis or a specific group of data consumers, as stated in DAMA International (2017). Data marts make specific data available to a target group of users for quick access to critical insights without searching through an entire data warehouse. Data Marts will feed data to the Business Intelligence (BI) Tool for operations and business performance analysis.

e) **Data and Knowledge Ecosystem**

The data accessed through the data marts is trusted to have high-quality data that fuels the overall Upstream business operations. The users are able to explore, discover, connect, and blend different types of data to perform actionable insights through serve-serve analytics tools (e.g. PowerBI) or make informed and calculated business decisions through the technical solution (e.g. GIS).

Data architecture is the main pillar for determining and recognising the current Upstream Data Landscape. It provides insights to strategise the improvements needed for the current data environment within Upstream.

2.9 Upstream Data Modelling & Design (M&D)

Data Modelling is the process of discovering, analysing, and scoping data requirements and then representing and communicating these data requirements in a precise form called the data model.

2.9.1 Data M&D Guiding Principles

The five (5) guiding principles for Data M&D are as follows:

a) The Upstream Data Management Guideline should prioritise the adoption of data models based on industry standards. Data Management Guideline subscribes and adopts data models from the following industry standards:
   i. The PPDM data model;
   ii. The Open Group Energistics data schema (WITSML, RESQML, PRODML);
   iii. The Open Group OSDU data schema;
   iv. The International Association of Oil and Gas Producers CFIHOS data model; and
   v. The International Organisation for Standardisation ISO 15926 data model.

b) The Upstream Data Management Guideline adopts commercial data models from Industry Service Providers (ISP) that have been evaluated and approved.

c) A custom-built data model should be considered in the event of the followings:
   i. The requirement is not incorporated in any of the industry standards that are adopted by the Upstream Data Management Guideline; and
   ii. The requirement is not available in the ISP's commercial data models that are adopted by the Upstream Data Management Guideline.

d) A custom-built data model shall follow a four-schema approach that provides subject area, conceptual, logical, and physical levels of detail.

e) Data models should be documented. The documents should include Data Model Usage Rules, Entity-Relationship (ER) diagram, Data Architecture and User Guides.

2.9.2 Upstream Commercial Data Model by Industry Service Providers

Commercial data models are provided together with a Data Management System as an underlying database by Industry Service Providers (ISP). Commercial data models and their Data Management System provide off-the-shelf adoption and consumption and are sustained by the ISP engineering team for defect fixing and enhancement.

The commercial data model should provide the following features as a preference to Upstream data management guiding principles:

a) The commercial data model should be an open data model;
b) The commercial data model should provide a data model usage rules document and Entity-Relationship (ER) diagram;
c) The commercial data model shall be accessible via industry-standard connectors such as ODBC, API, and database native connectors;
d) Should the data model contain BLOB (binary large object), ISP shall provide API openness for data accessibility; and
e) Commercial data models should provide extensibility capability in the event that additional data entities are needed on an ad hoc basis.

2.10 Upstream Data Integration & Interoperability (I&I)

Managing efficient data movement between data sources or applications in an organisation is important to ensure data is transferred securely and in the format and timeframe needed by the business.

Data Integration and Interoperability (I&I) describe the processes related to managing the movement and consolidation of data within and between data stores, applications, and organisations.

2.10.1 Upstream Data I&I Guiding Principles

The guiding principles for Upstream Data I&I are as follows:

a) The design of the Data (I&I) shall consider the enterprise perspective to ensure future extensibility and implement it through iterative and incremental delivery;
b) The design and activity shall have business accountability in the design and modification of data transformation rules;
c) The Data (I&I) shall comply with the defined data security rules; and
d) Adopt the Industry Standard where applicable.

2.10.2 Upstream Data Integration Methods

Designing and Implementing the Upstream data integration method should align with the Upstream Data Architecture. Below are the recommended Upstream Data Integration methods for Upstream Data:

a) **Extract, Transform, Load**

Extract, Transform and Load (ETL) or Extract, Load and Transform (ELT) is the basic process for all areas of Data (I&I). This process includes defining the source to be extracted, the rules for extraction, the targets where data are to be loaded, and any transformation rules or calculations to be applied. ETL, or ELT, can be implemented on batch or real-time data or based on a change or event. These are important steps needed when it comes to transferring data between data sources or applications in Upstream.

i. **ETL**

ETL is an integration method where data is first extracted from the source, then undergoes a data transformation process to the required format on the ETL server or staging area, and finally loaded into the target location. ETL is used for on-premises, relational, and structured data. Refer to Figure 2-14 for the ETL process flow.

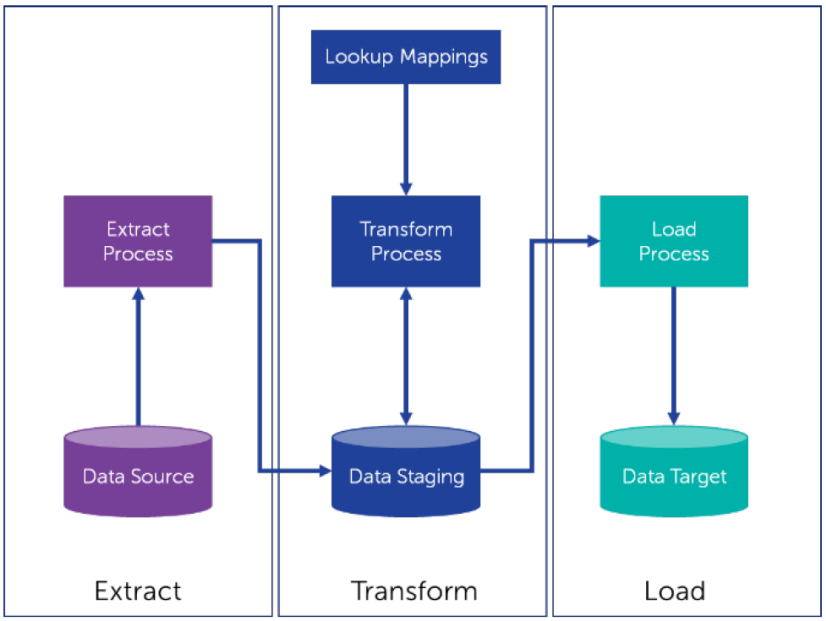

Figure 2-14 Process Flow for ETL

ii. **ELT**

ELT is an integration method where data is first extracted from the source, then straight loaded to the target location, followed by the data transformation process to the required format. ELT is usually used with no-SQL databases like Hadoop clusters or cloud installations. Refer to Figure 2-15 for the ELT process flow.

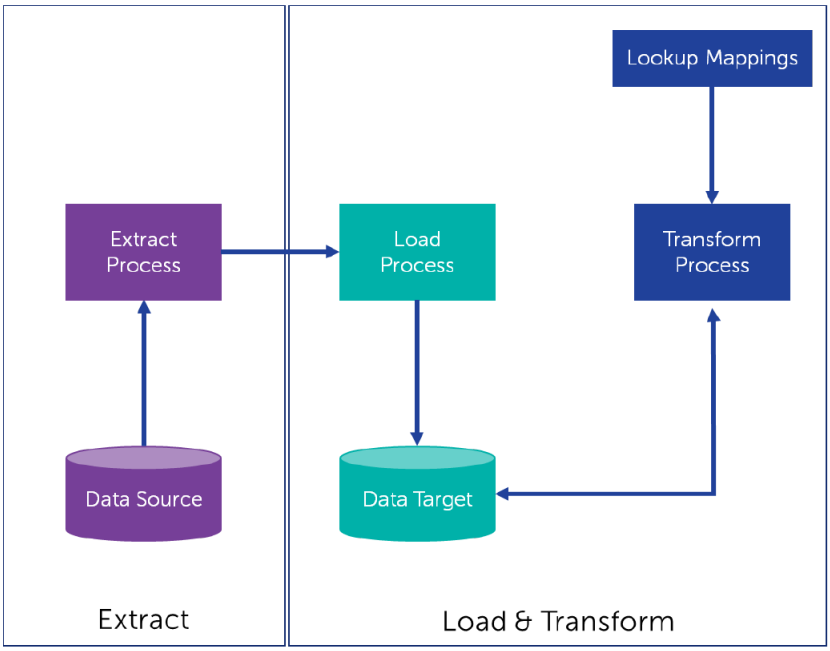

Figure 2-15 Process Flow for ELT

Data movement can be processed either in batch, real-time, or event-based. The definitions of batch, real-time, and event-driven are as follows:

i. **Batch Processing** –The data are grouped and processed in a single run of transactions.
ii. **Real-Time Data Processing** –The data are transferred in small groups on demand.
iii. **Event-Driven** – The data are processed when an event happens; for example, updates only apply to the data that has been changed within a defined timeframe to the application and consumers of the data.

Both ETL and ELT will require a Data Transformation Engine or ETL Tool. The selected data transformation engine should have the following functionalities:

i. The ability to perform batch, real-time, and event-driven processing;
ii. The ability to identify the record changes;
iii. The ability to perform the required transformation by business; and
iv. The ability to perform error-handling operations.

b) **Application Programming Interface (API)**

The Application Programming Interface (API) is a communication protocol used by various programmes to communicate between them. The common types of API are:

i. **SOAP** (SIMPLE OBJECT ACCESS PROTOCOL): It defines messages in XML format used by web applications to communicate with each other.
ii. **REST** (Representational State Transfer): It makes use of HTTP to GET, POST, PUT, or DELETE data.
iii. **JSON-RPC**: It uses JSON for data transfer and is a light-weight remote procedural call defining a few data structure types.
iv. **XML-RPC**: It is based on XML and uses HTTP for data transfer. This API is widely used to exchange information between two or more networks.
v. **ODBC** (Open Database Connectivity): An API used for accessing different SQL databases.

2.10.3 Data Integration Industry Standards

Adopting industry standards for data integration will reduce time, effort, and cost. This can be divided into two (2) areas, which are:

a) **Industry Standard Data Model**

The adoption of a comprehensive data model that covers multiple data domains' in a single centralised database and is adopted by industries (vendors and operators) is encouraged. A single data platform seamlessly handles data integration and interoperability (e.g. data movement, format) as compared to silo systems. An example of this data model is the OSDU data model.

b) **Data Exchange Standards**

Data Exchange Standards facilitate the sharing of structured data across different information systems. It specifies a common model that standardises the format in which data will be shared. The intention is that the sender and receiver of information share a common, unambiguous understanding of that information.

Upstream adopts Energistics data exchange standards, which use Extensible Markup Language (XML) for schema definitions and element representation. Some of these standards are WITSML, PRODML, RESQML, SEG-Y, and LAS.

2.10.4 Upstream Data Integration Process

Data I&I activities should be integrated by following the below process in Figure 2-16:

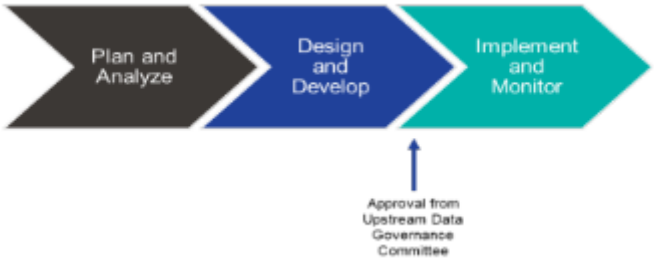

Figure 2-16 Upstream Data Integration Process

a) Plan and Analyse

Activities that need to be carried out under this process would be as follows:

i. **Define Data Integration and Lifecycle Requirement**

In this activity, it is important to clearly define the requirements needed for data integration.

ii. **Perform Data Discovery**

The objective of performing this step is to identify the sources of a data integration and make a high-level assessment of data quality to ensure that the data is appropriate for an integration.

iii. **Record Data Lineage**

This activity will give an overview of how the data will flow from the data source to the destination. It is important to identify how the data is being used for analytics or decision-making in Upstream.

iv. **Collect Business Rules relating to the process**

The business rules will ensure data behaves as required by the business and are part of data quality control. Thus, it is important that the business rules are collected and gathered accordingly.

A proper plan may be put in place upon completing the whole activity from Define Data Integration and Lifecycle Requirement to Collect Business Rule.

b) Design and Develop

Designing and Developing Data Integration solutions shall require the data architect and data engineer to see from the overall Upstream view. This will enable time and cost savings as a more concerted Data Integration design is produced. Below are the activities that need to be carried out in designing and developing data integration solutions:

i. Design Data Integration Architecture

In this process, there are two (2) activities involved, as per below:

1. **Select Interaction Model**

   A suitable interaction Model should be selected as per below:

   - **Hub-and-spoke**

     This interaction model consolidates shared data into a central hub that many applications can use.

   - **Publish-subscribe**

     This interaction model involves pushing data out (publish) and pulling data in (subscribe) from other systems.

   There is no one solution that fits all interaction models in Upstream. The selection should be made on a case-by-case basis, depending on the suitable interaction model to meet the desired objective. The respective data engineer will need to develop the respective interaction model upon selection.

2. **Design and Develop Data Services or Exchange Patterns**

   It is recommended to use industry exchange patterns (e.g. OSDU, WITSML) if the current data complies with the exchange patterns; otherwise, using the existing data design that describes the data flow is recommended. If there is no existing data design available, a design data service will need to be created.

ii. **Map Data Sources to Targets**

Mapping the data source to the target will require the rules of transforming the data from its data source to the target. It is also important to identify whether it needs to be done on a batch schedule or in real-time.

iii. **Design and Develop Data Orchestration**

It is important to properly design and develop the Data Orchestration, which defines how the data flows from start to finish. This also covers the steps needed to complete the transformation and/or transaction in batch and real-time frequency.

c) **Implement and Monitor**

The implementation should be done based on the tested and approved Data Integration design. Proper monitoring is required to ensure that any issues or gaps are captured and addressed accordingly during the implementation.

2.11 Upstream Data Warehousing & Business Intelligence (DWBI)

The Data Warehousing and Business Intelligence (DWBI) knowledge area describes the planning, implementation, and control processes to provide a decision, support data, and support knowledge to workers who are engaged in reporting, querying, and analysis.

Upstream is recommended to adhere to the DWBI guidelines. The objective of the DWBI is to ensure that data warehouses are designed to fit the purpose and are adaptable to evolving business demands, as well as business intelligence that can utilise the integrated data from the data warehouse to deliver immediate value to business operations.

2.11.1 Data Warehouse & Business Intelligence Guiding Principles

The guiding principles for DWBI are as follows:

a) Data Warehousing content shall be developed based on Upstream business solution requirements and the scope of end-to-end data delivery with regard to the selected Business Intelligence system;
b) To construct and implement a Data Warehouse in a "fit for purpose" mode and expand as the need arises through focus projects or sprints;
c) Shall be done in adherence to other Data Management Knowledge Area guidelines, including Reference and Master Data Management, Metadata Management, Data Architecture, Data Modelling and Design, Data Governance, and Data Quality; and
d) With the OSDU data platform, Upstream business should select a Business Intelligence tool that is certified with OSDU compatibility.

2.11.2 Data Warehousing

Data warehousing is the process of extracting, cleansing, transforming, controlling, and loading data from various sources into a Data Warehouse. A data source is a location where the data being used originates from. The data warehousing process aims to deliver integrated data consisting of historical operational data that can be retrieved and analysed to provide meaningful insight into operations.

As such, the Data Warehouse can be seen as the key driver for supporting operational functions, compliance requirements, as well as Business Intelligence activities.

There are several components that make up data warehousing:

a) **Staging Area**

A staging area is a database in between the source database and the target database, and this is where integration and ETL (Extract, Transform and Load) take place to put data into a common form. Data should be prepared and transformed according to the business rules before it is moved to the data warehouse.

b) **Data Warehouse**

A data warehouse is a database that collects and aggregates data from various sources to be analysed to produce business insights. It provides a unified approach for organising and representing data that is collected by business operational systems and offers decision-making support to different departments or business units across an enterprise. The data flows in one direction into a Data Warehouse from the source application systems, Corporate Data Stores, and external data sources and flows out in one direction to the Data Mart. Ideally, data that needs correction shall be rejected, corrected at the source, and flow back in through the system.

c) **Data Mart**

A data mart is a subset of a data warehouse that is focused on a particular line of business, department, or subject area. Data marts make specific data available to a target group of users for quick access to critical insights without searching through an entire data warehouse. Data Marts will feed data to the Business Intelligence (BI) Tool for operations and business performance analysis.

Refer to Figure 2-17, which shows an overview of data warehousing components. In addition to the three (3) main components that make up Data Warehousing, Data Governance is implemented from planning, developing, up to operationalising a Data Warehouse. Data Architecture, Data Modelling and Data Integration are the key elements that must be defined and designed. Reference and Master Data and Metadata Management will provide access to common data, simplify integration, and ensure quality data in the Data Warehouse. Data Security and Data Quality must be established.

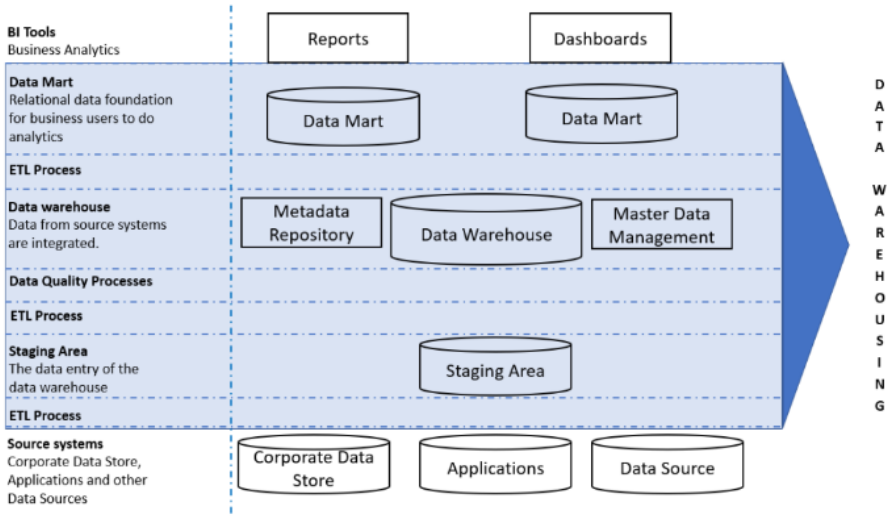

Figure 2-17 Component of Data Warehousing

2.11.3 Business Intelligence

Business Intelligence (BI) is defined as:

a) A type of data analysis used to understand, improve, and optimise decisions and performance; and
b) The set of technologies that support the data analysis activity.

BI tools allow for data to be drawn from the Data Warehouse as well as other sources. BI tools will organise, analyse, and visualise to draw business insights. Data is retrieved from the Data Warehouse and used by the BI tool for analysis and visualisation. The BI tools commonly used in an organisation are Microsoft Power BI, Tableau, and QlikSense.

2.11.4 Data Warehousing & Business Intelligence (DWBI) Development and Implementation

DWBI has different functions, but both need to be connected to bring value out of the data that the organisation generates. BI systems and tools use the data stored in the data warehouse, which acts as a foundation for business intelligence.

These are the three (3) main areas that must be developed in parallel when developing a DWBI system:

a) **Data** – Identify the type of data, its source, and how to make it available, accessible, applicable, and actionable.
b) **Technology** – Identify what kind of technology or application is to be used for back-end systems, to process the data, to flow the data, and to integrate the data.
c) **Business Intelligence Tools** – Select the right application software or solution to be used to transform data into actionable insights.

Data Warehouses must be built incrementally and made scalable. Below are the key steps in developing a DWBI system:

a) **Understanding Business Requirements**
   i. Define business goals and strategies; and
   ii. Define key performance metrics.

b) **Define the Data Warehouse and Business Intelligence (DWBI) Architecture**
   i. Define the DWBI Technical Architecture
   ii. Identify the Warehouse Hosting Environment, On-premise or Cloud;
   iii. Choose or develop a Data Model;
   iv. Establish a data flow diagram for the entire data set;
   v. Identify the suitable Integration tool and process; and
   vi. Identify the suitable BI Tool based on key user groups, their business requirements, and method of analysis.

c) **Develop Data Warehouses and Data Marts**

i. Map Sources to Target

ii. Establishing transformation rules to map data entities and attributes from their respective sources to the target system.

iii. Cleansing and correcting data, as well as implementing relevant standards to ensure the quality of the data. Data cleansing and correction shall be performed at the data sources.

iv. Transforming data by implementing business rules to ensure that the captured data meets all the six (6) quality dimensions as well as enables easy integration and interoperability.

d) **Populate the Data Warehouse**

i. Utilise tested Integration tools (e.g. ETL tool) to populate the warehouse.

e) **Configure Business Intelligence and Analytics Tools**

f) **Roll-out the Warehouse and Business Intelligence Tool**

g) **Maintain Data Warehousing Business Intelligence System**

i. Maintenance includes extensions, modifications, and improvements, which will be done incrementally;

ii. Monitor load processes and plan for partitioning, backup, recovery, and archiving; and

iii. Monitor BI Tool performance and customer feedback on performance, adequacy of features, speed, and other issues.

2.12 Upstream Data Capability

This data capability topic defines the data-specific knowledge and skills required when working with data. It is a critical enabler for delivering efficient, effective, and responsive data management services for Upstream.

Upstream Data Capability shall cover knowledge and skillsets from both the general data management and specialised business domain in terms of technical know-how, processes, and databases.

A capability development programme shall be fit for purpose and align with industrial professional bodies.

2.12.1 Upstream Data Capability Guiding Principles

The following are guiding principles for Upstream Data Capability:

a) Shall have basic knowledge about data management and good behaviour in data handling; and
b) Self-learning is encouraged, and individuals may participate in additional learning programmes recognised by data management professional bodies that are deemed necessary to enrich their knowledge.

2.12.2 Upstream Data Capability Knowledge and Skillset

PACs who are involved (directly or indirectly) in creating, capturing, managing, and using data should have the required level of data management knowledge or skill. Typically, the level of knowledge required can be grouped into two (2) categories below:

a) **Non-Data Management Practitioner** – Requires the fundamental data governance and data management knowledge.
b) **Data Management Practitioner** – Requires in-depth knowledge and skill in data management and an understanding of technical knowledge and data in the area of specialisation (Geoscience, Petroleum Engineering, Wells and Engineering). A holistic and fit-for-purpose capability development programme for Upstream Data Management practitioners should be guided by data management professional bodies.

3 DATA MANAGEMENT FOR PACs

Data management is a fundamental practice that underpins the digital age, acting as the foundation upon which the organisation develops its operations, decision-making processes, and innovation strategies.

It entails tasks such as data collection, consolidation, preservation, validation, auditing, and archiving. It also comprises strategies for ensuring data security and integrity, as well as practices for keeping data up-to-date, correctly organised, well handled, and conveniently accessible.

The objective is to guide PACs on how to manage technical data effectively while ensuring data accuracy, reliability, and security. This ensures that the data availability complies with PETRONAS standards and requirements.

This section consists of the following topics, which will equip PACs with the knowledge and understanding to handle their data according to PETRONAS standards and requirements:

a) **Data Preservation, Handling and Disposal/Deletion**

Provides guidance on how to preserve and handle data to ensure it remains accessible and usable at any time. It covers both physical and digital data handling, which includes further explanation of the appropriate disposal or deletion method of data based on the type of data.

b) **Data Submission by PACs**

Provides details on the standard processes and requirements for physical or digital data submission to PETRONAS, and it will specify the online data submission platforms according to PETRONAS requirements.

c) **Technical Data Release**

Includes details on PETRONAS requirements and standard processes for technical data release based on certain scenarios, such as internal studies, external studies, cloud initiatives, and disposal activities. This section will provide further information on accessing Malaysia data.

d) **Data Request**

Explains the process of technical data request and retrieval by PACs, based on certain scenarios.

e) **Data Transfer from PETRONAS to PACs**

Provides information on data transfer mediums from PETRONAS to PACs. This section will guide PACs on the access of the respective data transfer medium.

f) **Quarterly Commitment Reporting (QCR)**

Provides the details on Quarterly Commitment Reporting (QCR) submission to PETRONAS and the related references.

g) Contractor's Compliance **Index (CCI)**

Provides the objectives, assessment scope, and components of CCI for technical data.

h) **Relinquishment/Due Diligence Audit (DDA)**

Includes the objectives and approach, scope of the audit, data preparation steps, and reporting of DDA summary to PETRONAS.

i) **Work Programme Budget (WPB) for Technical Data Management**

Provides the general expectations for technical data management and guides PACs on other WPB-related processes.

3.1 Data Preservation, Handling & Disposal/Deletion

Any Upstream data created shall be preserved, handled, and securely disposed of and/or deleted to ensure its value is properly maintained. The goal is to prevent data loss, ensure data longevity, and support its continued usage and advancement. PACs shall responsibly maintain, protect, utilise, and appropriately dispose and/or delete data throughout its entire lifecycle according to PETRONAS standards and requirements. The definition of Upstream data preservation, handling, disposal, and deletion is described in the below Table 3-1 Definition Upstream Data Preservation, Handling & Disposal/Deletion:

Table 3-1 Definition of Upstream Data Preservation, Handling & Disposal/Deletion.

Data Preservation	Refers to the practice of safeguarding and maintaining data's safety and integrity over time. This is accomplished by following specific procedures such as using long-lasting file formats, keeping copies of files in local storage, or storing data in dedicated repositories to ensure that Upstream data will be available and usable in the long term.
Data Handling	Refers to the process of collecting, storing, archiving, sharing, transfering, and disposing/deleting of Upstream data in a safe and secure manner during and after Upstream activity.
Data Disposal	The final phase of a data lifecycle focuses on data disposal, where the data is removed completely from all forms of storage. The data disposal may be subject to the record retention schedule defined or due to the disposal.
Data Deletion	Involves the erasing of Upstream data, which refers to the permanent deletion of data such that it can no longer be recovered.

3.1.1 Physical Data

Physical data is defined as any form of data that has a physical appearance, such as a core, well log, etc. PACs shall preserve, retain, and dispose of all data generated from Upstream activities that is stored in repositories and ensure business continuity pursuant to Contract expiry or operatorship transfer. The physical data in this topic consists of the following:

a) Geomagnetic Tape; and
b) Technical Document

3.1.1.1 Geomagnetic Tape

Seismic geomagnetic media typically refer to data recording methods used in the field of geophysics, specifically in the study of seismic and geomagnetic phenomena. These methods involve the use of specialised instruments and recording devices to capture data related to seismic events and geomagnetic field variations. This data can be essential for research in geophysics and related fields.

PACs shall index all related information pertaining to geomagnetic tapes in their updated database. Any changes or movements on the media shall be updated and archived accordingly.

3.1.1.1.1 Data Preservation and Handling

PACs shall maintain and preserve all geomagnetic tapes to avoid obsolescence. The efficient management of data shall be undertaken to ensure data availability via the following methods:

a) Stored at a controlled temperature of 20°C with low humidity and labelled with information;
b) Image capture for metadata; and
c) Second copy to comply with the Disaster Recovery Plan (DRP)

3.1.1.1.2 Data Disposal

For geomagnetic tapes, PACs shall dispose of all obsolete media within six (6) months after the remastering activity. However, it depends on the retention period of the geomagnetic tapes.

Geomagnetic tapes disposal may be conducted in the following methods:

a) Incineration;
b) Physical or chemical treatment; and
c) Crash and dump

Please refer to 3.3 Technical Data Release, 3.3.5 Data Release for Disposal and/or Deletion Purposes for further details.

3.1.1.2 Technical Document

PACs shall submit technical documents to PETRONAS in digital format for archival purposes. In circumstances that require physical documents to be retained and stored, the requirements below will apply.

PACs shall store and manage all physical technical documents, either active or inactive, in boxes, or files, or folders with proper tagging or labelling and display them clearly to allow easy access.

The technical documents can be categorised as follows, but are not limited to:

a) Maps;
b) Technical report;
c) Seismic section;
d) Well log print;
e) Technical standards or procedures;
f) Technical manual or guideline;
g) Project documents (e.g. dossier, QA/QC, design data, and report); and
h) As built-drawing and others

3.1.1.2.1 Documents Preservation and Handling

PACs shall maintain and preserve all physical documents to ensure easy access and comply with all document storage requirements, including the following:

a) Documents are stored at the recommended temperature of 20°C to 25°C and below the dew point;
b) Good ventilation is in place with the recommended 40%-65% humidity level;
c) Secure the premises from any unauthorised access and have proper safety or security measures in place, such as surveillance cameras or the presence of security personnel;
d) The premises shall be protected against fire, water, pests, and any potential danger or disaster;
e) All stored documents are properly recorded and inventoried in a master list for easy access and retrieval; and
f) Dedicated personnel are assigned to handle document management safely and systematically.

3.1.1.2.2 Document Disposal

Physical documents shall be retained for a minimum of ten (10) years before disposal. Hence, PACs shall dispose of all documents that have reached their retention period. PACs also shall obtain PETRONAS approval prior to retention or disposal activities, please refer to 3.3 Technical Data Release, 3.3.5 Data Release for Disposal and/or Deletion Purposes for further details.

The following are the recommended methods for document disposal, but not limited to:

a) Shredding;
b) Pulping; and
c) Burning

3.1.2 Digital Data

Digital data is described as any form of data that has been stored in a database. PACs shall preserve, retain, and delete all data generated from Upstream activities that is stored in their database or shared folders to ensure business continuity pursuant to Contract expiry or operatorship transfer. PACs also shall delete the data acquired from PETRONAS once their studies or analysis have been completed. Digital data in this topic consists of the following:

a) Data generated from Upstream activities; and
b) Data acquired from PETRONAS by PACs

3.1.2.1 Data Generated from Upstream Activities

Data is generated by PACs throughout their Upstream activities. PACs shall submit the generated data to PETRONAS throughout their PSC contract validity through the respective platforms. Please refer to 3.2 Data Submission by PACs, 3.2.2 Digital Data Submission Through Secure Managed File Transfer (SMFT), and 3.2.3 Data Submission Through Online Database Platform.

3.1.2.1.1 Data Preservation and Handling

For generated data storage, PACs shall comply with the following requirements:

a) PACs shall submit the generated data according to PETRONAS data submission requirements (refer to Appendix 5);
b) The generated data shall be accessed by internals only; and
c) PACs shall manage the generated data by referring to 2.7 Upstream Data Operations, 2.7.6 Data Loading/Store and Maintain.

3.1.2.1.2 Data Deletion

PACs shall delete all generated data once their PSC contract has reached expiration. The following are the recommended methods for data deletion, but not limited to:

a) Delete the data of the Upstream activity from PACs' database or shared folder; and
b) Provide evidence of the data deletion to PETRONAS.

3.1.2.2 Data Acquired from PETRONAS

PACs may request and acquire data from PETRONAS for purposes such as studies, analysis, etc. Please refer to 3.4 Data Request.

3.1.2.2.1 Data Preservation and Handling

PACs shall comply with all acquired data storage requirements with the following:

a) The acquired data is for authorised personnel only;
b) The acquired data shall not be shared with external party without PETRONAS approval;
c) The acquired data shall be stored in a proper, safe, and secure manner in PACs database/platform/premise; and
d) The acquired data shall be deleted after the specific purpose of the data is completed.

3.1.2.2.2 Data Deletion

PACs shall delete all acquired data from PETRONAS once their purpose is completed. The following are the recommended methods for document deletion, but not limited to:

a) Delete the data of the Upstream activity from PACs' database or shared folder; and
b) Provide the evidence to PETRONAS

3.2 Data Submission by PACs

PACs are required to submit to PETRONAS all final and approved data generated and acquired as a result of the technical oil and gas activities throughout the exploration phase until the abandonment phase, in accordance with PSC.

PACs to submit all data, either digital or physical, to PETRONAS. For physical data, PACs are required to send it to PGSC. While for digital data, PACs are to submit through Secured Managed File Transfer (SMFT) or a specific online database platform.

Further details on data submission requirements are provided in Appendix 5. PACs shall comply with all data submission requirements.

Please refer below to Figure 3-1 on PACs data submission to PETRONAS.

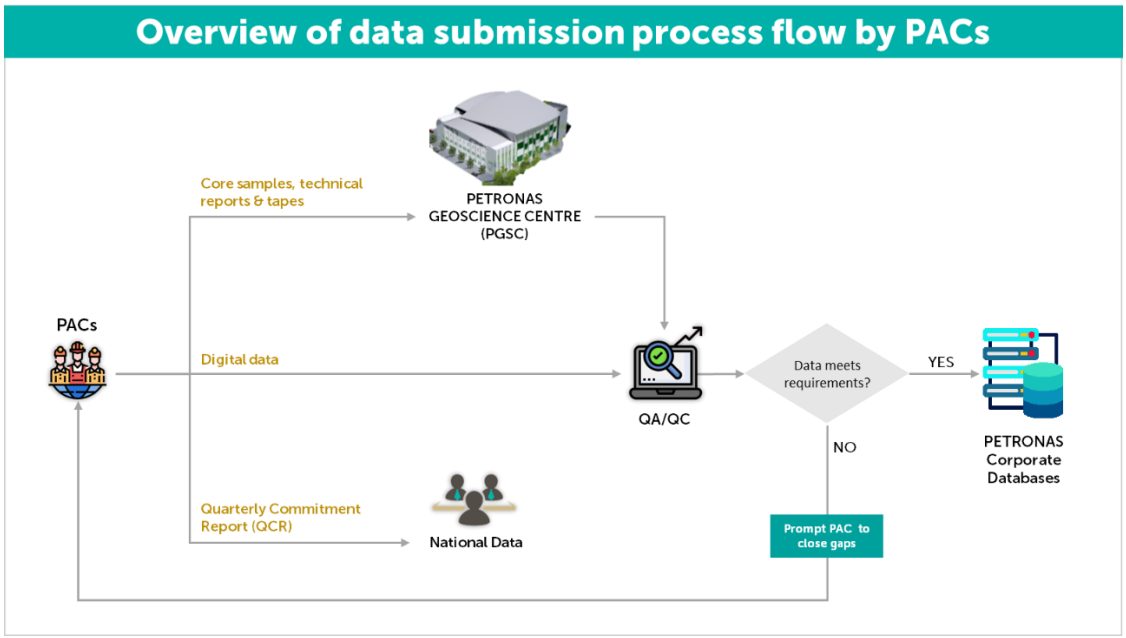

Figure 3-1 PACs Data Submission Illustration

3.2.1 Physical Data Submission to PETRONAS GEOSCIENCE CENTRE

Physical data submission refers to the submission of geo-samples, seismic tapes, and fluid samples. PACs shall notify PETRONAS at least three (3) business days prior to the transfer of physical data to PETRONAS GEOSCIENCE CENTRE (PGSC).

For any data submission to PGSC, a transmittal form (refer to Appendix 6) must be produced and recorded for both PACs and PETRONAS reference. For detailed data submission requirements, refer to Appendix 5.

3.2.1.1 Geo-samples

Geo-samples consist of conventional cores, core photos, core plugs, dry cuttings, isotubes, mud samples, fluid samples, resinated cores, samplex, side wall cores, thin sections, and unwashed cuttings.

All Malaysia geo-samples will be consolidated, managed, and centralised in PGSC. PACs shall submit all geo-samples, which include dry cuttings, in boxes as per PETRONAS' requirement as stipulated in Appendix 5.

For all geo-samples that are used for study or lab test purposes, including any non-destructive or unspent samples, the PACs shall return the samples and all comprehensive technical reports acquired from the lab test to PETRONAS upon job completion.

3.2.1.2 Geomagnetic Tapes

PACs shall submit two (2) copies of the original data to PETRONAS at PGSC. Refer to Appendix 5 for the detailed data submission requirements.

Submission of all physical core samples or cuttings, seismic data (field, navigation, pre-stack, and post-stack), well logs, well data or information, and other technical reports or documents shall be sent to the address below:

PETRONAS GEOSCIENCE CENTRE (PGSC),
No. 1 Jalan AU3/1, Taman Keramat,
54200 Kuala Lumpur,
Wilayah Persekutuan Kuala Lumpur.

The contact numbers for the respective areas are as below:

a) Physical core samples or cuttings: (6)03 2332 1511/1514
b) Seismic data (field, navigation, pre and post stack data): (6)03 2332 1520
c) Well logs or well general data: (6)03 2332 1520
d) Reports or documents: (6)03 2332 1520

PETRONAS will inform PACs of the details of the contact person from time to time, or in the event that the addresses are changed or revised.

3.2.2 Digital Data Submission Through Secure Managed File Transfer (SMFT)

PETRONAS Secure Managed File Transfer (SMFT) is a secure managed file transfer solution between PETRONAS and external users. SMFT is a solution to exchange large files between PETRONAS and external parties. It provides a safe, audited method for file and document transfers within and outside of PETRONAS. PACs shall submit all final data via SMFT to PETRONAS.

In order to submit data via SMFT, PACs need to have a user ID and password to login to SMFT. For SMFT access, PACs may reach out to the National Data Team to obtain ID creation.

PACs should note that the SMFT access will be removed automatically for users who have not logged in for ninety (90) days, and files will be removed automatically from the SMFT server after fourteen (14) days. Please refer to Figure 3-2 on the SMFT file transfer workflow.

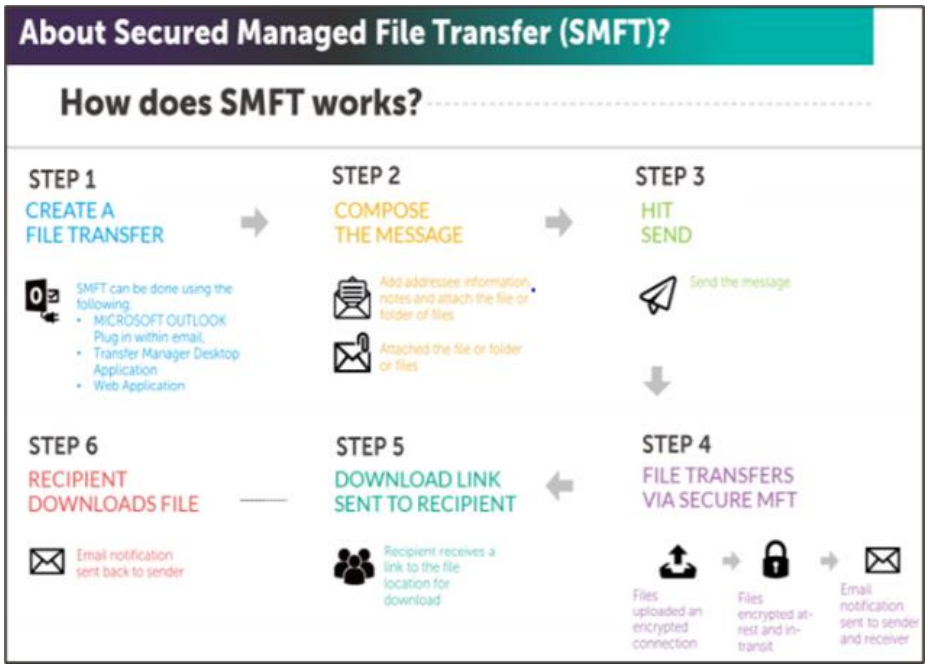

Figure 3-2 SMFT File Transfer Workflow

Below Table 3-2 is the summary of SMFT criteria and details. For SMFT service-related inquiries, PACs may email to MFT Support Team through mft.support@petronas.com.my.

Table 3-2 SMFT Criteria and Details

No.	Criteria	Details
1	Definition	Exchange of large files within and outside PETRONAS
2	File transfer limit	Min 18MB; Max 100GB
3	File transfer resume	File transfer will be resumed automatically
4	File encryption	Files are encrypted during storage and transfer
5	File tracking	Users can track or view the status of the file in the message tracking report
6	File type to transfer	• Inspection Reports • Engineering Drawings • Plant's Design • High-Definition Videos • ISO file extension • Large dataset
7	File retention	14 days
8	Recommended and supported transfer method	• Web Browser • MS Outlook • MFT Client
9	Recommended usage	Peer-to-peer file transfer

3.2.3 Data Submission Through Online Database Platform

An online database platform refers to an integrated technology solution that allows for the collection, processing, storage, management, and analysis of data.

PACs shall submit all final data through a specific online database platform such as PETRONAS Data Management System (P-EDMS), Online Data Uploader (ODU), and Deferment Management. The data submission requirements can be referred in Appendix 5.

Refer to Table 3-3 for further details on the online data platforms.

Table 3-3 Platform for Online Data Submission

Platform	Description/Scope	Contact/Access
a) Reservoir, Drilling & Petroleum Engineering		
Online Data Uploader (ODU)	Monthly production reporting; well test, actual technology potential, reservoir management plan	Request access through mpm.dataadmin@petronas.com.my
Online Drilling Benchmarking System (ODBS)	To view data on Drilling, Completion, Intervention, Workover and Plug & Abandonment (P&A). In terms of performance monitoring, it is done via executions of both Drillling Minimum Standards (DMS) and Completion Minimum	Contact MPM Asset Manager for access

Platform	Description/Scope	Contact/Access
	Standard (CMS) for each PAC	
b) Production & Operation Engineering		
Hydrocarbon Production Allocation System (HyPAS)	Allocate the production of oil, condensate, gas, and water for both Sabah and Sarawak operations	Contact MPM Hydrocarbon Accounting & Allocation (HAA) for access
Facilities Improvement Plan (FIP)	For PACs and Asset Integrity Management (AIM), Production & Operations Management (POM) Asset Manager to collaborate on FIP approvals	Request access through Platinum X (petronas.com)
Deferment Management	Monitor planned and unplanned deferment volume of oil & gas production in Malaysia	Request access through Platinum X (petronas.com)
Integrated Vessel Management System (iVMS)	Data pulled from PACs Vessel Tracking System (VTS) that is real time, the solution is to provide clear visibility and drive the performance	Contact MPM Asset Manager for access

Platform	Description/Scope	Contact/Access
	efficiency for PETRONAS	
PETRONAS Engineering Data Management System (P-EDMS)	Centralized repository to store PACs' engineering documents	Request access through P-EDMS | Official Page (petronas.com)
THRONES	Quarterly commitment reporting (QCR) submission. The platform is to update, review and endorse commitment progress and status	Contact MPM Governance & Strategic Relations (GSR) for access

3.3 Technical Data Release

Technical data release is commonly requested by PACs to support their operations and for various purposes (e.g. special studies, regional studies), which involve the sharing of data with external parties. As stated in PSC, Article 4.7 and Governing Standards for Malaysia Petroleum Operations, Volume 5, Section 5.2, Malaysia Information Release, PACs shall obtain written approval from PETRONAS for any release of data and samples of and related to petroleum operations.

The process of getting technical data release approval from PETRONAS to release Malaysia technical data to external parties is done through Malaysia Petroleum Management (MPM) Information Release System (MIRS). The scope of the system comprises various requests, including Technical Data Release.

Figure 3-3 shows the landing page for MIRS as a one-stop centre request and approval system for information release by PACs.

Figure 3-3 Malaysia Petroleum Management, Information Release System (MIRS) Landing Page

There are a few scenarios that involve technical data release by PACs and will be elaborated further in the next topics, such as:

a) Data Release for Internal Study
b) Data Release for External Study
c) Data Release within PETRONAS Approved Cloud Location
d) Data Release beyond PETRONAS Approved Cloud Location
e) Data Release for Disposal Purposes

For MIRS accessibility, the appointed Data Manager will need to be registered for account creation. Upon creation of the user ID for MIRS, the Data Manager is to submit the below information to PETRONAS as part of the cybersecurity requirement:

a) Full name;
b) Identification card number (for Malaysian)/Passport number (for non-Malaysian);
c) Nationality;
d) Gender;
e) Email address; and
f) Contact number

Once a user account is created, the user will be notified through email and will be able to access the system. For more details about MIRS, user may refer to this link: https://petronas.sharepoint.com/sites/mirs/Pages/UIRHome.aspx

3.3.1 Data Release for Internal Study

In this scenario, the data will be used only by the PACs and does not involve the release of data to third parties (e.g. service providers).

The principles of data release for internal study are as follows:

a) Supported by MPM Line Department's technical concurrence; and
b) MPM Head of Department's approval via MIRS is not required.

There are conditions to be included for MPM Line Department to support the data release for internal study, as stated below:

a) If the data is under another PAC's operatorship, the requestor is to syndicate and obtain consent from the other operator of which they require the data from.
b) Any agreement to share data with the requestor should be concluded with the execution of a Non-Disclosure Agreement (NDA) or Confidentiality Agreement (CA) between both parties. It is best to use PETRONAS' drafted NDA template to be reviewed by PETRONAS Legal prior to signing.
c) Requestor to provide a signed copy of NDA/CA for PETRONAS' line of sight.

3.3.2 Data Release for External Study

In this scenario, it involves PACs disclosing data to third parties (e.g. service providers, consultants). Data is commonly requested by PACs to allow analysis, testing, or studies to be performed by third parties due to technology or capability limitations in Malaysia.

The principles of data release for external study are as follows:

a) Supported by MPM Line Department's technical concurrence;
b) MPM Head of Department's approval via MIRS is required; and
c) Execution of NDA/CA between the parties.

The approval process will take 14 working days, depending on the complexity and uniqueness of the request. The approval by AA for data disclosure to external parties will be granted with all governance requirements in place.

Figure 3-4 shows the data release approval process flow for the external study. Please refer to the notes below the figure for further information.

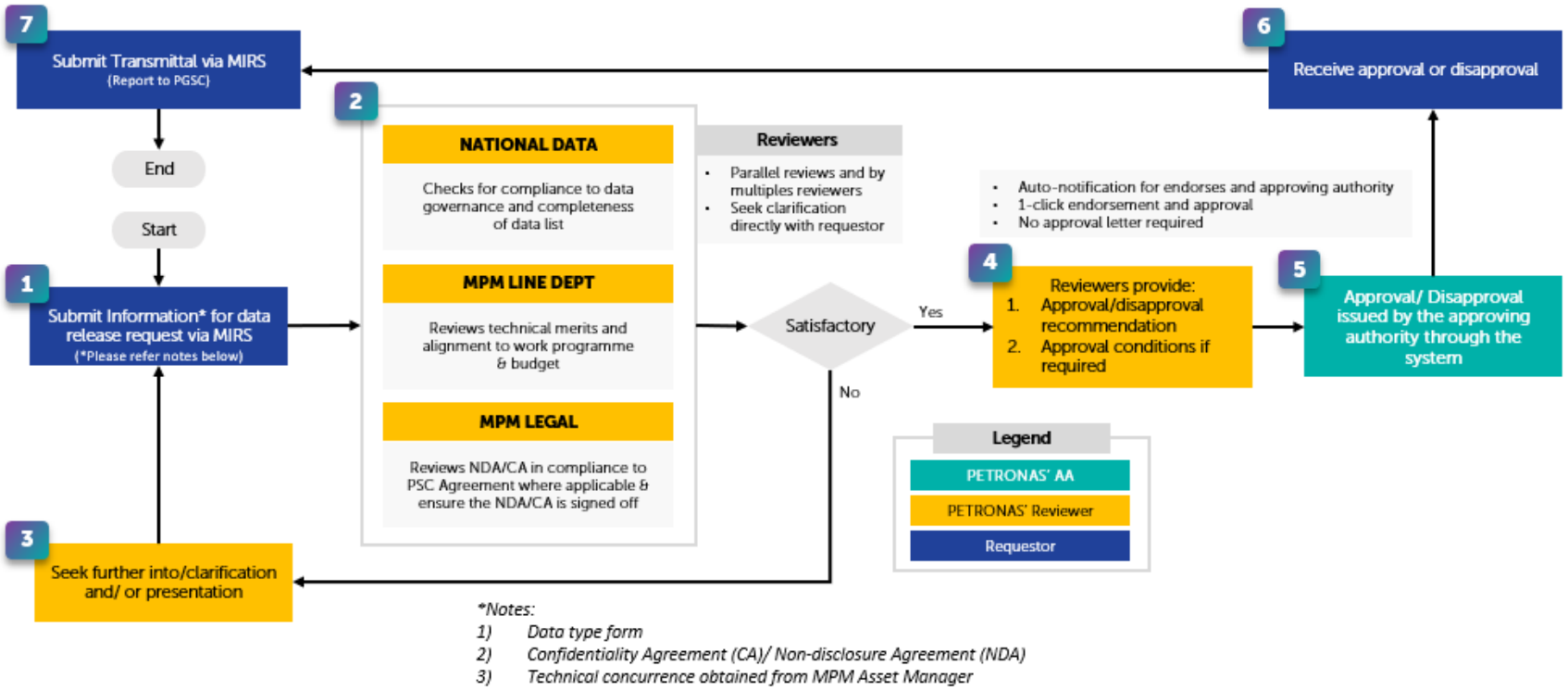

Figure 3-4 Data Release Approval Process via MIRS

Note:

i. Requestor to submit all information to MIRS with supporting documents. The supporting documents here refer to:

- Data Type form;
- Signed CA/NDA between both parties; and
- Technical concurrence obtained from MPM Line Department, either through email, minutes of meetings, etc.

ii. All reviewers will be notified of the submission and will be able to review the request.

iii. Reviewers seek clarification directly from Requestor.

iv. Reviewers to provide recommendation to Approving Authority (AA).

v. AA to approve or disapprove in MIRS.

vi. Requestor will be notified through email that the request has been approved/disapproved.

vii. Requestor is to submit a transmittal form that report sent to PGSC once the project is completed. For samples used for study or lab test purposes, nondestructive or unspent samples are to be returned to PETRONAS upon job completion.

3.3.3 Data Release within PETRONAS Approved Cloud Location

As digital evolution has taken place in recent years, there has been a demand by PACs to host data in cloud environment. In addressing the demand and providing guidance to PACs, PETRONAS has issued PETRONAS Public Cloud Guidelines for PACs in 2021, which can be referred to on the Governing Standards for Malaysia Petroleum Operations website under the reference documents.

In this scenario, PACs will host the data in cloud environment located within PETRONAS approved cloud location. The principles of the data release are as follows:

a) Supported by MPM Line Department's technical concurrence;
b) Execution of NDA/CA between the parties;
c) The cloud initiative had obtained Work Programme Budget (WPB) approval for the next calendar year;
d) Cloud project brief to be provided. Please refer to Appendix 3;
e) Cloud technical checklist to be provided. Please refer to Appendix 4;
f) Recommendation for approval from Technical Review Committee (TRC) for cloud adoption;
g) Data is ready to be migrated to Malaysia once Malaysia Data Centre available; and
h) MPM Head of Department's approval via MIRS is required.

PACs shall fulfil all the requirements above along with a complete submission of the required documents by the 7th day of each month. The Technical Review Committee (TRC) conducts a review or walkthrough of the cloud request within PETRONAS approved cloud location on the 14th day of the same month. This is likely to assess the technical aspects and potential implications of the data release before granting approval.

3.3.4 Data Release beyond PETRONAS Approved Cloud Location

In this scenario, PACs will host the data beyond PETRONAS approved cloud location. The principles of the data release are as follows:

a) Supported by MPM Line Department's technical concurrence;
b) Execution of NDA/CA between the parties;
c) The cloud initiative had obtained Work Programme Budget (WPB) conditional approval for the next calendar year;
d) Cloud project brief to be provided. Please refer to Appendix 3;
e) Cloud technical checklist to be provided. Please refer to Appendix 4;
f) Recommendation for approval from TRC for cloud adoption;
g) Approved TRC Minutes of Meetings (MoM) to be submitted in MIRS;
h) Data is ready to be migrated to Malaysia once Malaysia Data Centre available; and
i) MPM Head of Department's approval via MIRS is required.

PACs shall fulfil all the requirements above along with a complete submission of the required documents by the 7th day of each month. For cloud requests that involve data release beyond PETRONAS approved cloud location, the TRC holds a sitting on the 21st day of the same month. This sitting might involve more comprehensive discussions due to the international aspect of the data release.

For a detailed process flow of data release approval to the cloud environment, please refer to Figure 3-5.

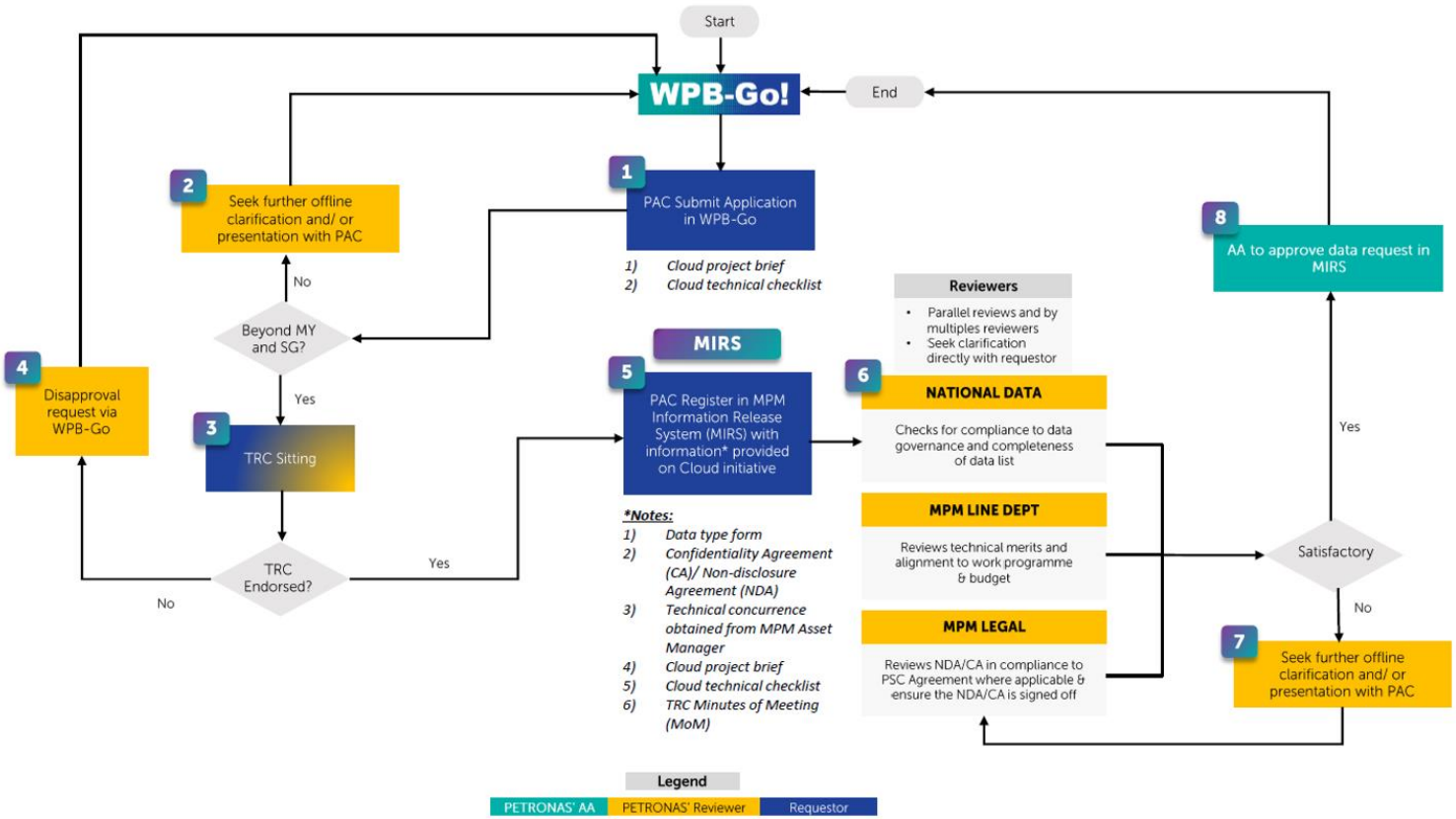

Figure 3-5 Data Release Approval to Cloud Environment

Note:

i. Requestor to submit planned budget for the initiative in WPB-Go! and to attached supporting documents below:
   - Cloud project brief; and
   - Cloud technical checklist.

ii. Reviewer will seek further clarification from Requestor regarding the initiative. Once all information is sufficient, Reviewer will approve the planned budget in WPB-Go!.

iii. Presentation to TRC for cloud adoption. TRC members will provide recommendation for approval or disapproval during TRC sitting.

iv. Disapproval in WPB-Go! if the initiative is not recommended by TRC members.

v. Requestor to submit all information to MIRS with supporting documents. The supporting documents here refers to:
   - Data Type form;
   - Signed NDA/CA between both parties;
   - Technical concurrence obtained from MPM Line Department for the data to be release, either through email communication, minutes of meetings, etc;
   - Cloud project brief;
   - Cloud technical checklist;
   - TRC Minutes of Meeting (for data hosted beyond Singapore); and
   - WPB-Go! approval for planned budget (for data hosted within Singapore).

vi. All reviewers will be notified on the submission and will be able to review the request. Reviewers to provide recommendation to Approving Authority (AA).

vii. Reviewers seek clarification directly from Requestor.

viii. AA to approve or disapprove in MIRS.

3.3.4.1 Technical Review Committee (TRC) Objectives

As stipulated in the principles for data release to the cloud environment, a special sitting of the Technical Review Committee (TRC) for cloud adoption is established, primarily to:

a) Review and recommend for approval/disapproval on cloud initiatives by PACs.
b) Provide a platform for check-and-balance on digital technology and data requirements prior to cloud adoption.
c) Ensure the governance process is in place with reference to three (3) main documents:
    i. PSC, Article 4.7, Prohibition of Taking Out or Transmitting D*ata from Malaysia without PETRONAS'* Permission.
    ii. Governing Standards for Malaysia Petroleum Operations, Volume 5, Data, Digital and Technology, Section 5.4, Cloud Adoption and Cyber Security.
    iii. PETRONAS Public Cloud Guidelines for PACs.
d) Deliberate any deviation pertaining to the outlined requirements.

3.3.4.2 Technical Review Committee (TRC) Principles

These are the principles for TRC for cloud adoption sitting:

a) Any technical data export request must be raised through MPM Information Release System (MIRS). The review process applies to all technical data export requests that involve cloud adoption, covering both budgeted in Work Program Budget or PAC sole risk projects;
b) Up until Malaysia Data Centre is ready by the end of 2024, any cloud adoption beyond PETRONAS approved cloud location is required to be presented in TRC;
c) However, once Malaysia Data Centre is ready, it is mandatory for all cloud adoption beyond Malaysia to be presented in TRC to assess any potential risks;

d) Cloud adoption for divestment / farm in / farm out activities will not require any TRC sitting. However, offline review with MPM Digital MLD on cloud technical checklist and project brief must be in place to ensure it is according to PETRONAS Public Cloud Guidelines for PACs requirements; and

e) TRC is not required for any additional or different data requests using the same Cloud Service Provider (CSP) provided no changes are made to the technical checklist. However, MPM data approval is still required via MIRS.

3.3.5 Data Release for Disposal and/or Deletion Purposes

Any samples used for study or lab test purposes, that are non-destructive or unspent, are to be returned to PETRONAS upon job completion. However, to dispose of any physical and/or digital data, PACs shall obtain PETRONAS approval. This is followed by the submission of a comprehensive technical report acquired from the lab tests to PETRONAS.

For physical data disposal, PACs shall comply to standards imposed by the Department of Environment (DOE), Malaysian Ministry of Natural Resources and Environment by seeking their advice on the disposal method prior to obtaining the approval from PETRONAS.

The principles of data release for disposal and/or deletion purposes are as follows:

a) Supported by MPM Line Department's technical concurrence;
b) Execution of NDA/CA between the parties; and
c) MPM Head of Department's approval via MIRS is required.

The relevant evidence, which is the certificate of disposal produced by DOE and photo(s) of disposal and/or deletion, shall be submitted by PACs to PETRONAS Geoscience Centre (PGSC) once the disposal activity has been completed. Every evidence submission must include a transmittal and a copy of a signed transmittal must be submitted in MIRS for future reference.

3.3.6 Accessing Malaysia Data

PETRONAS myPROdata is a web-based platform that provides access to and transparency of Malaysia E&P technical data to external parties. The purpose is to enhance data accessibility and transparency not only for investors but also opening access for researchers, universities, service companies, and any other relevant oil and gas players.

The web-based platform contains essential subsurface and surface data related to exploration blocks, Discovered Resource Opportunities (DRO) and producing fields. Oil and gas players, investors, and academicians will gain a clear regional understanding for new investments, asset growth, and Research & Development (R&D) projects.

For more information about myPROdata, please refer to this website: https://www.petronas.com/myprodata/.

3.3.6.1 Access Level

PETRONAS myPROdata offers five (5) access levels with different data entitlements and subscription fees. The five (5) access levels are:

a) **Basic**: View-only access to available data;
b) **Standard**: Full access to Malaysia E&P technical data in open areas;
c) **Premium**: Full access to Malaysia E&P technical data;
d) **Academia**: Selected data access of Malaysia E&P technical data in open areas to academic institutions for research and study purposes; and
e) **Bid Round**: Full access to Malaysia Bid Round (MBR) offerings technical data.

3.3.6.2 Registration Process for Basic Access Level

The information required for user registration for Basic Access Level is as follows:

a) Corporate email address;
b) Contact details (i.e. contact number, job description); and
c) Company details (i.e. company address, country, contact number).

The details of Basic Level Access are as follows:

a) Access to explore SmartViewer and browse E&P dataset in SmartData Catalogue.
b) Data entitlement includes general information on Malaysian open opportunities, regional geology, and cultural.
c) A preview of the standard and premium access level data listing in SmartData Catalogue.
d) This access level provides all the information for the user to decide which subscription level is suitable for their needs.
e) Available for a period of three (3) months of free access.

3.3.6.3 Registration Process for Standard, Premium & MBR Access Level

Standard, Premium, and Bid Round offer three (3) different access levels and data entitlements. Standard and Premium access levels are yearly subscriptions, and the Bid Round access level is a five-month subscription (bid round duration). Users can subscribe to either the Standard or Premium access level. During active Bid Rounds, the Bid Round access level can be added to participate in the offered opportunities. The user's yearly subscription must be active during the duration of the Bid Round for free access.

Each subscription represents one (1) account and is entitled to five (5) users. The subscription can be shared between the parent company and its affiliate, if the parent company is in Malaysia (e.g. Shell Global) and its affiliate is in Malaysia (Shell Sabah and Shell Sarawak). If the affiliate is not in Malaysia, a new subscription is required (e.g. Shell Brunei).

The subscription is subject to a fee based on the access level requested. The Standard and Premium's minimum durations are one (1) year, with options for three (3) and five (5) years.

All companies subscribing to PETRONAS myPROdata are required to provide the following information:

a) An appointment letter stating an authorised company representative's name (senior management), department, company registration number, address, email, and contact number. The appointment letter should be signed by the HOD of the company and/or the HOD of HR.
b) An attachment consisting of a management company profile, including the CEO, Leadership Team, and Technical Leads. The authorised company representative designation should be included in the company profile.
c) The authorised company representative is to appoint up to five (5) users within the subscription period. The company can request to change one of the existing users without cost, two (2) times per year, with a valid justification (e.g. resignation, transfer, death). Users can

only be granted access after the submission of the following and successful payment of registration:

i. An appointment letter stating an authorised company representative to name (senior management), department, company registration number, address, email, and contact number. The appointment letter should be signed by the HOD company and/or HOD of HR; and

ii. Attachment consisting of management company profile including CEO, Leadership Team & Technical Leads. The authorised company representative designation should be included in the company profile.

The Figure 3-6 below is the myPROdata registration process flow in general:

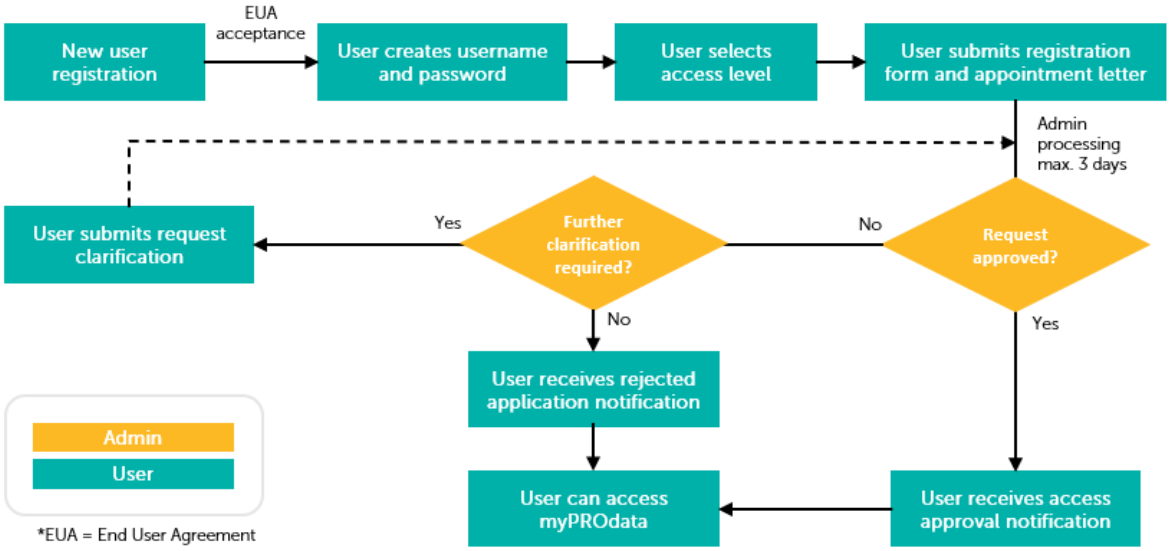

Figure 3-6 myPROdata Registration Process Flow in General

3.3.6.4 Data Release to External Party

The rights and restrictions to use PETRONAS myPROdata are stated in the End User Agreement (EUA) upon account registration. For any requirement for data release to an external party (i.e. service provider), please refer to 3.3 Technical Data Release, 3.3.2 Data Release for External Study, 3.3.3 Data Release to PETRONAS Approved Cloud Location and 3.3.4 Data Release Beyond PETRONAS Approved Cloud Location.

3.4 Data Request

PACs are eligible for all data under their PSC, as stated in Article 4.6, Title & Ownership of Original Data Acquired by Contractors. The data requested by PACs is to support PSC operations based on the following scenarios:

a) PACs require additional data from operated block
b) PACs require other PSC data
c) PACs require data from Open Block or Field

3.4.1 Request Additional Data from Operated Block

PACs request additional data from their operated block to support PSC operation. The data can be requested directly from the MPM Asset Manager through email. PACs need to provide the data list to MPM Asset Manager to seek confirmation and communicate with National Data team for further processing.

The National Data team will facilitate data availability checking and data collection. PACs will be informed of the readiness of the data through email.

Once the data is ready, it will be delivered to the PACs through a proper medium. Any digital data will be sent through Azure Blob or SMFT and require PACs to download the data. Meanwhile, for physical data, PACs are to collect it directly from PGSC.

For every data collection, a transmittal form must be produced and recorded for both PACs and PETRONAS references.

3.4.2 Request Other Production Sharing Contract (PSC) Data

When a PAC requests other PSC data, it will be considered a data release to an external party. The request must be made to the main operator of that PSC. The main operator needs to submit the request to MIRS (refer to 3.3 Technical Data Release, 3.3.2 Data Release for External Study) on behalf of the requestor for MPM approval (refer to PSC, Article 4.6 & 4.7 and Governing Standards for Malaysia Petroleum Operations, Volume 5, Section 5.2, Malaysia Information Release).

Upon receiving approval from MPM, the PACs may obtain the required data from the main operator.

3.4.3 Request Data from Open Block or Field

Any request for open block data requires the PACs to reach out to the respective MPM Line Department to obtain technical concurrence. The execution of NDA/CA needs punto be established between MPM and PACs. The request needs to be submitted by MPM Line Department through MIRS and obtain approval from MPM Approving Authority. MPM Line Department will notify PACs of the approval of the request via email.

Upon receiving approval, the National Data team will facilitate data availability checking and data collection. PACs will be informed of the readiness of the data through email.

Once the data is ready, it will be delivered to the PACs through a proper medium. Any digital data will be sent through Azure Blob or SMFT and require PACs to download the data. Meanwhile, for physical data, PACs are to collect it directly from PGSC.

For every data collection, a transmittal form must be produced and recorded for both PACs and PETRONAS references.

3.5 Data Transfer from PETRONAS to PACs

Data transfer will take place when PACs request data to deliver their initiatives, such as to perform analysis and conduct studies.

For physical data, PACs are to collect the data at PGSC under certain procedures. Meanwhile, for digital data, PETRONAS provides two (2) methods to transfer data to PACs, either using SMFT or Azure Blob cloud.

3.5.1 Secure Managed File Transfer (SMFT)

PETRONAS will perform data transfers to PACs through SMFT. The process is similar to PACs data submission to PETRONAS, as in 3.3.2 Digital Data Submission Through SMFT.

When PETRONAS transfers the data, the recipient will receive an email notification that the data has been sent and transferred via SMFT.

3.5.2 PETRONAS Approved Cloud Location

Azure cloud is a service for storing large amounts (data size >100GB) of unstructured data, such as text or binary data, that can be accessed from anywhere in the world via HTTP or HTTPS. PETRONAS uses Azure cloud storage to transfer data to PACs. PACs will be able to download the data from Azure storage.

PACs need to have "Azure Storage Explorer" on their Personal Computer to be able to download the data.

Please refer to the steps below on Azure cloud setup and data downloading:

a) Install "Azure Storage Explorer" through this website: Azure Storage Explorer – cloud storage management | Microsoft Azure;
b) Click "Open Connect Dialog" for connection;
c) Select "Blob container";
d) Select "Shared access signature URL (SAS)";
e) Paste the given token via email in "Blob container SAS URL:";
f) "Display name" will be automatically detected.
g) Select "Next"; and
h) Select "Connect".

Refer Table 3-4 for the summary of SMFT and Azure cloud storage.

Table 3-4 Summary of SMFT and Azure Cloud

No.	Criteria	SMFT	Azure Cloud
1	File transfer limit	Min 18MB; Max 100GB	Larger than 100GB
2	File retention	14 days	One (1) month
3	Recommended and supported transfer method	i. Web Browser ii. MS Outlook iii. MFT Client	Download and setup in computer
4	Recommended usage	Peer-to-peer file transfer	Only allow for data transfer from PETRONAS to PACs

3.6 Quarterly Commitment Reporting (QCR)

Quarterly Commitment Reporting (QCR) is a periodic process that necessitates the PACs to report the status of their contract commitments for PETRONAS' review and endorsement. PACs shall refer to Governing Standards for Malaysia Petroleum Operations, Volume 2, Planning and Reporting, Section 2.5 Commitment Reporting and Closure.

PACs shall submit the QCR Technical Data List via THRONES platform within fourteen (14) days after the end of each quarter. Please refer to Governing Standards for Malaysia Petroleum Operations, Volume 2, Planning and Reporting, Section 2.5 Commitment Reporting and Closure. QCR shall be reviewed and approved by PACs' Approving Authority prior to submission to PETRONAS via THRONES platform.

PETRONAS will review and endorse PACs submissions within thirty (30) days of submission.

3.7 Contractor's Compliance Index (CCI)

Contractor's Compliance Index (CCI) is an annual assessment by PETRONAS to measure PACs compliance with governance and performance towards sets of requirements and business relationship and aspirations.

The main objectives of having CCI are:

a) To provide a comprehensive evaluation of PACs compliance level with their data governance and performance; and
b) To facilitate the sharing of best practices and the deliberation of key issues attributed to data governance and performance.

3.7.1 Assessment Scope

The CCI assessment scope shall be:

a) PACs operated assets, excluding assets operated on behalf of PETRONAS;
b) Applicable for all types of Petroleum Arrangement, including Risk Sharing Contract (RSC), Small Field Asset (SFA) and Late Life Asset (LLA);
c) Applicable to PACs with a full-year operatorship or at least six (6) months operating in Malaysia during the assessment year;
d) Assessment is conducted at PSC level and rolls up to PAC level; and
e) One (1) year performance assessment (from January until December of that year).

The assessment will cover the surface and subsurface technical data submission to PETRONAS as stipulated in Appendix 5. CCI assessment components consist of completeness, validity, and timeliness:

a) **Completeness:** Data completeness against completed activities.
b) **Validity:** Data meets quality requirements at the point of creation (i.e. as per standard and format).
c) **Timeliness:** Conformance to the data submission period as per Governing Standards for Malaysia Petroleum Operations.

3.8 Relinquishment/Due Diligence Audit (DDA)

Due Diligence Audit (DDA) is an assurance activity established to ensure all values and obligations under the respective contract (i.e. Petroleum Sharing Contract (PSC), Risk Sharing Contract (RSC)) are satisfactorily met prior to its relinquishment.

DDA is undertaken as part of the requirements of Governing Standards for Malaysia Petroleum Operations, Volume 13, Asset Management, Section 13.3, Relinquishment.

The DDA scope is divided into technical and non-technical functions. Data management is one of the non-technical functions of DDA. Hence, the scope of DDA does involve data management activities.

3.8.1 Objectives & Approach

The objectives of data management in DDA are:

a) Review and verify data submission status (submission to date for each asset);
b) Review and verify all data to be captured for the transfer of operatorship;
c) Review and verify pending data for past activities;
d) Review and identify a list of non-compliances for rectification;
e) Ensure that audit activities are carried out as intended and the findings are captured and tracked; and
f) Review and identify the list of data types submitted as per the data submission guidelines in Appendix 5.

For data management, the approach will be through a site audit, either physically or remotely. National Data will engage with PACs DDA focal points from Data Management and conduct a progress meeting to share the findings and updates.

3.8.2 Scope

The scope will cover, but is not limited to, the following:

a) Overall governance
b) Data gathering activities
c) Data and information safekeeping and updating
d) Process data
e) Inspection records
f) Management of Change (MoC) records
g) Site conditions; virtual evidence during site visits, if required

3.8.3 Data Preparation by PACs

Data preparation involves several steps, which are as follows:

a) Create a common repository for collaboration.
b) Gather data and system inventory.
c) Capture master data, critical data, and documents generated based on PACs activities, including but not limited to:
    i. **Exploration Data**
        1) Geospatial
        2) Geophysics
        3) Geology
    ii. **Development Data**
        1) Static & Dynamic Subsurface Data Models
        2) Reservoir Engineering
        3) Production Technology
        4) Petrophysics
        5) Production & Operation
        6) Wells

iii. **Operation & Maintenance Data**

1) Maintenance & Asset Integrity
2) Surface Engineering, including As Built Drawings, Data Model and Final Documents

3.8.4 Report

DDA Data Management Report will highlight any areas of improvement arising from the audit and significant issues requiring Management's attention and action, including cost estimation for corrective works.

The significant findings in the DDA report will be presented to the specified PETRONAS' Steering Committee.

PACs are required to submit a progress report on the action items, action plan, and cost for the corrective action required to close the findings, along with a copy, to the Due Diligence Audit (DDA) Steering Committee at the end of the review.

3.9 Work Programme Budget (WPB) for Technical Data Management

With reference to Governing Standards for Malaysia Petroleum Operations, Volume 2, Planning and Reporting, Section 2.1, Work Programme and Budget (WPB), PACs shall submit for the approval of PETRONAS the Work Programme and Budget (WPB) that sets forth the Petroleum Operations that PACs propose to carry out and initiate during the next calendar year and for the four-year period following the end of the relevant calendar year. The WPB submission will be made through WPBGo! system, and the user may request access to the system from MPM.

The Pre-Budget Expectation (PBE) exercise is a platform for MPM to provide steer to PACs for the upcoming WPB exercise and is issued by early May annually. As stated in Governing Standards for Malaysia Petroleum Operations, PBE outlines PETRONAS' expectations for PACs in preparing the annual WPB consistent with PETRONAS' business plans and objectives, which commence prior to actual WPB submission on an annual basis.

For technical data management, budgets can be requested under Digital category, Run & Maintain. Table 3-5 can be referred to for technical data management budget items.

Table 3-5 Technical Data Management Budget Items

Budget Items	Applicable Items
Physical Data & Media Management	Subscription of physical data/media storage and management services, such as: i. Geo-sample storage & services rendered by PETRONAS Geoscience Centre (PGSC). ii. Geophysics media (i.e. seismic tape), business records, technical documents at third-party facilities.
Technical Data Assurance Programmes/Initiatives	i. Establishment of new technical databases to "house" technical data that are currently managed in shared folders. ii. QA/QC, data quality rules development. iii. Data taxonomy development. iv. Data delivery initiatives such as digitization of legacy data and/or data wrangling.

3.9.1 General Expectations for Technical Data Management

a) All technical data is to be stored in a safe and secure manner with discipline and functionally appropriate technical databases.
b) PACs to align data requirements with the governance and compliance requirements stipulated in Governing Standards for Malaysia Petroleum Operations, Volume 5, Data, Digital and Technology, Section 5.1, Data Governance.
c) PACs must provide assurance that all data is made available and compliance requirements are met to allow seamless operatorship transfers in the future.
d) PACs must provide a solid business case/justification to support any initiative planned for the year. This includes reflecting the impact (e.g. data loss, data leakage) if the initiatives were not performed.

3.9.2 Clarification Prior and Post WPB Submission

PACs shall engage National Data team for clarifications on technical data management matters.

3.9.3 Other Budget Related

For other budget-related, such as Conditional Approval Lifting, Additional Budget Request etc., please refer to Governing Standards for Malaysia Petroleum Operations, Volume 2, Planning and Reporting, Section 2.1, Work Programme and Budget (WPB).

APPENDICES

Appendix 1: Confidentiality/Non-disclosure Agreement (Sample)

CONFIDENTIALITY AGREEMENT AND TERMS OF DATA INSPECTION

THIS AGREEMENT, entered into the **XX[th] of [xx]**, by and between

PETROLIAM NASIONAL BERHAD (PETRONAS) (Company No.20076-K), a company incorporated under the laws of Malaysia and having its registered address at Tower 1, PETRONAS Twin Towers, Kuala Lumpur City Centre, 50088 Kuala Lumpur, Malaysia (hereinafter referred to as the "Disclosing Party");

and

----------,a company incorporated under the laws of ----------and having its registered/ business address at---------- (hereinafter referred to as the "Receiving Party").

Disclosing Party and Receiving Party may also be referred to herein individually as "Party" or collectively as "Parties".

1. In connection with the evaluation and the possible acquisition by the Receiving Party or its Affiliate (as hereinafter defined) of certain petroleum exploration and production rights held by the Disclosing Party in respect to the **[xx]** (the "Area", as shown in the location map in Exhibit "A" attached hereto and made a part hereof), the Disclosing Party is willing, in accordance with the terms and conditions of this Agreement to disclose to the Receiving Party certain confidential and/or proprietary information relating to the Area which includes, but is not necessarily limited to, copies or originals of geological and geophysical data, maps, models, interpretations, well logs, reports and all other subsurface, seismic and related data as well as all information derived from or generated therefrom and may also include commercial, contractual and financial information (the "Confidential Information"). This Agreement and the fact and content of communications between the Parties concerning the subject of this Agreement shall be deemed also to constitute Confidential Information.

2. In consideration of the disclosure referred to in Clause 1, the Receiving Party agrees that the Confidential Information shall be kept strictly confidential and shall not be sold, traded, published or otherwise disclosed to anyone in any manner whatsoever, including by means of photocopy, reproduction or electronically, without the Disclosing Party's prior written consent, except as provided herein.

3. The Receiving Party may disclose the Confidential Information without the Disclosing Party's prior written consent to an Affiliate (as hereinafter defined), provided that the Receiving Party guarantees the adherence of such Affiliate to the terms of this Agreement. "Affiliate" shall mean any company or legal entity which (a) controls a Party; or (b) is controlled by a Party; or (c) which is controlled by a company or legal entity which controls a Party. "Control" means the ownership directly or indirectly of more than fifty percent (50%) of the voting rights in a company or other legal entity.

4. The Receiving Party shall be entitled to disclose the Confidential Information without the Disclosing Party's prior written consent to employees, officers and directors of the Receiving Party or its Affiliate. The Receiving Party shall be entitled to disclose the Confidential Information to professional consultants or agents or financiers retained by the Receiving Party or its Affiliate for the purpose of evaluating the Confidential Information, to the extent they have a clear need to know in order to evaluate the Area, provided that prior to making any such disclosures the Receiving Party shall obtain an undertaking of confidentiality, essentially in the same form and content as this Agreement, from each such person.

5. The Receiving Party may disclose the Confidential Information without the Disclosing Party's prior written consent only to the extent such information:

   (a) is already known to the Receiving Party as of the date of disclosure hereunder;

   (b) is already in possession of the public or becomes available to the public other than through the act or omission of the Receiving Party;

   (c) is required to be disclosed under applicable law or by a governmental order, decree, regulation or rule or by the regulation or rule of any recognised stock exchange on which Receiving Party or its Affiliate is listed (provided that the Receiving Party shall give written notice to the Disclosing Party prior to such disclosure); or

   (d) is acquired independently from a third party that represents that it has the right to disseminate such information at the time it is acquired by the Receiving Party.

Appendix 2: Data Type form (Sample)

* COMPULSORY FIELDS

No	*Technical Discipline	*Data Type	*Quantity	*Start date	*End date	*Block Name	*Field Name	*Well Name	Reservoir Name
1	Geology_and_Geospatial	Core Plugs	16 Plugs	11/1/2019			M1		
2	Geology_and_Geospatial	Reservoir Fluid-Condensate	5 Litres	11/1/2019			M1		
3	Geology_and_Geospatial	Reservoir Fluid-Produced Water	10 Litres	11/1/2019			M1		
4									
5									
6									

Appendix 3: Cloud Project Brief

Project Brief (Example) in WPB

Priority of the request	Low	Medium	High

INITIATIVE TITLE			
PAC / OPERATOR		CSP NAME	
LOCATION		CLOUD MODEL	IaaS / PaaS / SaaS

PROJECT OVERVIEW

PROJECT BACKGROUND	*<Provide an overview and purpose of this initiative e.g. to replace EOS software> <To pilot a construction planning solution that will allow Engineers to maximize the results by giving them access to all the data and science they need in a single, common system> <The solution will provide team a quicker and better-quality drilling program through the automation of repetitive tasks and validation workflows to ensure the entire plan is coherent> <The key pain points that PAC wants to solve or address> <Explain if the request is high priority>*
BUSINESS VALUE	*<clear demonstration of estimated value gain/realized resulted from this initiative, the basis and assumption of the calculation of value e.g. financial, operational & sustainability> e.g. the system able to generate incremental additional production of xx kbpod of BCO identification YoY through its xyz capabilities/modules, through deployment to these fields xyz. The basis and assumptions used as follow; aaa, bbb, ccc*

INITIATIVE COST PHASING 1+4 (RM '000)

	START DATE	END DATE	2022 YER	2023 ACTUAL	2024	2025	2026	2027
PHASE 1: INITIATIVE A								
PHASE 1: INITIATIVE B								
PHASE 1: INITIATIVE C								
PHASE 2: INITIATIVE A								
PHASE 2: INITIATIVE B								

CLOUD COST

BUDGETED IN WPB (Y2024)	Yes (RM XX) / No	CLOUD PRICING (RM)		MIGRATION COST (RM)	(manpower, ingress/egress /regress)

COST SAVING

ON-PREMISE (RM)		ON- CLOUD (RM)		ESTIMATED SAVING (RM)	

JUSTIFICATION ON CLOUD LOCATION

- *Please provide a justification (if location is beyond Malaysia/Singapore)*
- *PAC to show the plan to migrate data back to Malaysia once the Malaysia Cloud Data Centre is available*
- *Cloud pricing comparison between Cloud in MY/SG & Cloud Beyond MY/SG*
- *Attach supporting document e.g. Network Diagram*

Open

Appendix 4: Cloud Technical Checklist

PAC_Cloud_Adoption_ Technical Checklist.xls:

- Sample of PAC Cloud Adoption Technical Checklist.

PETROLEUM ARRANGEMENT CONTRACTORS CLOUD ADOPTION TECHNICAL CHECKLIST

Name of Company:

Initiative Name:

Proposed Cloud Hosting Location:

Initiative Description:

Initiative Budget and Cloud Budget: E.g. Total budget RM2mil inclusive of cloud hosting at RM1mil

Instruction: All of the below are to be answered and submitted to MPM for review prior to TRC sitting.

				To be Filled in by PAC			To be Filled in by PETRONAS
No.	Item	Reference to PETRONAS PUBLIC CLOUD GUIDELINES		Checklist	Yes / No	Supporting Details from PAC	Remarks
1	Compliance with PETRONAS Cloud Cybersecurity requirements	Section 5.1		**Market Services Requirements:**			
			1	**Assurance** A. Does CSP comply to SOC2 - Type 2 (service organization controls)?			
				B. Does CSP comply to Singapore Multi-Tier Cloud Security Standard (MTCS SS 584) Level-3?			
		Section 5.2	2	**Asset Management** Does CSP have standard asset management tools in place?			
		Section 5.3	3	**Segregation** **A. Network segregation:** Are systems/applications segregated by network? E.g. through "virtual firewalls" or "Security Groups".			

Appendix 5: Data Submission Guidelines

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
1	SEISMIC DATA								
1.1	ACQUISITION DATA: (2D & 3D)								Refer attachment for Standard Data Type Naming Convention
1.1.1	Raw navigation		IOGP P2/11 or any related raw nav (for land & OBS survey only)	Submit to PGSC	CARTRIDGE 3592 E07 and E08 only		Within 2 months after survey completion	1. Inclusive of water depth 2. Header must include datum, projection system & any conversion which is applied 3. CRS Information	Refer to attachments for: 1. CRS Information Requirements
1.1.2	Processed/Final navigation		IOGP P1/11 or SPS (for land and ocean bottom seismic)	Submit to PGSC	CARTRIDGE 3592 E07 and E08 only		Within 2 months after survey completion	1. Inclusive of water depth 2. Header must include datum, projection system & any conversion which is applied 3. CRS Information	Refer to attachments for: 1. CRS Information Requirements
1.1.3	Observer's Log		Acrobat PDF (.pdf)	Submit to PGSC			Within 2 months after survey completion		To include PDF Bookmarking based on single line to assist viewing
1.1.4	Field Data/Raw Shots/Navigation Merged Shots		SEG-D/ SEG-Y	Submit to PGSC	CARTRIDGE 3592 E07 and E08 only		Within 2 months after survey completion	SEG-Y EBCDIC Information should contain: 1. Line/Survey name, Area (Block/Prospect name), Processing Company, Client, Date 2. Acquisition Information required for processing. Also need to include date and name of company acquiring the survey 3. Geodetic information: 3.1 Projection System 3.2 Datum 3.3 Grid definition (bin size) and 4-corner coordinates (Inline, crossline, XY reference) 4. Brief Processing Sequence	Note: Polarity for nav-merged SEG-Y marine/land/OBN/OBC case would be minimum phase, except when vibroseis as source, in which polarity will be zero phase. Refer to attachments for: 1. SEG-Y EBCDIC header 2. Data Type Naming Convention 3. SEG-Y Seismic Polarity 4. SEG-Y Trace Header 5. CRS Information 6. Tape log listing 7. All other info related to deliverables submission

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
1	SEISMIC DATA								
1.1	ACQUISITION DATA: (2D & 3D)								Refer attachment for Standard Data Type Naming Convention
1.1.5	Raw Receiver gathers (for Ocean Bottom Seismic - OBC OBN)		SEG-D/ SEG-Y	Submit to PGSC	CARTRIDGE 3592 E07 and E08 only		Within 2 months after survey completion	SEG-Y EBCDIC Information should contain: 1. Line/Survey name, Area (Block/Prospect name), Processing Company, Client, Date 2. Acquisition Information required for processing. Also need to include date and name of company acquiring the survey 3. Geodetic information: 3.1 Projection System 3.2 Datum 3.3 Grid definition (bin size) and 4-corner coordinates (Inline, crossline, XY reference) 4. Brief Processing Sequence	Note: Polarity for nav-merged SEG-Y marine/land/OBN/OBC case would be minimum phase, except when vibroseis as source, in which polarity will be zero phase. Refer to attachments for: 1. SEG-Y EBCDIC header 2. Data Type Naming Convention 3. SEG-Y Seismic Polarity 4. SEG-Y Trace Header 5. CRS Information 6. Tape log listing 7. All other info related to deliverables submission

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
1	SEISMIC DATA								
1.1	ACQUISITION DATA: (2D & 3D)								Refer attachment for Standard Data Type Naming Convention
1.1.6	Far Field Signatures, Near Field Signatures, Calibrated Marine Source Signatures		ASCII & SEG-Y	Submit to PGSC	CARTRIDGE 3592 E07 and E08 only		Within 2 months after survey completion		To be included in acquisition report or/and text file (ASCII)/SEG-Y. Modelled Far Field Signatures (FFS) need to have ghost free FFS, FFS with receiver ghost only, FFS with source ghost only and FFS with both source and receiver ghost included. For NFS, to archive shot by shot and averaged FFS generated by NFH. For CMS project, need to archive shot by shot signature. For SEG-Y deliverables, can refer to refer to attachment for PETRONAS standard SEG-Y header

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
1	SEISMIC DATA								
1.1	ACQUISITION DATA: (2D & 3D)								Refer attachment for Standard Data Type Naming Convention
1.1.7	Final Acquisition Report	Acrobat PDF (.pdf)		Submit to PGSC	CD/DVD and SMFT		Within 2 months after survey completion	To include: 1. Complete survey information (Details of acquisition parameter) 2. Coverage of acquired data (sq km for 3D and line km for 2D) 3. Seismic Coverage Map (pre/post-plot), inclusive of geological play and pre-existing seismic lines with full fold coverage (scale 1:100000) 4. CRS Information 5. Far Field Signature 6. Transmittal of data submission 7. List of deliverables (datasets, tapes)	

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
1	SEISMIC DATA								
1.1	ACQUISITION DATA: (2D & 3D)								Refer attachment for Standard Data Type Naming Convention
1.1.8	Tape listing (for acquisition, processing and tape re-mastering)	Excel (.xls/.xlsx)		Submit to PGSC			To be submitted together with the shipment and email	Media listing should contain the following info: 1. Country, Region, Block, Area 2. Acquisition Year 3. Processing Year 4. Survey Type 5. Survey Description 6. PSC Operator 7. Acquisition Contractor 8. Processing Contractor 9. Data Type, Data Format 10. Original Line Name 11. FCDP, LCDP, FREC, LREC 12. FSP. LSP, FOFF, LOFF 13. FLINE, LLINE, FXLINE, LXLINE 14. Domain Unit, (metre or millisecond) 15. Record Length, Sample Rate 16. FSEQ, LSEQ, 17. Label Tape No. 18. Set label, Media 19. Transmittal No./Date 20. Sender Name/Company 21. Original Input Tape No., Original Input media, Transc company, Transc Year, Remarks (if any)	Refer to attachment for standard seismic media listing. For Remastering of data – to provide 1-21 For New data submission- 1-19

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
1	SEISMIC DATA								
1.1	ACQUISITION DATA: (2D & 3D)								Refer attachment for Standard Data Type Naming Convention
1.1.9	Fish Trap Scouting Report	Acrobat PDF (.pdf)	GIS Format a) Shapefiles b) RINEX	Submit to PGSC	CD/DVD and SMFT			Report to include: Summary of the operation which include but not limited to: a. Survey/Operation Area b. Date of fish scouting/seismic survey c. Contractor name and vessel name in the operation area d. Summary of fishing activities i.e fishermen vessel, vessel number & owner and type of fish device found within the survey area and survey date e. Summary of removing of any fishing device f. Attachment (Fish Device Form and Photo)Listing of data type Data Requirements: a. In Geospatial format 1. List of coordinates of found/removed/missing FAD as per Police Report from claimant 2. Survey Operation Area 3. Scouting Area 4. Operational dataset (affected platforms, Block Boundaries b. In RINEX format 1. Vessel Tracking	Please refer to Governing Standards, Volume 7
1.1.10	All the onboard QC products including Near Trace Cube/Gather, etc.		SEG-Y	Submit to PGSC	CARTRIDGE 3592 E07 and E08 only/ Hard Disk				

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
1	SEISMIC DATA								
1.2	PROCESSING/REPROCESSED DATA: 2D & 3D								Refer attachment for Standard Data Type Naming Convention
1.2.1	Pre Stack								
1.2.1.1	Navigation Merged Raw Shots		SEG-Y (32 bits, IBM Floating Points)	Submit to PGSC	CARTRIDGE 3592 E07 and E08 only		Within 2 months upon completion of processing activity	SEG-Y EBCDIC Information should contain: 1. Line/Survey name, Area (Block/Prospect name), Processing Company, Client, Date 2. Acquisition Information required for processing. Also need to include date and name of company acquiring the survey 3. Geodetic information: 3.1 Projection System 3.2 Datum 3.3 Grid definition (bin size) and 4-corner coordinates (Inline, crossline, XY reference) 4. Brief Processing Sequence	Note: Polarity for nav-merged SEG-Y marine/land/OBN/OBC case would be minimum phase, except when vibroseis as source, in which polarity will be zero phase. Refer to attachments for: 1. SEG-Y EBCDIC header 2. Data Type Naming Convention 3. SEG-Y Seismic Polarity 4. SEG-Y Trace Header 5. CRS Information 6. Tape log listing All other info related to deliverables submission
1.2.1.2	Pre-migration shot gathers (non-interpolated, unregularized)		SEG-Y (32 bits, IBM Floating Points)	Submit to PGSC	CARTRIDGE 3592 E07 and E08 only		Within 2 months upon completion of processing activity		
1.2.1.3	Pre-Stack Time Migration CIP Gathers		SEG-Y (32 bits, IBM Floating Points)	Submit to PGSC	CARTRIDGE 3592 E07 and E08 only		Within 2 months upon completion of processing activity		
1.2.1.4	Pre-Stack Depth Migration CIP Gathers		SEG-Y (32 bits, IBM Floating Points)	Submit to PGSC	CARTRIDGE 3592 E07 and E08 only		Within 2 months upon completion of processing activity		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
1	SEISMIC DATA								
1.2	PROCESSED/REPROCESSED DATA: 2D & 3D								Refer attachment for Standard Data Type Naming Convention
1.2.2	Post-Stack Trace (Pre-stack migration or Post-stack migration)								
1.2.2.1	Filtered Scaled Migration		SEG-Y (32 bits, IBM Floating Points)	Submit to PGSC	CARTRIDGE 3592 E07 and E08 only		Within 2 months upon completion of processing activity	SEG-Y EBCDIC Information should contain: 1. Line/Survey name, Area (Block/Prospect name), Processing Company, Client, Date 2. Acquisition Information required for processing. Also need to include date and name of company acquiring the survey 3. Geodetic information: 3.1 Projection System 3.2 Datum 3.3 Grid definition (bin size) and 4-corner coordinates (Inline, crossline, XY reference) 4. Brief Processing Sequence	Note: Polarity for nav-merged SEG-Y marine/land/OBN/OBC case would be minimum phase, except when vibroseis as source, in which polarity will be zero phase. Refer to attachments for: 1. SEG-Y EBCDIC header 2. Data Type Naming Convention 3. SEG-Y Seismic Polarity 4. SEG-Y Trace Header 5. CRS Information 6. Tape log listing All other info related to deliverables submission
1.2.2.2	Unfiltered Unscaled Migration		SEG-Y (32 bits, IBM Floating Points)	Submit to PGSC	CARTRIDGE 3592 E07 and E08 only		Within 2 months upon completion of processing activity	SEG-Y EBCDIC Information should contain: 1. Line/Survey name, Area (Block/Prospect name), Processing Company, Client, Date 2. Acquisition Information required for processing. Also need to include date and name of company acquiring the survey 3. Geodetic information: 3.1 Projection System 3.2 Datum 3.3 Grid definition (bin size) and 4-corner coordinates (Inline, crossline, XY reference) 4. Brief Processing Sequence	Note: Polarity for nav-merged SEG-Y marine/land/OBN/OBC case would be minimum phase, except when vibroseis as source, in which polarity will be zero phase. Refer to attachments for: 1. SEG-Y EBCDIC header 2. Data Type Naming Convention 3. SEG-Y Seismic Polarity 4. SEG-Y Trace Header 5. CRS Information 6. Tape log listing All other info related to deliverables submission

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
1	SEISMIC DATA								
1.2	PROCESSED/REPROCESSED DATA: 2D & 3D								Refer attachment for Standard Data Type Naming Convention
1.2.3	MIGRATION AVO/AVA								
1.2.3.1	Unfiltered Unscaled Angle Stacks		SEG-Y (32 bits, IBM Floating Points)	Submit to PGSC	CARTRIDGE 3592 E07 and E08 only		Within 2 months upon completion of processing activity	SEG-Y EBCDIC Information should contain: 1. Line/Survey name, Area (Block/Prospect name), Processing Company, Client, Date 2. Acquisition Information required for processing. Also need to include date and name of company acquiring the survey 3. Geodetic information: 3.1 Projection System 3.2 Datum 3.3 Grid definition (bin size) and 4-corner coordinates (Inline, crossline, XY reference) 4. Brief Processing Sequence	Note: Polarity for nav-merged SEG-Y marine/land/OBN/OBC case would be minimum phase, except when vibroseis as source, in which polarity will be zero phase. Refer to attachments for: 1. SEG-Y EBCDIC header 2. Data Type Naming Convention 3. SEG-Y Seismic Polarity 4. SEG-Y Trace Header 5. CRS Information 6. Tape log listing All other info related to deliverables submission
1.2.3.2	Others (such as specular reflection and diffraction image stacks, AVO/AVA envelopes, 4D attributes, pre-migrated estimated multiples and Migrated multiple model volume etc.)		SEG-Y (32 bits, IBM Floating Points)	Submit to PGSC	CARTRIDGE 3592 E07 and E08 only		Within 2 months upon completion of processing activity	SEG-Y EBCDIC Information should contain: 1. Line/Survey name, Area (Block/Prospect name), Processing Company, Client, Date 2. Acquisition Information required for processing. Also need to include date and name of company acquiring the survey 3. Geodetic information: 3.1 Projection System 3.2 Datum 3.3 Grid definition (bin size) and 4-corner coordinates (Inline, crossline, XY reference) 4. Brief Processing Sequence	Note: Polarity for nav-merged SEG-Y marine/land/OBN/OBC case would be minimum phase, except when vibroseis as source, in which polarity will be zero phase. Refer to attachments for: 1. SEG-Y EBCDIC header 2. Data Type Naming Convention 3. SEG-Y Seismic Polarity 4. SEG-Y Trace Header 5. CRS Information 6. Tape log listing All other info related to deliverables submission

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
1	SEISMIC DATA								
1.2	PROCESSED/REPROCESSED DATA: 2D & 3D								Refer attachment for Standard Data Type Naming Convention
1.2.4	SPECIAL PROCESSING								
1.2.4.1	Output for aiding final interpretation such as Instantaneous Phase, Acoustic Impedance, Optical Stacking etc.		SEG-Y (32 bits, IBM Floating Points)	Submit to PGSC	CARTRIDGE 3592 E07 and E08 only		Within 2 months upon completion of processing activity	SEG-Y EBCDIC Information should contain: 1. Line/Survey name, Area (Block/Prospect name), Processing Company, Client, Date 2. Acquisition Information required for processing. Also need to include date and name of company acquiring the survey 3. Geodetic information: 3.1 Projection System 3.2 Datum 3.3 Grid definition (bin size) and 4-corner coordinates (Inline, crossline, XY reference) 4. Brief Processing Sequence	Note: Polarity for nav-merged SEG-Y marine/land/OBN/OBC case would be minimum phase, except when vibroseis as source, in which polarity will be zero phase. Refer to attachments for: 1. SEG-Y EBCDIC header 2. Data Type Naming Convention 3. SEG-Y Seismic Polarity 4. SEG-Y Trace Header 5. CRS Information 6. Tape log listing All other info related to deliverables submission
1.2.4.2	Pore Pressure (Seismic)		SEG-Y (32 bits, IBM Floating Points)	Submit to PGSC	CARTRIDGE 3592 E07 and E08 only		Within 2 months upon completion of processing activity	SEG-Y EBCDIC Information should contain: 1. Line/Survey name, Area (Block/Prospect name), Processing Company, Client, Date 2. Acquisition Information required for processing. Also need to include date and name of company acquiring the survey 3. Geodetic information: 3.1 Projection System 3.2 Datum 3.3 Grid definition (bin size) and 4-corner coordinates (Inline, crossline, XY reference) 4. Brief Processing Sequence	Note: Polarity for nav-merged SEG-Y marine/land/OBN/OBC case would be minimum phase, except when vibroseis as source, in which polarity will be zero phase. Refer to attachments for: 1. SEG-Y EBCDIC header 2. Data Type Naming Convention 3. SEG-Y Seismic Polarity 4. SEG-Y Trace Header 5. CRS Information 6. Tape log listing All other info related to deliverables submission

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
1	SEISMIC DATA								
1.2	PROCESSED/REPROCESSED DATA: 2D & 3D								Refer attachment for Standard Data Type Naming Convention
1.2.5	VELOCITY (TIME/DEPTH)								
1.2.5.1	Migration Velocity: RMS, Interval, Average		SEG-Y (32 bits, IBM Floating Points) and ASCII	Submit to PGSC	CARTRIDGE 3592 E07 and E08 only		Within 2 months upon completion of processing activity	SEG-Y EBCDIC Information should contain: 1. Line/Survey name, Area (Block/Prospect name), Processing Company, Client, Date 2. Acquisition Information required for processing. Also need to include date and name of company acquiring the survey 3. Geodetic information: 3.1 Projection System 3.2 Datum 3.3 Grid definition (bin size) and 4-corner coordinates (Inline, crossline, XY reference) 4. Brief Processing Sequence	Refer to attachments for: 1. SEG-Y EBCDIC header 2. Data Type Naming Convention 3. SEG-Y Seismic Polarity 4. SEG-Y Trace Header 5. CRS Information 6. Tape log listing 7. All other info related to deliverables submission
	Stacking Velocity or HDVA: RMS, Interval, Average		SEG-Y (32 bits, IBM Floating Points) and ASCII	Submit to PGSC	CARTRIDGE 3592 E07 and E08 only		Within 2 months upon completion of processing activity		
	Domain conversion Velocity: RMS, Interval, Average		SEG-Y (32 bits, IBM Floating Points) and ASCII	Submit to PGSC	CARTRIDGE 3592 E07 and E08 only		Within 2 months upon completion of processing activity	Domain conversion Velocity: RMS, Interval, Average	

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
1	SEISMIC DATA								
1.2	PROCESSED/REPROCESSED DATA: 2D & 3D								Refer attachment for Standard Data Type Naming Convention
1.2.5	VELOCITY (TIME/DEPTH)								
1.2.5.2	Anisotropic Parameters: ETA, Delta, Epsilon, Dip, Azimuth, orthorhombic anisotropy, etc.		SEG-Y (32 bits, IBM Floating Points) and ASCII	Submit to PGSC	CARTRIDGE 3592 E07 and E08 only		Within 2 months upon completion of processing activity		
1.2.5.3	FWI Velocity, Near Surface Velocity Model, Shot & Receiver Statics, Tidal Statics		SEG-Y (32 bits, IBM Floating Points) and ASCII	Submit to PGSC	CARTRIDGE 3592 E07 and E08 only		Within 2 months upon completion of processing activity		
1.2.5.4	Others (such as Q Model, Gamma (VP/VS) etc.)		SEG-Y (32 bits, IBM Floating Points) and ASCII	Submit to PGSC	CARTRIDGE 3592 E07 and E08 only		Within 2 months upon completion of processing activity		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
1	SEISMIC DATA								
1.2	PROCESSED/REPROCESSED DATA: 2D & 3D								Refer attachment for Standard Data Type Naming Convention
1.2.6	BIN CENTER XY COORDINATES								
1.2.6.1	Bin Center XY COOR		IOGP P6/11	Submit to PGSC	CARTRIDGE 3592 E07 and E08 only	Unit in meter	Within 2 months upon completion of processing activity	1. To follow the latest IOGP P6/11 format.	Refer to attachments for: 1. CRS Information 2. All other info related to deliverables submission
1.2.7	PROCESSING REPORT								
1.2.7.1	Processing Report (Including any special processing report)	Acrobat PDF (.pdf)		Submit to PGSC	CD/DVD and SMFT		Within 2 months upon completion of processing activity & to be submitted together with the shipment	To include also the following: 1. Complete survey information (Details of acquisition parameters) 2. Processing information 3. Types of output polarity (normal/reverse) and phase (minimum/zero phase) 4. Grid information or 4-corner point (3D only) 5. CRS information and coordinate transformation procedure (if applicable) 6. Trace header byte location 7. Coverage of processed data (sq km for 3D and line km for 2D 8. Transmittals of data submission 9. List of deliverables (datasets)	Refer to attachments for: 1. CRS Information 2. All other info related to deliverables submission

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
2	SITE SURVEY								
2.1	SITE SURVEY PROJECTS/GEOPHYSICAL/GEOHAZARD								
2.1.1	SITE SURVEY PROJECTS/GEOPHYSICAL DATA								
2.1.1.1	Site Survey Project Deliverables 1. Rig site surveys 2. Platform site surveys 3. Geohazard surveys 4. Pipeline site surveys (pre, post-lay) 5. Cable route surveys 6. Nearshore/ Bathymetry survey 7. Field development surveys 8. Clearance (debris), abandonment and inspection surveys	Acrobat PDF (.pdf) & Drawing (.dwg, .dxf)	Microsoft Words, Microsoft Excel, ASCII, GeoTIF Shapefile polygon, SEG-Y, *.gdb using IOGP SSDM, & CAD files, Video	Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD External Hard Drive (EHD)		1 month after survey completed		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
2	SITE SURVEY								
2.1	SITE SURVEY PROJECTS/GEOPHYSICAL/GEOHAZARD								
2.1.2	SITE SURVEY RAW AND PROCESSED DATA							Survey Equipment Measured Data	
2.1.2.1	Survey Tracklines	Acrobat PDF (.pdf)	UKOOA P2/94, OGP P2/11, P1/90	Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD External Hard Drive (EHD)	Final Survey Lines/Tracklines Maps (A0 size)	1 month after survey completed	Navigation (raw & processed)	UKOOA P2/94, OGP P2/11 or latest format with header information of navigation/shotpoint location data including elevations or Bathymetry. Header data must include geodetic datum, spheroid, projection and clearly stated transformation parameters. Grid cell sizes suitable for the project and survey accuracy classes. Gridded spot height/depth points and other derived information such as Bathymetry Contour lines at specific intervals (1m, 5m) are part of SSDM feature classes.

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
2	SITE SURVEY								
2.1	SITE SURVEY PROJECTS/GEOPHYSICAL/GEOHAZARD								
2.1.2	SITE SURVEY RAW AND PROCESSED DATA							Survey Equipment Measured Data	
2.1.2.2	Bathymetry/ Water depth measurement/sea bed topography	Acrobat PDF (.pdf), Gridded data as ASCII XYZ, Esri Grids/ Raster Shaded relief in Esri Grids, GeoTIFF, IMG or JPEG2000	Raw and processed data in General Sensor Format (GSF), BAG(.bag), Grid (.grd), MBES Image, *.gdb using IOGP SSDM & CAD files (.dwg, .dxf)	Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD External Hard Drive (EHD)	Final Bathymetry/ seafloor topography maps (A0 size)	1 month after survey completed for data	Bathymetry - Singlebeam/ MultibeamEchosounder (S/MBES)	Final Bathymetry/seafloor topography maps (*.pdf) & CAD format
2.1.2.3	Temperature Salinity Dip (TS-Dip) Profiles	Raw data in General Sensor Format (GSF)	.XLS/XLSX/AS CII/CSV *.gdb using IOGP SSDM (TSdip_Sampl e_pnt)	Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD External Hard Drive (EHD)		1 month after survey completed for data		Refer item 2.1.1.1

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
2	SITE SURVEY								
2.1	SITE SURVEY PROJECTS/GEOPHYSICAL/GEOHAZARD								
2.1.3	SEABED FEATURES								
2.1.3.1	Sonar images for detection/identification of seabed and obstructions	Acrobat PDF (.pdf)	Triton XTF GeoTIFF, IMG or JPEG2000, TFW, CODA, Mosaic image, *.GDB USING IOGP SSDM & CAD file(.dwg, .dxf	Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD External Hard Drive (EHD)	Final (SSS & Interpreted) Maps with imagery (A0 size)	1 month after survey completed for data	Side scan sonar image	Refer item 2.1.1.1
2.1.4	SHALLOW/INTERMEDIATE GEOLOGY FEATURES								
2.1.4.1	Shallow seismic for interpretation of soil lithology	Acrobat PDF (.pdf), Tif, JPEG2000	SEG-Y (raw), GeoTIFF, ASCII Shapefile polygon, IMG, TFW, CODA & CAD file(.dwg, .dxf)	Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD External Hard Drive (EHD)		1 month after survey completed for data	Pinger/Chirper Boomer/Sparker	Final Seismic Sections with interpreted information to support report (in PDF). Final geotechnical soil investigation report in hardcopy. To be accompanied by itemised tape listing, navigation data, velocity F, observer logs, and operation reports. Showing tape number, survey name, line number, shot point range, data type. Including line number, shotpoint, time versus RMS pairs for both stacked and migrated velocities.

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
2	SITE SURVEY								
2.1	SITE SURVEY PROJECTS/GEOPHYSICAL/GEOHAZARD								
2.1.4	SHALLOW/INTERMEDIATE GEOLOGY FEATURES								
2.1.4.2	High-Resolution Seismic for shallow gas detection	Acrobat PDF (.pdf), Tiff, JPEG2000	SEG-D (raw), SEG-Y (raw), Microsoft Words, Microsoft Excel, *gdb using IOGP SSDM, ASCII Shapefile polygon & CAD files (.dwg, .dxf)	Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD External Hard Drive (EHD)		1 month after survey completed for data	High Resolution Seismic (2D or pseudo 3D)	Refer item 2.1.1.1

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
2	SITE SURVEY								
2.1	SITE SURVEY PROJECTS/GEOPHYSICAL/GEOHAZARD								
2.1.5	ENVIRONMENTAL/GEOTECHNICAL DATA								
2.1.5.1	Geotechnical Borehole, CPT (Cone Penetration Test) and Soil Samples	Acrobat PDF (.pdf) & Drawing	Microsoft Words, Microsoft Excel, ASCII & CAD files	Submit to PGSC	Paper & CDR/DVD		1 month after survey completed for data. 1 month after studies/ survey completed for final report.	1. Locations with CRS (Coordinate Reference System) 2. Lab Results Analysis 3. In-situ Data 4. Factual Data 5. Design Soil Parameter 6. Engineering Analysis 7. Spudcan Penetration Analyses 8. Ground Model/Soil Provinces	All CRS information shall be in WGS84 1. Locations: coordinates in WGS84, local grid, geodetic parameters 2. Water Depth reduced to MSL 3. Lab Results: electronic format (.xls) 4. In-situ Data: ASCII data
2.1.5.2	Drop camera/video	Acrobat PDF (.pdf)	JPEG/ MPEG/ WMF/ MP4/ AVI/MOV	Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD External Hard Drive (EHD)				Sample locations also applied to camera, video etc.
3	INFRASTRUCTURE & PIPELINE INSTALLATION/AS-BUILT DATA								
3.1	Infrastructure Installations (Facilities, Platforms, SBM)	Acrobat PDF (.pdf)	.XLS/XLSX Esri File GeoDB/ CAD files(.dwg, .dxf), ASCII File	Upload to P-EDMS			3 month after installation completed	As per Attachment 1(w) Installation features, position and names. Official Structure Listing (Name and Coordinates) As-Built Drawings. Official Structure Listing in PDF.	Include information on Platform types, Installation Dates. (Adoption of draft PETRONAS Installation Data Model are encouraged)
3.2	Pipelines	Acrobat PDF (.pdf)	APDM/POD S in Esri File GeoDB, ASCII File, CAD files (.dwg, .dxf)	Upload to P-EDMS			3 months after installation completed	As per Attachment 1(w) Pipeline alignment, size, product content and names. As-Built Drawings. Final Survey Report (.pdf).	Include information on Platform types, Installation Dates. (Adoption of draft PETRONAS Installation Data Model are encouraged)

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
4	GRAVITY SURVEY								
4.1	Gravity and accelerometer records/profiles or spot reading		ASCII	Submit to PGSC	CDR/DVD		Within 2 months after survey is completed		
4.2	Traverse line maps		ASCII	Submit to PGSC	CDR/DVD	1:25,000 1:50,000	Within 2 months after survey is completed		
4.3	Meter calibration and drift base station reports		ASCII	Submit to PGSC	CDR/DVD		Within 2 months after survey is completed		
4.4	Navigational record required for correction to observations		ASCII	Submit to PGSC	CDR/DVD		Within 2 months after survey is completed		
4.5	Processed gravity anomaly maps		ASCII	Submit to PGSC	CDR/DVD		Within 2 months after survey is completed		
4.6	Listing of absolute measured gravity values, theoretical gravity values and corrected free-air anomaly values		ASCII	Submit to PGSC	CDR/DVD		Within 2 months after survey is completed		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
5	MAGNETIC								
5.1	Magnetometer records/profiles		ASCII	Submit to PGSC	CDR/DVD		Within 2 months after survey is completed		
5.2	Altimeter records, storm monitor records and navigational record		ASCII	Submit to PGSC	CDR/DVD		Within 2 months after survey is completed		
5.3	Traverse line maps		ASCII	Submit to PGSC	CDR/DVD		Within 2 months after survey is completed		
5.4	Magnetometer operator log or other magnetic local time reports		ASCII	Submit to PGSC	CDR/DVD		Within 2 months after survey is completed		
5.5	Diurnal variation records		ASCII	Submit to PGSC	CDR/DVD		Within 2 months after survey is completed		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
6	NON-SEISMIC - CONTROLLED SOURCE ELECTROMAGNETIC (CSEM)								
6.1	ACQUISITION DATA								
6.1.1	Raw navigation (navigation line logs)		(.xls/.tx/ .S00/ .rx).png	Submit to PGSC	HDD/Cart 3592		Within 1 month after acquisition completed		Header must include datum, projection system & any conversion which is applied
6.1.2	Raw Receiver Data (receiver)		(.xls/.tx/ .S00/.rx)				Within 1 month after acquisition completed		
6.1.3	Raw Source Data (source output)		(.ant)				Within 1 month after acquisition completed		
6.1.4	Water Conductivity		(.svp)				Within 1 month after acquisition completed		
6.1.5	EchoSounder		.txt				Within 1 month after acquisition completed		
6.1.6	Tx file		.txt				Within 1 month after acquisition completed	Containing all information of the acquisition	

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
6	NON-SEISMIC - CONTROLLED SOURCE ELECTROMAGNETIC (CSEM)								
6.2	QUALITY CONTROL								
6.2.1	Navigation		.png	Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after acquisition completed	Comprises of: 1. Drop position accuracy 2. Accuracy Antenna Heading 3. Sound Velocity 4. Tail Fish Position 5. VRP Position 6. Tow Fish Doppler Speed 7. VRP Echo-sounder Depth Tx Sample Interval	
6.2.2	Receiver	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after acquisition completed	Comprises of: 1. Equipment Performance Spreadsheet	
6.2.3	Line Logs	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after acquisition completed	Line logs for each line must contain the following information: 1. Vessel Name 2. Time stamp on activities during acquisition 3. X,Y coordinates of SOL and EOL with calculation of exact line distance 4. Equipment Check and Weather Info	
6.2.4	Source		.png	Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after acquisition completed	Comprises of: 1. Amplitude and Phase QC plot 2. Within 1 month after acquisition completed Composite square pulse in time and frequency domain	
6.2.5	Standard Data Acquisition Report	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC			Within 2 months after acquisition completed		To include: 1. Survey Plan - X, Y coordinates of each receiver 2. HSE and Operating Statistics 3. Data Quality Control (DQC) 4. Transmittal of data submission.

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
6	NON-SEISMIC - CONTROLLED SOURCE ELECTROMAGNETIC (CSEM)								
6.2	QUALITY CONTROL								
6.2.6	Acquisition Mobilization Report	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC			Within 2 months after acquisition completed		To include: Full vessel description and specification
6.2.7	Survey Layout Sheet	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC			Within 2 months after acquisition completed	Survey Layout Plan and list of X, Y coordinate of each receiver and line/SOL and EOL. Full image of the Survey Layout	

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
6	NON-SEISMIC - CONTROLLED SOURCE ELECTROMAGNETIC (CSEM)								
6.3	PROCESSED DATA								
6.3.1	Rotated EM Data		.ASCII ,Bridge/ HD5/netcdf format	Submit to PGSC	HDD		Within 1 month after processing completed		To include: 1. Read-me file describing attributes, Noise floor and frequencies
6.3.2	2D/3D MVO/PVO plots for main frequencies		.png	Submit to PGSC	HDD		Within 1 month after processing completed		To include: 1. Read-me file describing attributes, Noise floor and frequencies
6.3.3	Noise Data/Masked Data		.ASCII/ HD5/netcdf format	Submit to PGSC	HDD		Within 1 month after processing completed		To include: 1. Read-me file describing attributes
6.3.4	2D/3D Line response plots for main frequencies and all offsets		.png	Submit to PGSC	HDD		Within 1 month after processing completed		To include: 1. Read-me file describing attributes, Noise floor and frequencies
6.3.5	3D Attribute cubes (MVO/PVO) for the main frequencies		SEG-Y	Submit to PGSC	HDD/ Cart 3590		Within 2 months after processing completed		Information on Trace Header should contain the following (UKOOA standard): 1. X coordinate at byte location 73-76 (4 byte-32 bit) integer 2. Y coordinate at byte location 77-80 (4 byte-32 bit) integer 3. CDP at byte location 21 (4 byte integer) 4. LINE at byte location 5 (4 byte integer) To include: Read-me file describing attributes, Noise floor and frequencies

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
6	NON-SEISMIC - CONTROLLED SOURCE ELECTROMAGNETIC (CSEM)								
6.3	PROCESSED DATA								
6.3.6	3D Attribute cubes (NMVO/PDVO) for the main frequencies		SEG-Y	Submit to PGSC	HDD/ Cart 3591		Within 2 months after processing completed		Information on Trace Header should contain the following (UKOOA standard): 1. X coordinate at byte location 73-76 (4 byte-32 bit) integer 2. Y coordinate at byte location 77-80 (4 byte-32 bit) integer 3. CDP at byte location 21 (4 byte integer) 4. LINE at byte location 5 (4 byte integer To include: Read-me file describing attributes, Noise floor and frequencies
6.3.7	2.5D Unconstrained results along dense line where applicable		SEG-Y	Submit to PGSC	HDD/ Cart 3592		Within 2 months upon completion of processing		Information on Trace Header should contain the following (UKOOA standard): 1. X coordinate at byte location 73-76 (4 byte-32 bit) integer 2. Y coordinate at byte location 77-80 (4 byte-32 bit) integer 3. CDP at byte location 21 (4 byte integer) 4. LINE at byte location 5 (4 byte integer To include: Read-me file describing Line description, Noise floor and frequencies used
6.3.8	Standard Data Analysis Report	Acrobat PDF (.pdf)	SEG-Y	Submit to PGSC	DVD/HDD		Within 2 months upon completion of processing		To include: Attribute analysis: Summary Plots, Multi- offset, Unconstrained 2.5D Inversion Results

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
6	NON-SEISMIC - CONTROLLED SOURCE ELECTROMAGNETIC (CSEM)								
6.4.	INTERPRETATION - LEVEL 1								
6.4.1	2.5D Unconstrained and constrained results along dense line where applicable		SEG-Y	Submit to PGSC	HDD/ Cart 3592		Within 1 week after interpretation completed		Information on Trace Header should contain the following (UKOOA standard): 1. X coordinate at byte location 73-76 (4 byte-32 bit) integer 2. Y coordinate at byte location 77-80 (4 byte-32 bit) integer 3. CDP at byte location 21 (4 byte integer) 4. LINE at byte location 5 (4 byte integer To include: Read-me file describing Cube X,Y min and max/ Polygon, Noise floor and frequencies used
6.4.2	3D Unconstrained results along dense line where applicable		SEG-Y	Submit to PGSC	HDD/ Cart 3592		Within 1 month after interpretation completed	1. CSEM results and interpretation of projects 2. Results and description of all inversion permutations including misfit plots	

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
6	NON-SEISMIC - CONTROLLED SOURCE ELECTROMAGNETIC (CSEM)								
6.5	INTERPRETATION AND INTERGRATION-LEVEL 2								
6.5.1	3D Constrained results		SEG-Y	Submit to PGSC	HDD/ Cart 3592		Within 1 week after interpretation completed		Information on Trace Header should contain the following (UKOOA standard): 1. X coordinate at byte location 73-76 (4 byte-32 bit) integer 2. Y coordinate at byte location 77-80 (4 byte-32 bit) integer 3. CDP at byte location 21 (4 byte integer) 4. LINE at byte location 5 (4 byte integer To include : Read-me file describing Cube X,Y min and max/ Polygon, Noise floor and frequencies used
6.5.2	Interpretation Report	Acrobat PDF (.pdf)		Submit to PGSC	HDD/ Cart 3592		Within 1 month after interpretation completed	1. CSEM results and interpretation of projects 2. Results and description of all inversion permutations including misfit plots	
7	OTHER SURVEYS AND STUDIES								
7.1	METOCEAN (Meteorology and Oceanography) data: 1. Wind 2. Wave 3. Current 4. Tide 5. Temperature Salinity	Acrobat PDF (.pdf)	ASCII/ *.XLS/XLSX	Secured Managed File Transfer (SMFT) to PGSC			1 month after survey completed	1. Locations with CRS (Coordinate Reference System) 2. Observation data 3. Date & Time 4. Results Analysis 5. Forecast Analysis	All CRS information shall be in WGS84

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
8	NON-SEISMIC- FULL TENSOR GRAVITY (FTG)								
8.1	ACQUISITION								
8.1.1	Depth		ASCII (.xyz)	Secured Managed File Transfer (SMFT) to PGSC			6 months after acquisition completion		
8.1.2	FFT Grids		ASCII (.xyz)	Secured Managed File Transfer (SMFT) to PGSC			6 months after acquisition completion		
8.1.3	Grids		ASCII (.xyz)	Secured Managed File Transfer (SMFT) to PGSC			6 months after acquisition completion		
8.1.4	Lineaments		ASCII (.xyz)	Secured Managed File Transfer (SMFT) to PGSC			6 months after acquisition completion		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
8	NON-SEISMIC- FULL TENSOR GRAVITY (FTG)								
8.2	PROCESSING								
8.2.1	FTG Depths		Databases (.xyz & .txt)	Secured Managed File Transfer (SMFT) to PGSC	HDD		2 months after completion		
8.2.2	MAG		Databases (.xyz & .txt)	Secured Managed File Transfer (SMFT) to PGSC	HDD		2 months after completion		
8.2.3	ATD DEPTHS		Databases (.xyz & .txt)	Secured Managed File Transfer (SMFT) to PGSC	HDD		2 months after completion		
8.2.4	LINEAMENT SLICES		Databases (.xyz & .txt)	Secured Managed File Transfer (SMFT) to PGSC	HDD		2 months after completion		
8.2.5	RTE		GeoTIFFs (.tif & .tfw)	Secured Managed File Transfer (SMFT) to PGSC	HDD		2 months after completion		
8.2.6	TCD		GeoTIFFs (.tif & .tfw)	Secured Managed File Transfer (SMFT) to PGSC	HDD		2 months after completion		
8.2.7	TMI		GeoTIFFs (.tif & .tfw)	Secured Managed File Transfer (SMFT) to PGSC	HDD		2 months after completion		
8.2.8	ACQ & PROC	Acrobat PDF (.pdf)	GeoTIFFs (.tif & .tfw)	Secured Managed File Transfer (SMFT) to PGSC	HDD		2 months after completion		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
8	NON-SEISMIC- FULL TENSOR GRAVITY (FTG)								
8.3	INTERPRETATION								
8.3.1	Survey Report	Microsoft Powerpoint (.ppt)		Secured Managed File Transfer (SMFT) to PGSC	HDD		2 months after acquisition completion		
8.3.2	Density Analysis	Microsoft Powerpoint (.ppt)		Secured Managed File Transfer (SMFT) to PGSC	HDD		2 months after acquisition completion		
8.3.3	TAR Slice		.mp4	Secured Managed File Transfer (SMFT) to PGSC	HDD		2 months after acquisition completion		
8.3.4	README INTERP		.txt	Secured Managed File Transfer (SMFT) to PGSC	HDD		2 months after acquisition completion		
9	NON-SEISMIC- GRAVITY & MAGNETICS (GRAVMAG)								
9.1	ACQUISITION								
9.1.1	Navigation (P190)		ASCII	Submit to PGSC	CDR/DVD		Within 2 months after survey is completed		
9.1.2	Gravity (ULTRASYS)		ASCII	Submit to PGSC	CDR/DVD		Within 2 months after survey is completed		
9.1.3	GRAVMAG (UNISON)		ASCII	Submit to PGSC	CDR/DVD		Within 2 months after survey is completed		
9.1.4	BASE MAG		ASCII	Submit to PGSC	CDR/DVD		Within 2 months after survey is completed		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
9	NON-SEISMIC- GRAVITY & MAGNETICS (GRAVMAG)								
9.2	PROCESSING								
9.2.1	Line Data		GeoPDF/ ASCII	Submit to PGSC			Within 2 months after survey is completed		
9.2.2	Grid Data		GeoPDF	Submit to PGSC			Within 2 months after survey is completed		
9.2.3	Line Location		GeoPDF	Submit to PGSC			Within 2 months after survey is completed		
9.2.4	Bathymetry		GeoPDF	Submit to PGSC			Within 2 months after survey is completed		
9.2.5	Free Air Gravity		GeoPDF	Submit to PGSC			Within 2 months after survey is completed		
9.2.6	Free Air Gravity FVD		GeoPDF	Submit to PGSC			Within 2 months after survey is completed		
9.2.7	TMI		GeoPDF	Submit to PGSC			Within 2 months after survey is completed		
9.2.8	TMI_RTP		GeoPDF	Submit to PGSC			Within 2 months after survey is completed		
9.2.9	TRI_RTP_HG		GeoPDF/ ASCII	Submit to PGSC			Within 2 months after survey is completed		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
9	NON-SEISMIC- GRAVITY & MAGNETICS (GRAVMAG)								
9.3	INTERPRETATION								
9.3.1	Acquisition	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC			Within 3 months after survey is completed		
9.3.2	Processing	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC			Within 3 months after survey is completed		
9.3.3	Digital Data Description	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC			Within 3 months after survey is completed		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
10	REGIONAL/BLOCK STUDIES								
10.1	SURFACE GEOCHEMISTRY								
10.1.1	Headspace & Interstitial Gas Concentration	.xlsx		Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		
10.1.2	Headspace & Interstitial Gas Wetness	.xlsx		Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		
10.1.3	Interstitial Gas & Isotopes Tables	.xlsx		Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		
10.1.4	Headspace Gas & Isotopes Tables	.xlsx		Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		
10.1.5	Isotopes	.xlsx		Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		
10.1.6	TSF Maximum Intensity	.xlsx		Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		
10.1.7	GC Traces & UCM Values	.xlsx		Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
10	REGIONAL/BLOCK STUDIES								
10.1	SURFACE GEOCHEMISTRY								
10.1.8	GCMS	.xlsx		Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		
10.1.9	Final Report	.xlsx		Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		

NO	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
10	REGIONAL/BLOCK STUDIES								
10.2	BASIN MODELLING								
10.2.1	Thermal Maturity	.xlsx/ Acrobat PDF (.pdf)	ASCII	Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		
10.2.2	Geothermal gradient		ASCII	Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		
10.2.3	1D maturity model	CPS3		Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		
10.2.4	2D maturity model		ASCII	Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		
10.2.5	3D maturity model		ASCII	Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		
10.2.6	MAP	ZMAP		Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		
10.2.7	Paleowaterdepth	Png/ Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		
10.2.8	TOC Map	Png/ Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
10	REGIONAL/BLOCK STUDIES								
10.1	SURFACE GEOCHEMISTRY								
10.2.9	HI Map	Png/ Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		
10.2.10	Heatflow Map	Png/ Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		
10.2.11	Gradient Map	ZMAP		Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		
10.2.12	Kinetic	.xlsx		Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		
10.2.13	Studies Report	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
10	REGIONAL/BLOCK STUDIES								
10.3	SEQUENCE STRATIGRAPHY								
10.3.1	Regional Geoseismic Sections	png		Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		
10.3.2	Chronostratigraphic Chart	png		Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		
10.3.3	Seismic facies, paleo-GDE maps & depositional models		ASCII	Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		
10.3.4	Studies Report	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		
10.4	BIOSTRATIGRAPHY								
10.4.1	Planktonic Foraminifera		ASCII	Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		
10.4.2	Larger Foraminifera		ASCII	Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		
10.4.3	Smaller Benthic Foraminifera		ASCII	Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		
10.4.4	Nannofossils		ASCII	Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
10	REGIONAL/BLOCK STUDIES								
10.4	BIOSTRATIGRAPHY								
10.4.5	Palynology		ASCII	Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		
10.4.6	Studies Report	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
10	REGIONAL/BLOCK STUDIES								
10.5	STRUCTURAL GEOLOGY								
10.5.1	Geometrically & Geomechanically interpretation	png		Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		
10.5.2	Timing of structuration	png		Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		
10.5.3	Structural evolution of the basin	png		Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		
10.5.4	Eroded section	png		Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		
10.5.5	Studies Report	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC			Within 1 month after study completed		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORTS/ LOGS	DIGITAL DATA						
EXPLORATION/APPRAISAL									
11	WELL DATA								
11.1	PRE-DRILL								
11.1.1	G&G Interpretation Data								
11.1.1.1	Seismic data used in Pre-Drill study		SEG-Y/ZGY in Project Backup - Authorised application format (i.e. Petrel) Other application format, please follow the format as per attachment 1(o) to 1(r)	Secure Managed File Transfer (SMFT) to PGSC	Electronic submission area for PSCs other than PCSB Petrel Studio Database (PCSB)		1 month before spud date	1. Data format is according to application used in Pre-Drill study 2. Project CRS parameter must be included (it is advised to standardise to WGS84) 3. To realized	All CRS information shall be in WGS84 Please refer to attachment 1 (s)
11.1.1.2	Seismic Interpretation Data		ZMAP/ASCII /3D GRID in Final project copy	Secure Managed File Transfer (SMFT) to PGSC	Electronic submission area for PSCs other than PCSB Petrel Studio Database (PCSB)		1 month before spud date	Content of the below, but not limited to: 1. Horizon(s) interpretation (zones, layers, Gridded surfaces, etc.) 2. Geological models (source rock, maturity and hydrocarbon migration, etc.) 3. Geobodies, prospect maps 4. Fault(s) interpretation (Sticks/polygons) 5. Fault Modelling & properties analysis 6. Stratigraphic interpretation (Facies, Sequences analysis) 7. Synthetic seismogram	Please refer to Attachment 1 (s), (t), (u), (v)

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORTS/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.1	PRE-DRILL								
11.1.1	G&G Interpretation Data								
11.1.1.3	Attribute Volume and Maps		SEG-Y/ ZGY/ZMAP/ 3D in Final working project copy	Secure Managed File Transfer (SMFT) to PGSC	Electronic submission area for PSCs other than PCSB Petrel Studio Database (PCSB)		1 month before spud date	Content of: 1. Attributes generated cubes	Please refer to Attachment 1 (s), (t), (u), (v)
11.1.1.4	General well data/ Well Header		ASCII	Secure Managed File Transfer (SMFT) to PGSC			1 month before spud date	Content of: 1. Country Name 2. Wellbore Name 3. Lease/Block Name 4. Field/Prospect Name 5. Well Operator 6. Drilling Rig Contractor 7. Rig Name 8. Rig Type 9. Well Situation 10. Well Classification (eg: Wildcat, Appraisal) 11. Wellbore Path Type (eg: Vertical) 12. Technical Status (eg: P&A, Oil Producer) 13. Well Spud Date 14. Easting 15. Northing 16. Projected CRS 17. Latitude 18. Longitude 19. Geographic CRS	All CRS information shall be in WSG84 Please refer to Attachment 1 (s), (t), (u), (v)
11.1.1.5	Formation Tops		ASCII	Secure Managed File Transfer (SMFT) to PGSC			1 month before spud date		Please refer to Attachment 1 (s), (t), (u), (v)
11.1.1.6	MWD/LWD Wireline data		ASCII/LAS in Final working project copy	Secure Managed File Transfer (SMFT) to PGSC			1 month before spud date	Content of: 1. Time-Depth data 2. Well Seismic/Checkshots data as used in the study - To add all logs list	Please refer to Attachment 1 (s), (t), (u), (v)

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NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.1	PRE-DRILL								
11.1.1	G&G Interpretation Data								
11.1.1.7	Velocity model/ Velocity function		ASCII/ SEG-Y/ in Final working project copy Project Backup - Authorised application format (i.e. Petrel) Other application format, please follow the format as per Attachment 1(o) to 1®	Secure Managed File Transfer (SMFT) to PGSC			1 month before spud date	Content of: 1. Velocity model or Maps	Please refer to Attachment 1 (s), (t), (u), (v)
11.1.1.8	Other Geological Data (if applicable)	Acrobat PDF (.pdf)	ASCII/ SEG-Y/ in Final working project copy	Secure Managed File Transfer (SMFT) to PGSC	Electronic submission area for PSCs other than PCSB Petrel Studio Database (PCSB)		1 month before spud date	Content of: (if applicable) 1. Mud logs as used in the Study 2. SCAL/RCAL as used in the Study	Please refer to Attachment 1 (s), (t), (u), (v)

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.1	PRE-DRILL								
11.1.2	Pore Pressure Prediction								
11.1.2.1	Pore Pressure		SEG-Y (32 bits, IBM Floating Points)	Submit to PGSC			Within 2 months after study completed		
11.1.2.2	Overburden Gradient		SEG-Y (32 bits, IBM Floating Points)	Submit to PGSC			Within 2 months after study completed		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.1	PRE-DRILL								
11.1.3	Drilling								
11.1.3.1	Well Proposal	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT) to PGSC			Minimum 2 month before spud date	The guideline for a complete well proposal, not limited to: 1. Well summary sheet 2. General Description 3. Geodetic Description 4. Geological Discussion 5. Geophysical Discussion 6. Volumetric & Risk Assessment (STOIIP and reserves) 7. Economic Analyses 8. Drilling Risk and Uncertainties 9. Well location, Objective and TD criteria 10. Technical discussion 11. Data acquisition 12. Migrated TVS sections with at least one key seismic line passing through the location of the proposed well 13. Depth and time structure maps and velocity map used of prospective horizons 14. Assessment of hydrocarbon volume-in-place and estimated reservoir 15. Structural/stratigraphic cross-section 16. Pre-drill montage 17. Pressure plot 18. Geological prognosis 19. Cultural data (interpretation of faults, horizons, polygon, etc) 20. Core analysis Programme (if applicable) 21. Proposed formation evaluation program	Final deliverable should be after technical presentation to REX. Please refer to Governing Standards, Volume 7.

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.1	PRE-DRILL								
11.1.3	Drilling								
11.1.3.2	Geomechanics	Acrobat PDF (.pdf)	Project Backup - Authorised application format (i.e. Petrel) Other application format, please follow the format as per Attachment 1(o) to 1(r)	Secure Managed File Transfer (SMFT) to PGSC	Electronic submission area for PSCs other than PCSB Petrel Studio Database (PCSB)			Content of: Pore pressure as used in the Study	
11.1.3.3	NOOP	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT) to PGSC			14 days before spud date	Please refer Governing Standards, Volume 11. 1. Well summary sheet 2. Other contents as per listed in Governing Standards, Volume 11	1. Well summary sheet, please refer to Attachment 1(u) 2. Refer Governing Standards, Volume 11 for complete deliverables Final NOOP, signed
11.1.3.4	Rig Positioning Report	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT) to PGSC			1 month after spud date	Please refer to Governing Standards, Volume 11	
11.1.3.5	Well Test Program Proposal	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT) to PGSC	CDR/DVD/ Thumb Drive		1 month before spud date	As part of NOOP	The plan should be incorporated into the well proposal/NOOP (if any)
11.1.4	Petrophysical								
11.1.4.1	Core Analysis Proposal	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT) to PGSC	CDR/DVD/ Thumb Drive		1 month before spud date	As part of NOOP	The plan should be incorporated into the well proposal and NOOP (if any)

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.1	PRE-DRILL								
11.1.5	Reservoir Engineering								
11.1.5.1	Fluid Sampling & Analysis Proposal	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT) to PGSC	CDR/DVD/ Thumb drive		1 month before spud date	As part of NOOP	
11.2	DURING DRILLING								
11.2.1	G&G								
11.2.1.1	Daily Geological Report	Acrobat PDF (.pdf)		E-mail			Daily by 8:30am	The report should include: 1. Operation update 2. Last 24 hrs break down of operations 3. Preliminary formation tops 4. Lithology 5. Gas and oil show 6. Mud losses records 7. Last three survey update 8. Calibration record	Detailed report is required to be submitted via e-mail to MPM Line Departments upon request
11.2.1.2	Daily Geological Report (Mudlogging report)	Acrobat PDF (.pdf)		E-mail			Daily by 8:30am	The package should include: 1. Mudlog 2. Gas log 3. Drilling Log 4. Pressure Log 5. Time log 6. Depth Log 7. Morning Report 8. Afternoon report 9. Midnight Report	Detailed report is required to be submitted via e-mail to MPM Line Departments upon request

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.2	DURING DRILLING								
11.2.2	Petrophysical Data (Logging)								
11.2.2.1	MWD/LWD log	PDF & PDF Log Prints	ASCII, LAS, DLIS, XLSX	E-mail		1:200 1:500	Real time – during drilling Recorded mode. After pull out BHA	All logging data that acquired as per approved logging programme including pressure and all processed and interpreted logs	Please refer to Governing Standards, Volume 7 Detailed log is required to be submitted via e-mail to MPM Line Departments upon request
11.2.2.2	Wireline Data	PDF & PDF Log Prints	.DLIS .LAS ASCII XLSX SEG-Y	E-mail		1:200 1:500 (for supercombo, PEX, etc)	To be delivered within 24/7 after complete logging	All logging data that acquired as per approved logging programme including pressure and all processed and interpreted logs, the wireline logging not limited to: 1. GR 2. Resistivity 3. Density 4. Porosity 5. Caliper 6. Pressure and sampling 7. Sonic 8. Image 9. Side wall core 10. VSP/Checkshot 11. Logging summary	Detailed log is required to be submitted via e-mail to MPM Line Departments upon request

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.2	DURING DRILLING								
11.2.2	Petrophysical Data (Logging)								
11.2.2.3	Checkshot	.XLS/XLSX		Secure Managed File Transfer (SMFT) to PGSC		1:200 1:500	3 month after completion of the well	All logging data that acquired as per approved logging programme including pressure and all processed and interpreted logs.	Raw digital data acquired as per actual logging programme for exploration and development wells, for open hole and cased hole logging. Composite log, process and interpreted results data are final approved versions. Data deliverable is in Measured Depth (MD). True Vertical Depth (TVD)
11.2.2.4	Logging Summary	Acrobat PDF (.pdf) .doc/.docx		Secure Managed File Transfer (SMFT) to PGSC		1:200 1:500	Wireline report: 3 month after completion of the well	All logging data that acquired as per approved logging programme including pressure and all processed and interpreted logs.	Raw digital data acquired as per actual logging programme for exploration and development wells, for open hole and cased hole logging. Composite log, process and interpreted results data are final approved versions. Data deliverable is in Measured Depth (MD). True Vertical Depth (TVD)
11.2.2.5	Log Prints	Acrobat PDF (.pdf) .pds/cgm (image)		Secure Managed File Transfer (SMFT) to PGSC		1:200 1:500	3 month after completion of the well		Raw digital data acquired as per actual logging programme for exploration and development wells, for open hole and cased hole logging. Composite log, process and interpreted results data are final approved versions. Data deliverable is in Measured Depth (MD). True Vertical Depth (TVD)

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.2	DURING DRILLING								
11.2.2	Petrophysical Data (Logging)								
11.2.2.6	Pressure & sampling results	Acrobat PDF (.pdf) .xls/xlsx		Secure Managed File Transfer (SMFT) to PGSC		1:200 1:500	3 month after completion of the well	All logging data that acquired as per approved logging programme including pressure and all processed and interpreted logs.	Raw digital data acquired as per actual logging programme for exploration and development wells, for open hole and cased hole logging. Composite log, process and interpreted results data are final approved versions. Data deliverable is in Measured Depth (MD). True Vertical Depth (TVD)

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.2	DURING DRILLING								
11.2.3	Drilling Data								
11.2.3.1	Daily Drilling Report	Acrobat PDF (.pdf)	Online Drilling Benchmarking System (ODBS)	Online database connection			Daily		Refer to Governing Standards, Volume 11
11.2.3.2	Daily Cost Report	Acrobat PDF (.pdf)	Online Drilling Benchmarking System (ODBS)	Online database connection			Daily	As part of daily drilling report	Detailed cost report is required to be submitted via e-mail to MPM Line Departments upon request
11.2.3.3	Daily Survey Report	Acrobat PDF (.pdf) .xls/xlsx	Online Drilling Benchmarking System (ODBS)	Online database connection			Daily		
11.2.3.4	Risk Assessment/ Memorandum of Change (MOC)	Acrobat PDF (.pdf) .xls/xlsx		Online data submission	PLATINUM		Immediately when there is significant deviation from NOOP and requires approval		Refer to Governing Standards, Volume 11

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.2	DURING DRILLING								
11.2.3	Drilling Data								
11.2.3.5	Weekly Drilling Summary	Acrobat PDF (.pdf) .xls/xlsx		E-mail			Weekly	On-going Wells a. Well name, rig name, block and water depth; b. Well type (development, exploration, appraisal or workover) and well complexity (if any - Deepwater, HPHT, or Carbonate); c. Last casing size and current hole size; d. Spud date, plan and actual days; e. Plan and actual cost (USD or RM); f. Plan Total Depth (TD) in MD and TVD (metre); g. Current depth in MD and TVD (metre); and h. Cumulative NPT in hours and percentage (for ongoing wells NPT percentage to be calculated on planned well days). i. Progress during the week; j. Major NPT/WOW during the week; k. Cumulative NPT in hours and percentage; and l. Forward plan Finished Wells a. Well name, rig name, block and water depth; b. Well type (development, exploration, appraisal or workover) and well complexity (if any - Deepwater, HPHT, or Carbonate); c. Last casing size and current hole size;	Refer to Governing Standards, Volume 11

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								d. Start date, Spud date and end date; e. Plan and actual days drilling; f. Plan and actual days completion; g. Plan and actual cost drilling (USD); h. Plan and actual cost completion (USD); i. Plan Total Depth (TD) in MD and TVD (metre); j. Total NPT in hours and percentage; and k. Final well cost and days KPI measured against PETRONAS issued KPI (i.e. WCPF, DCPF, DDPTF, CCPF and CDPTF)	

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.2	DURING DRILLING								
11.2.3	Drilling Data								
11.2.3.6	P&A Programme	Acrobat PDF (.pdf)		E-mail			Before well abandonment operation and requires approval	Contents as per listed in Governing Standards, Volume 11	P&A diagram and letter to Wells MPM and REX MPM (for exploration wells)
11.2.3.7	Well Abandonment Report (WAR)	Acrobat PDF (.pdf)		-Secured Managed File Transfer (SMFT) to PGSC -E-mail			After well abandonment operation completed	Contents as per listed in Governing Standards, Volume 11	Refer Governing Standards, Volume 11 for further information E-mail to MPM Line Department
11.2.3.8	Daily Well Test Operation	Acrobat PDF (.pdf)		E-mail			Daily		E-mail to MPM Line Departments

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.3	POST DRILL								
11.3.1	G&G								
11..3.1.1	Well Completion Report	Acrobat PDF (.pdf)/pds/ tiff/cgm/ jpeg (image)		Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD	1:500 1:200	3 months after completion of the well	The report should include all preliminary well result which the contents not limited to: 1. Executive summary 2. Summary of well data (post drill) 3. Operation summary 4. Geological operation summary 5. Pre-well result 6. Conclusion/recommendation 7. Reference	Please refer to Governing Standards, Volume 7
11.3.1.2	Well Evaluation Report	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD		6-8 month after completion of the well	The report should include all necessary work to conclude the well result, which the contents not limited to: 1. Introduction of well 2. Well result 3. Geological summary 4. Formation top summary 5. Petroleum system evaluation 6. Formation evaluation 7. Time and depth map 8. Volumetric 9. Post-drill montage 10. Well composite log 11. G&G Analysis 12. Lesson learn 13. **Other study related to the well (core analysis etc)	Please refer to Governing Standards, Volume 7
11.3.1.3	Wellsite/Operation report	Acrobat PDF (.pdf)/pds/ tiff/cgm/ jpeg (image)		Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD	1:5001:200	2 months after completion of the well	The report should include all operational report which the contents are not limited to: 1. Executive summary 2. Summary of well data (post drill) 3. Operation summary 4. Geological operation summary 5. Conclusion/recommendation 6. Reference	Please refer to Governing Standards, Volume 7

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.3	POST DRILL								
11.3.2	G&G (3rd Party Report)								
11.3.2.1	Final well report (mudlogging)	Acrobat PDF (.pdf) (Mudlog print)	ASCII	Secured Managed File Transfer (SMFT) to PGSC			1 month after P&A well	The package shall includes inside Mudlogging final well report; 1. Morning report 2. Afternoon report 3. Midnight report 4. Mud log 5. Gas log 6. Pressure log 7. Time log 8. Depth log 9. Sample manifest Working files in ASCII format shall be delivered together for below; 1. Gas log 2. Pressure log 3. Time log 4. Depth log	3rd party evaluation report from mudlogging unit
11.3.2.2	Final well report (MWD/LWD/ Directional survey report)	Acrobat PDF (.pdf)	.XLS/XLSX ASCII	Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD		1 month after P&A well		To be addendum to Geological Evaluation Report
11.3.2.3	Final well report (Wireline logging report)	Acrobat PDF (.pdf)	.XLS/XLSX ASCII	Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD		1 month after P&A well		To be addendum to Geological Evaluation Report

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.3	POST DRILL								
11.3.3	G&G Interpretation in Project								
11.3.3.1	Seismic data used in Post-Drill study		Working project such as Petrel working project Project Backup - Authorized application format (i.e. Petrel) Other application format, please follow the format as per attachment 1(o) to 1(r)	Secured Managed File Transfer (SMFT) to PGSC			1 month after final presentation to REX	1. Data format is according to application used in Post-Drill study 2. Project CRS parameter must be included	1. All CRS information shall be in WGS84 2. To include into final version project 3. Please refer to attachment 1 (s)
11.3.3.2	Seismic Interpretation Data		Working project such as Petrel working project	Secured Managed File Transfer (SMFT) to PGSC	USB disk Electronic submission area for PSCs other than PCSB Petrel Studio Database (PCSB)		1 month after final presentation to REX	The petrel project should content the below item, but not limited to: 1. Synthetic seismogram 2. Fault Interpretation/modelling 3. Horizon interpretation 4. Gridded interpretation/surfaces	1. To include into final version project 2. Please refer to attachment 1 (s)

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.3	POST DRILL								
11.3.3	G&G Interpretation in Project								
11.3.3.3	Attribute Volume and Maps	Acrobat PDF (.pdf)	Project Backup - Authorized application format (i.e. Petrel) Other application format, please follow the format as per attachment 1(o) to 1(r)	Secured Managed File Transfer (SMFT) to PGSC	USB disk Electronic submission area for PSCs other than PCSB Petrel Studio Database (PCSB)			Content of: 1. Attributes generated cubes	Please refer to attachment 1 (s)

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.3	POST DRILL								
11.3.3	G&G Interpretation in Project								
11.3.3.4	General Well Data	Acrobat PDF (.pdf)	Project Backup - Authorized application format (i.e. Petrel) Other application format, please follow the format as per attachment 1(o) to 1(r)	Secured Managed File Transfer (SMFT) to PGSC	Electronic submission area for PSCs other than PCSB Petrel Studio Database (PCSB)		1 month after final presentation to REX	Information of newly well drill: 1. Well headers as used in the Study 2. Well Plan trajectory as used in the Study 3. Time-Depth data 4. Well Seismic/Checkshots data as used in the Study 5. Well Tops/Markers/Points The other information from nearby well and culture data should be included. 1. Country Name 2. Wellbore Name 3. Lease/Block Name 4. Field/Prospect Name 5. Well Operator 6. Drilling Rig Contractor 7. Rig Name 8. Rig Type 9. Well Situation 10. Well Classification (e.g. Wildcat, Appraisal) 11. Wellbore Path Type (e.g. Vertical) 12. Technical Status (e.g. P&A, Oil Producer) 13. Well Spud Date 14. Easting 15. Northing 16. Projected CRS 17. Latitude 18. Longitude 19. Geographic CRS	Please refer to attachment 1 (s)

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.3	POST DRILL								
11.3.3	G&G Interpretation in Project								
11.3.3.5	Formation Tops		ASCII	Secure Managed File Transfer (SMFT) to PGSC			1 month before spud date		Please refer to attachment 1 (s)
11.3.3.6	MWD/LWD Wireline data		ASCII/LAS in Final working project copy	Secure Managed File Transfer (SMFT) to PGSC			1 month before spud date	Content of: 1. Time-Depth data 2. Well Seismic/Checkshots data as used in the Study - To add all logs list To be included in the final version working project (i.e. Petrel) Other application format	Please refer to attachment 1 (s)
11.3.3.7	Velocity model/ Velocity function	ASCII/ SEG-Y		Secured Managed File Transfer (SMFT) to PGSC			1 month before spud date	Content of: 1. Velocity modelling or Maps	

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.3	POST DRILL								
11.3.4	G&G (Samples)								
11.3.4.1	Washed/drill cuttings			Submit to PGSC	Washed and dried sample cuttings		1 month after completion of well	A manifest of all sample intervals and explaining any missing samples to be submitted with samples A minimum of 100g dry weight per sample interval set and thoroughly cleaned, dried and suitably packaged with indelible printing of well name, depth ranges	
11.3.4.2	Unwashed drill cuttings			Submit to PGSC	Cutting Samples		1 month after completion of well	A manifest of all sample intervals and explaining any missing samples to be submitted with samples A minimum of 100g per sample interval set and suitably packaged with indelible printing of well name, depth ranges	
11.3.4.3	Sidewall cores and related sample including thin sections (if acquired)			Submit to PGSC	Samples		1 month after completion of analysis or 1 month after completion of well, whichever applicable	A manifest of all sample intervals and explaining any missing samples to be submitted with samples With sidewall bullet casing in suitably packaged with indelible printing of well name and depth	
11.3.4.4	Full hole conventional cores and related sample including plugs, thin sections, etc. (if acquired)			Submit to PGSC	Paper/Core Samples		1 month after completion of analysis or 1 month after completion of well, whichever applicable	Fresh core to be slabbed vertically in one-third and two-third ratio	
11.3.4.5	Fluid - oil, gas, condensate, water			Submit to PGSC	Paper/Fluid Samples		1 month after completion of well or after collection of sample	To be submitted in API approved safety container To submit Material Safety Data Sheet (MSDS) for fluid samples	
11.3.4.6	Any other types of sample			Submit to PGSC			As when available		To PGSC

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NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.3	POST DRILL								
11.3.5	G&G (Biostratigraphy Lab Analysis)								
11.3.5.1	Residue			Submit to PGSC	Palynological residue		1 month after project completion	To be submitted in glass vial (of 3 cm size) with samples submerged in ethanol or distilled water. Vials must be labelled with well name and sample depth	
11.3.5.2	Slides			Submit to PGSC	Nannofossil and palynology slides		1 month after project completion	To be submitted in a dry box on a per well basis. Every box must be labelled with well name and sample type. Each slide must be labelled with slide number and sample depth	
11.3.5.3	Microfossil picked specimen			Submit to PGSC	Foraminifer a picked specimen		1 month after project completion	To be submitted in standard 3 mm thick, 75 mm x 27 mm micropaleontological slides with cavity secured by glass cover slide in aluminum slide holder. Slides must be labelled with well name, sample number and sample depth	
11.3.5.4	Biostratigraphy reports	Acrobat PDF (.pdf), csv, dex		Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD		1 month after completion of study	Reports must at least have the appendices of 1. Depositional Environmental Model; 2. Sample list (depth and types of analysis); 3. Biostratigraphic Summary Chart; and 4. Biostratigraphic distribution chart	Inclusive of raw biostratigraphy data/fossil count and interpreted data
11.3.5.5	Biostratigraphy digital data		ASCII	Secured Managed File Transfer (SMFT) to PGSC			1 month after completion of study	Stratabugs	

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.3	POST DRILL								
11.3.6	G&G (Geochemistry)								
11.3.6.1	Geochemical report (fingerprinting)	Acrobat PDF (.pdf), .xls, CSV		Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD		1 month after completion of the well	Inclusive of raw and processed GC, GCMS chromatogram data files	To be addendum to Geological Evaluation Report, Refer to PETRONAS Guideline on Upstream HC Fingerprinting
11.3.6.2	Geochemistry digital data		ASCII	Secured Managed File Transfer (SMFT) to PGSC			1 month after completion of the well	The working file of: 1. Detailed source rock Analysis 2. SR Pyrolosis 3. SR kinetics 4. SR GC 5. SR GCMS 6. SR CSIA 7. Oil properties 8. Oil GCMS 9. Oil GCSIA 10. Gas Composition 11. Gas isotope 12. SGE CS 13. SGEGCMS 14. Gas chromatograph 15. Gas chromatography for Mass Spectoscopy 16. Physical Properties for Fluid Geochemistry 17. Isotope-ratio Mass Spectometry (IRMS) 18. FIS 19. Drilling mud analysis 20. Surface Geochem 21. Rock Eval Pyrolisis 22. Vitrinite Reflection	

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.3	POST DRILL								
11.3.7	G&G (Sedimentology)								
11.3.7.1	Petrographic studies report	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD		1 month after completion of the well	Inclusive of thin section photographs, SEM images	To be addendum to Geological Evaluation Report
11.3.7.2	Core analysis report	Acrobat PDF (.pdf)	.XLS/XLSX	Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD		1 month after completion of the analysis	Detailed report on the Routine core analysis (RCA), Special core analysis (SCAL), petrographic studies and any other analysis carried out	To be addendum to Geological Evaluation Report
11.3.8	G&G (Studies Report)								
11.3.8.1	AVO Analysis	Acrobat PDF (.pdf)	.XLS/XLSX ASCII	Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD		1 month after completion of the study	1. AVO Model 2. Report	
11.3.8.2	Inversion Analysis	Acrobat PDF (.pdf)	.XLS/XLSX ASCII	Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD		1 month after completion of the study		
11.3.8.3	Rock Physics Analysis	Acrobat PDF (.pdf)	.XLS/XLSX ASCII	Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD		1 month after completion of the study		
11.3.8.4	Any Technical study	Acrobat PDF (.pdf)	.XLS/XLSX ASCII	Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD		1 month after completion of the study		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.3	POST DRILL								
11.3.9	Petrophysical Data								
11.3.9.1	Final Petrophysical Evaluation Report	Acrobat PDF (.pdf)	.LAS, EXCEL	Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD	1:500 1:200	3 months after completion of the well	1. Well completion logs 2. Well composite logs 3. Final well log analysis and interpretation PAC to submit 3 types all log: 1. Raw 2. Composite/Spliced 3. Interpreted	Final approved version of log analysis, processing and interpretation reports with a summary of the average property of the reservoir (net reservoir, NTG, porosity and water saturation and permeability). The cutoffs and other assumptions used or made in deriving the results shall be reported
11.3.9.2	Well Logs - Composite (Curves naming standards (Units); refer Remarks)	.LAS	Project Backup - Authorized application format (i.e. Geolog, Technolog, IP)	Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD		3 months after completion of well	Measured Depth True Vertical Depth Bit Size Gamma Ray Caliper Spontaneous Potential Deep Resistivity Medium/Shallow Resistivity Shallow Resistivity Micro Resistivity True Resistivity Flushed Zone Resistivity Neutron Porosity Bulk Density Density Correction Photoelectric Factor Sonic - Compressional Sonic - Shear	DEPTH (M) TVDSS (M) BS_P (IN) GR_P (GAPI) CALI_P (IN) RDEP_P (OHM.M) RMED_P (OHM.M) RSHAL_P (OHM.M) RMICRO_P (OHM.M) RT_P (OHM.M) RXO_P (OHM.M) NEUT_P (FRAC) DENS_P (G/CC) DENSC_P (G/CC) PEF_P (B/E) DTC_P (US/FT) DTS_P (US/FT)

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.3	POST DRILL								
11.3.9	Petrophysical Data								
11.3.9.3	Well Logs - Interpreted (Curves naming standards (Units); refer Remarks)	.LAS	Project Backup - Authorized application format (i.e. Geolog, Technolog, IP)	Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD		3 months after completion of well	Volume of Clay Dry Volume of Clay Bound Water Volume of Clay Wet (VCLD+VCLB) Volume of Silt Volume of Shale (VCLW+VSILT) Volume of Sand Volume of Lime Volume of Dolomite Volume of Anhydrite Effective Porosity Total Porosity Effective Water Saturation Total Water Saturation Flushed Zone Water Saturation Volume of Gas Volume of Oil Coal Flag Horizontal Permeability HC Corrected Bulk Density HC Corrected Neutron Porosity	VCLD (FRAC) VCLB (FRAC) VCLW FRAC) VSILT (FRAC) VSHALE (FRAC) VSAND (FRAC) VLIME (FRAC) VDOLO (FRAC) VANHY (FRAC) PHIE (FRAC) PHIT (FRAC) SWE (FRAC) SWT (FRAC) SXO (FRAC) VGAS (FRAC) VOIL (FRAC) COALF (Unitless) PERM (MD) RHOBHC (G/CC) NPHIHC (FRAC)
11.3.9.4	Well Logs - Specialised Processing & Interpretation (refer remarks for format required)	DLIS/LAS/ EXCEL/ SEG-Y/ ASCII/DLIS/ LAS, EXCEL, Production Logging project file (KE2/KE5)	Project Backup - Authorized application format (i.e. Geolog, Technolog, IP)	Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD		3 months after completion of well	Borehole Image (i.e FMI, STAR) Dipmeter (i.e SHDT) Nuclear Magnetic Resonance (NMR) Sonic Waveform (i.e DSI, XMAC) Formation Testing (i.e MDT, RCI) Production Logging Vertical Seismic Profiling (VSP) Cement Bond Log Corrosion Reservoir Saturation Logs	DLIS/LAS LAS DLIS/LAS DLIS/LAS LAS, EXCEL LAS/Production Logging project file (KE2/KE5) SEG-Y/ASCII DLIS/LAS DLIS/LAS DLIS/LAS

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.3	POST DRILL								
11.3.9	Petrophysical Data								
11.3.9.5	Log Images/Plot (for well logs - composite/ Interpreted/ specialized processing)	CGM/PDF/ PDS/TIFF		Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD	1:200 1:500 Additional 1:20 scale is required for image logs	3 month after completion of the well	All logging data that acquired as per approved logging programme including pressure and all processed and interpreted logs	Raw digital data acquired as per actual logging programme for exploration and development wells, for open hole and cased hole logging Composite log, process and interpreted results data are final approved versions Data deliverable is in Measured Depth (MD). True Vertical Depth (TVD) if available)
11.3.9.6	Wireline/LWD/ MWD Log Data		.DLIS .LAS	Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD	1:200 1:500 Additional 1:20 scale is required for image logs	3 month after completion of the well	All logging data that acquired as per approved logging programme including pressure and all processed and interpreted logs	Raw digital data acquired as per actual logging programme for exploration and development wells, for open hole and cased hole logging. Composite log, process and interpreted results data are final approved versions. Data deliverable is in Measured Depth (MD). True Vertical Depth (TVD) if available)
11.3.9.7	Vertical Seismic Profile		SEG-Y	Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD	1:200 1:500 Additional 1:20 scale is required for image logs	3 month after completion of the well	All logging data that acquired as per approved logging programme including pressure and all processed and interpreted logs	Raw digital data acquired as per actual logging programme for exploration and development wells, for open hole and cased hole logging. Composite log, process and interpreted results data are final approved versions. Data deliverable is in Measured Depth (MD). True Vertical Depth (TVD) if available)

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.3	POST DRILL								
11.3.9	Petrophysical Data								
11.3.9.8	Checkshot		.XLS/XLSX	Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD	1:200 1:500 Additional 1:20 scale is required for image logs.	3 month after completion of the well	All logging data that acquired as per approved logging programme including pressure and all processed and interpreted logs	Raw digital data acquired as per actual logging programme for exploration and development wells, for open hole and cased hole logging Composite log, process and interpreted results data are final approved versions Data deliverable is in Measured Depth (MD). True Vertical Depth (TVD) if available)
11.3.9.9	Logging Summary	.pdf .doc/.docx		Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD	1:200 1:500 Additional 1:20 scale is required for image logs.	3 month after completion of the well	All logging data that acquired as per approved logging programme including pressure and all processed and interpreted logs	Raw digital data acquired as per actual logging programme for exploration and development wells, for open hole and cased hole logging Composite log, process and interpreted results data are final approved versions Data deliverable is in Measured Depth (MD). True Vertical Depth (TVD) if available)
11.3.9.10	Log Prints	.pdf .pds/cgm (image)		Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD	1:200 1:500 Additional 1:20 scale is required for image logs.	3 month after completion of the well	All logging data that acquired as per approved logging programme including pressure and all processed and interpreted logs	Raw digital data acquired as per actual logging programme for exploration and development wells, for open hole and cased hole logging Composite log, process and interpreted results data are final approved versions Data deliverable is in Measured Depth (MD). True Vertical Depth (TVD) if available)

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.3	POST DRILL								
11.3.9	Petrophysical Data								
11.3.9.11	Petrophysical log processing and evaluation report e.g.Pressure analysis, Image log, Sonic log or NMR analysis, Ressum – reservoir summary, Low resistivity, Low Contrast, Cased hole)	Acrobat PDF (.pdf)	.XLS/XLSX ASCII LAS	Secured Managed File Transfer (SMFT) to PGSC			Upon completion of the study		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.3	POST DRILL								
11.3.10	Reservoir Engineering								
11.3.10.1	Well test data & report	Acrobat PDF (.pdf)	ASCII	Secured Managed File Transfer (SMFT) to PGSC			As when available 3 month after completion of the well		
11.3.11	Drilling Data								
11.3.11.1	Final Drilling and Completion Report (FDCR)	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC			2 months after completion of well	Post drilling report specifically related to drilling data with minimal or basic reservoir/geological details	Refer Governing Standards, Volume 11 for complete deliverables. Require 2 copies, 1 for PGSC and 1 for RDM, MPM
11.3.11.2	Well Abandonment Report (WAR)	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC			After well abandonment operation completed	Contents as per listed in Governing Standards, Volume 9	Refer Governing Standards, Volume 9 for further information Require 2 copies, 1 for PGSC and 1 for RDM, MPM
11.3.12	Relinquishment								
11.3.12.1	Complete set of final data	All required formats as per checklist	All required formats as per checklist		All required formats and media as per checklist		Within 3 months before expiry date	1. All geophysical acquisition and processing data, well data, reports, special studies 2. Transmittal copies 3. Samples listing	1. All technical data, but not limited to checklist as per submission to PETRONAS (refer attachment 1(v)) 2. MPM reserves the right to conduct DM assessment prior to relinquishment
11.3.12.2	Relinquishment Report	Acrobat PDF (.pdf)	.XLS/XLSX ASCII	Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD		Within 3 months after expiry date	1. PSC History 2. PSC Activities 3. Summary of exploration well result 4. Geological analysis 5. Geophysical history and analysis 6. Overall Petroleum system evaluation 7. Overall Formation evaluation 8. Remaining Prospect and leads 9. Overall Lesson learn (drilling and geological)	*as and when available

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
DEVELOPMENT									
11	WELL DATA								
11.4	PRE- DRILL								
11.4.1	G&G								
11.4.1.1	Daily Geological Report	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC	Electronic File/Digital/CDR/ DVD		Daily		
11.4.2	Petrophysical								
11.4.2.1	Wireline logging	.pdf	.DLIS	Secured Managed File Transfer (SMFT) to PGSC	Electronic File/Digital/CDR/DVD	0.18055555	Daily during logging operations together with Geological Report	As per 11.2.2.2	As per 11.2.2.2
11.4.3	Production Technology								
11.4.3.1	Daily Well Test Operation	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC			Daily		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.4	PRE- DRILL								
11.4.4	Drilling								
11.4.4.1	Daily Drilling Report	Acrobat PDF (.pdf)	ODBS	Online data submission			Daily	Please refer to Governing Standards, Volume 11	
11.4.4.2	Weekly Drilling Summary	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC	Electronic File/Digital/CDR/ DVD		Weekly	**On-going Wells** a) Well name and rig name; b) Block and water depth; c) Last casing size and current hole size; d) Spud date, plan and actual days; e) Plan and actual cost (USD or RM); f) Plan Total Depth (TD) in MD and TVD (metre); g) Current depth in MD and TVD (metre); h) Cumulative NPT in hours and percentage. **Finished Wells** a) Well name and rig name; b) Block and water depth; c) Last casing size and current hole size; d) Spud date and end date; e) Plan and actual days; f) Plan and actual cost (USD or RM); g) Plan Total Depth (TD) in MD and TVD (metre); h) Total NPT in hours and percentage; Final well cost and days KPI measured against PETRONAS issued KPI (i.e. WCPF, DCPF, DDPTF, CCPF and CDPTF)	Please refer to Governing Standards, Volume 11
11.4.4.3	P&A Programme	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD/ Thumb drive		Before well abandonment operation and requires approval	Contents as per listed in Governing Standards, Volume 11	

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.5	POST- DRILL								
11.5.1	Well Header	Acrobat PDF (.pdf)	Project Backup - Authorized application format (i.e. Petrel) Other application format, please follow the format as per attachment 1(o) to 1(r)	via Secure Managed File Transfer (SMFT)			3 months after ITR approval	Content of: 1. Country Name 2. Wellbore Name 3. Lease/Block Name 4. Field/Prospect Name 5. Well Operator 6. Rig Name 7. Rig Type 8. Well Situation 9. Well Classification (eg: Wildcat,Appraisal) 10. Wellbore Path Type (eg: Vertical) 11. Technical Status (eg: P&A, Oil Producer) 12. Well Spud Date 13. Well Completion Date 14. Plugged & Abandoned Date 15. Vertical Reference Datum (eg: MSL) 16. Rig Elevation Datum (eg:DF) 17. Rig Elevation 18. Water Depth (if offshore) 19. Ground Elevation (if onshore) 20. Total Depth (MD) 21. Total Depth (TVD) 22. Total Depth (TVDSS) 23. Rig Elevation Unit 24. Water Depth Unit 25. Ground Elevation Unit 26. Total Depth (MDDF) Unit 27. Total Depth (TVDDF) Unit 28. Total Depth (TVDSS) Unit 29. Easting 30. Northing 31. Projected CRS 32. Latitude 33. Longitude 34. Geographic CRS 35. Slot Number 36. Platform Name	To Integrated Technical Reviewe (ITR) To include: 1. Only final approved version of report or data. 2. Suitable naming convention to describe the respective data content

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.5	POST- DRILL								
11.5.2	G&G (Samples)								
11.5.2.1	Dry drill cuttings			Submit to PGSC			1 months after completion of well	As per 11.3.4.1	
11.5.2.2	Unwashed drill cuttings			Submit to PGSC			1 months after completion of well	As per 11.3.4.2	
11.5.2.3	Sidewall cores and related sample including thin sections (if acquired)			Submit to PGSC			1 month after completion of analysis or 1 month after completion of well, whichever applicable.	As per 11.3.4.3	
11.5.2.4	Full hole conventional cores and related sample including plugs, thin sections, etc. (if acquired)			Submit to PGSC			1 month after completion of analysis or 1 month after completion of well, whichever applicable.	As per 11.3.4.4	
11.5.2.5	Fluid - oil, gas, condensate, water			Submit to PGSC			1 months after completion of well or after collection of sample	As per 11.3.4.5	

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.5	POST- DRILL								
11.5.2	G&G (Samples)								
11.5.2.6	Liquid Hydrocarbon - oil		LIMS (PCSB)	Submit to PGSC Online data submission via LIMS (PCSB)	Fluid Samples		Within 1 months after sampling and analysis done		Refer to PTS 18.04.02 - Hazards and Effects Management Process (HEMP) for PETRONAS Risk Assessment Matrix. Sampling of oil samples shall be done at the location which is ranked as HIGH and VERY HIGH based on the PETRONAS Risk Assessment Matrix, but not limited to: 1. Reservoir 2. FPSO 3. Main trunk line (commingled line) 4. Crude export facility 5. Drilling rig Quantity of sample required during sampling are as follows: 1. At least 2 x 500ml for each sampling location. Sampling frequency for oil samples shall be done at the identified location as follows: 1. Once off sampling for database development Annual sampling for validation
11.5.2.7	Residue			Submit to PGSC	Palynological residue		1 month after project completion	As per 11.3.5.1	
11.5.2.8	Slides			Submit to PGSC			1 month after project completion	As per 11.3.5.2	For Foram, Nanno, Paly studies
11.5.2.9	Core Plug			Submit to PGSC			As when available 3 month after completion of the well		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.5	POST- DRILL								
11.5.2	G&G (Samples)								
11.5.2.10	Mud Sample			Submit to PGSC			As when available		
11.5.2.11	Isotubes			Submit to PGSC			As when available 3 month after completion of the well		
11.5.2.12	Field Trip Sample			Submit to PGSC			As when available		
11.5.2.13	Seabed Sample			Submit to PGSC			As when available 3 month after completion of the well		
11.5.2.14	Microfossil picked specimen			Submit to PGSC			1 month after project completion	As per 11.3.5.3	

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.5	POST- DRILL								
11.5.3	Reservoir Engineerin								
11.5.3.1	Post Drilling Review (PDR) Report	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC			6 months after completion of the well or for long drilling programme (more than 1 year), PDR to be submitted within 6 month after last well in the yearly cycle.	PDR shall contain: 1. Executive Summary 2. Field Development Summary 3. Reservoir Development 4. Pre Drill vs Post Drill comparison 5. Summary of Total STOIIP/GIIP Pre Drill vs Post Drill Comparison. EUR revision 6. Drilling & Completion Performance 7. Key Lessons Learn & Future Improvement 8. Montages	
11.5.3.2	Well test data & report	Acrobat PDF (.pdf)	ASCII	Secured Managed File Transfer (SMFT) to PGSC			As when available 3 month after completion of the well		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.5	POST- DRILL								
11.5.4	Petrophysical								
11.5.4.1	Logging data	Acrobat PDF (.pdf)	.DLIS .LAS .XLS/XLSX	Secured Managed File Transfer (SMFT) to PGSC	Electronic File/Digital/CDR/ DVD	0.1805555555 55556 0.3888888888 88889	3 month after completion of the well	As per 11.2.2	
11.5.4.2	Petrophysical log processing and evaluation report e.g. Pressure analysis, Image log, Sonic log or NMR log analysis	Acrobat PDF (.pdf)	.XLS/XLSX ASCII	Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD		Upon completion of the study		
11.5.4.3	Core analysis report	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC	Paper CDR/DVD/ Thumb drive		As when available	Inclusive of daylight or UV photographs and any other analysis carried out	As when available
11.5.5	Drilling								
11.5.5.1	Final Drilling and Completion Report (FDCR)	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD		60 days after well drilled and completed, suspended or abandoned	Refer Requirement in Governing Standards, Volume 9 for complete deliverables.	Require 2 copies, 1 for PGSC and 1 for RDM, MPM
11.5.5.2	Well Completion Schematic/ Well bore diagram	Report (.pdf)	Microsoft Words/ Microsoft Excel/Any digital file	Secured Managed File Transfer (SMFT) to PGSC			2 months after well completed		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.5	POST- DRILL								
11.5.6	Others								
11.5.6.1	Biostratigraphy reports	Acrobat PDF (.pdf), csv, dex)		Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD		1 month after completion of the well	As per 11.3.5.4	
11.5.6.2	Geochemical report (fingerprinting)	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD			As per 11.3.6.1	
11.5.6.3	Petrographic studies report	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD			As per 11.3.7.1	
11.5.6.4	Fluid analysis report	Acrobat PDF (.pdf)	.XLS/XLSX ASCII	Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD// Thumb drive		3 months after completion of the well		As and when available
11.5.6.5	Geophysical Site Surveys and Shallow Hazards Reports	Acrobat PDF (.pdf)		Email			Upon request by PETRONAS		
11.5.6.6	Notice of Operations (NOOP/NOWOP/NOWIP/NOWAP)	Acrobat PDF (.pdf)		Email			Within 14 calendar days prior to the spud date in digital format		
11.5.6.7	Materials Documentations, Certicates and Records	Acrobat PDF (.pdf)		Email			Upon request by PETRONAS		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.5	POST- DRILL								
11.5.6	Others								
11.5.6.8	Incident Reporting	Acrobat PDF (.pdf)		Email			As soon as practible		Submit to PETRONAS, a comprehensive written report of the situiation, event, or accident, and shall notify releveant government authorities as circumstances require
11.5.6.9	Rig Arrival and Release Notice	Acrobat PDF (.pdf)		Email			Within 24 hours		Notify PETRONAS in writing via e-mail or other electronic means: i. Of the date that the drilling unit arrives at the drilling location; and ii. Of the actual hour and date that the drilling rig or drilling unit is released from the drilling location
11.5.6.10	Final Well Report (FDCR/FWIR/FWOR/FWAR)	Acrobat PDF (.pdf)		Email			Within 60 days after a well has been drilled and completed, suspended, or abandoned		
11.5.6.11	Supporting Reports	Acrobat PDF (.pdf)		Email			As and when requested, within an agreed timeline		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
11	WELL DATA								
11.5	POST- DRILL								
11.5.6	Others								
11.5.6.12	Oil Analysis Report	Native PDF file	LIMS (PCSB)	-Secured Managed File Transfer (SMFT) to PGSC -Online data submission			Within 3 months after sampling and analysis done	Refer to 11.5.6.4 for oil sampling and analysis requirement. Oil analysis report shall contain the followings, but not limited to: 1. Title page (to include date, name of author and etc) 2. Summary (to include information on sample types and analytical result) 3. Introduction (to include background, objective, number and types of samples analysed and information for data interpretation) 4. Results and discussion 5. Conclusion	As and when available
11.5.6.13	Other Analysis/ Study Report	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC			As when available		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
12	PRODUCTION DATA								
12.1	Monthly production data		Online Data Uploader (ODU)/ PETRONAS Global Production System (PGPS)	Online data submission			Monthly	1. Produced oil, water, gas, condensate volume (whichever applicable) 2. Producing days 3. Production Date	Online Data Uploader requirement may be revised time to time and shall be notified to PACs
12.2	Monthly gas lift gas data		Online Data Uploader (ODU)/ PETRONAS Global Production System (PGPS)	Online data submission			Monthly	1. GL volume 2. GL injection days	Online Data Uploader requirement may be revised time to time and shall be notified to PACs
12.3	Monthly injection data		Online Data Uploader (ODU)/ PETRONAS Global Production System (PGPS)	Online data submission			Monthly/ upon request	1. Gas and/or water volume 2. Gas and/or water injection pressure 3. Injection days 4. Injection Date	Online Data Uploader requirement may be revised time to time and shall be notified to PACs
12.4	Pressure survey (SGS/FGS/PBU/ PDG		Online Data Uploader (ODU)/ PETRONAS Global Production System (PGPS)	Online data submission			Monthly/ upon request	1. Survey type (SGS/FGS/PBU/PDG) - other than this 2. Survey quality 3. Duration 4. Gauge used 5. Gauge Depth (tvdss ft) 6. Gauge Depth (md ft) 7. Datum depth (tvdss ft) 8. Pressure at datum (psig) 9. Mid Perf Depth (tvdss ft) 10. Mid Perf depth (md ft) 11. Pressure At Mid Perf (psig) 12. Pressure gradient (psi/ft) 13. WBP gradient (psi/ft) 14. Production test data (if applicable) 15. Interpreted data (for PBU)	Key parameters are to be submitted in ODU. Online Data Uploader requirement may be revised time to time and shall be notified to PACs. Digital copy of report on interpreted pressure survey shall be submitted to PETRONAS

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
12	PRODUCTION DATA								
12.5	Surface Pressure		Online Data Uploader (ODU)/ PETRONAS Global Production System (PGPS)	Online data submission			Monthly/ upon request	1. Flowing THP (psig) 2. Shut in THP (psig) 3. Injection THP (psig) 4. Flow line pressure (psig) 5. Production casing pressure (psig) 6. Surface casing pressure (psig) 7. Conductor casing pressure (psig) 8. Sand production rate (pptb or ppmcf)	Online Data Uploader requirement may be revised time to time and shall be notified to PACs
12.6	Surface Sampling		Online Data Uploader (ODU)/ PETRONAS Global Production System (PGPS)	Online data submission			Monthly/ upon request	1. BSW 2. Watercut 3. Emulsion 4. Oil density 5. API gravity 6. Sand Pr1111oduction/Count 7. Water salinity (ppm)	Online Data Uploader requirement may be revised time to time and shall be notified to PACs
12.7	PVT of the producing reservoir		Online Data Uploader (ODU)/ PETRONAS Global Production System (PGPS)	Online data submission			When applicable/ upon request	1. Pressure (psig) 2. Temperature (degC) 3. Bo (rb/stb) 4. Bg (rb/stb) 5. Bw (rb/stb) 6. Rs (scf/stb) 7. Oil viscosity (cp) 8. Gas viscosity (cp) 9. Water viscosity (cp) 10. Oil density (lbm/bbl) 11. Gas density (lbm/ft3) 12. Water density (lbm/bbl) 13. GOR 14. CGR 15. Gas gravity 16. Z factor	Key parameters are to be submitted in ODU. Online Data Uploader requirement may be revised time to time and shall be notified to PACs

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
12	PRODUCTION DATA								
12.8	Well Trajectory		Online Data Uploader (ODU)/ PETRONAS Global Production System (PGPS)	Online data submission			When applicable/ upon request	1. Measured depth (ft or m) 2. True vertical depth (ft or m) 3. Delta X 4. Delta Y	In addition to 11.5.6.5
12.9	Wells Management data		Online Data Uploader (ODU)/ PETRONAS Global Production System (PGPS)	Online data submission			Monthly	All requirement in the well management template (relates to strings status, classifications, time period, and well intervention activities (actual vs. plan)	Online status of strings, summary of well intervention activities Refer to Governing Standards, Volume 9 for details Online Data Uploader requirement may be revised time to time and shall be notified to PACs
12.10	ESP Information		Online Data Uploader (ODU)/ PETRONAS Global Production System (PGPS)	Online data submission			Monthly/upon request/with any change	1. Frequency 2. Current 3. Discharge pressure 4. Intake pressure & temperature 5. Motor temperature & motor vibration	Refer to Governing Standards, Volume 9 Online Data Uploader requirement may be revised time to time and shall be notified to PACs
12.11	Well Intervention information		Online Data Uploader (ODU)/ PETRONAS Global Production System (PGPS)	Online data submission			Monthly		As per in Wells Management template data requirement 12.10. Online Data Uploader requirement may be revised time to time and shall be notified to PACs

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
12	PRODUCTION DATA								
12.12	Production Enhancement and Idle Well Restoration Proposal	Acrobat PDF (.pdf) Powerpoint (.ppt)		Secured Managed File Transfer (SMFT) to PGSC Email to POM			1 months before job execution	Contractor shall obtain PETRONAS' approval for any PE or IWR activities on well, whenever the: a. Estimated cost of proposed activities is greater than Ringgit Malaysia one million (RM1,000,000) per string; b. Activity includes adding new perforations in the well; c. Activity includes any cementation job; and d. Activity includes isolating existing perforated interval or hydrocarbon (HC) zones completed in a well permanently or irreversibly	Refer to Governing Standards, Volume 9
12.13	Post Job Analysis and Lessons Learned report	Acrobat PDF (.pdf)	PJA/LLR system	Online data submission			4 months after the well intervention/ PE job IWR job completed	Post Job Analysis and Lessons Learned Report shall be as per online format	Refer to Governing Standards, Volume 9
12.14	Sand Management information	Acrobat PDF (.pdf) Powerpoint (.ppt) Word (.docx)		Secured Managed File Transfer (SMFT) to PGSC	Online data submission to be notified by MPM		Upon request		Refer to Governing Standards, Volume 9
12.15	Well Surveillance information	Acrobat PDF (.pdf)	Online Data Uploader (ODU)/ PETRONAS Global Production System (PGPS)	Secured Managed File Transfer (SMFT) to PGSC Online data submission				1. RST 2. MPLT 3. PLT 4. Only objective driven surveillance acquisition and interpretation	To support Governing Standards, Volume 9 Digital copy of report on interpreted surveillance information shall be submitted to PETRONAS (POM)

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
13	INTERPRETATIVE MATERIAL								
13.1	Progress reports on geophysical and drilling operation	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC			As and when available		To MPM Line department
13.2	An annual general review of the interpretation of the subsurface structure in any area over which geological, geophysical, drilling or other operations have been conducted	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC			As and when available		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
13	INTERPRETATIVE MATERIAL								
13.3	Reserve Calculation Reports. All reports inclusive of any subsequent revisions with respect to the amount of Petroleum in a petroleum reservoir classified as – 1. Proven petroleum originally-in-place 2. Expected and maximum possible petroleum originally-in-place 3. Proven estimated ultimate recoverable petroleum reserves 4. Expected estimated ultimate recoverable petroleum reserves Platform conformable proven and expected estimated recoverable petroleum reserves	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC			As and when available	In respect of contract area the reports shall include: 1. The location, size, extend, structural and stratigraphic cross-sections of the petroleum reservoirs 2. The amount of Petroleum estimated to be in reservoir 3. The method and calculation of the estimates in item (2) above; 4. All the data upon which the above estimates were based which includes but not limited to maps of scale 1:12,500, 1:25,00, whichever is applicable at each reservoir level for the following: i. Structure depth map at top of reservoir quality rocks ii. Reservoir facies to reflect the porosity and permeability distribution vertically or laterally iii. Net hydrocarbon iv. Definition of the various petroleum in place and reserves categories	*Including the 3rd party geological report

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
14	PRODUCTION OPERATIONS								
14.1	Monthly Production report including all PDF format	Acrobat PDF (.pdf)	HyPAS	Online data submission			Monthly	Oil, gas and condensate allocated production data (PSC level)	
14.2	All available data, information, studies and reports inclusive of any subsequent revision thereof relating to production operations	Acrobat PDF (.pdf)	Application project format e.g. OFM, Excel (.xls/.xlsx)	Email			As per requested by PETRONAS		
14.3	No of wells which produced Petroleum or water	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD		Monthly		
14.4	No of wells which were shut-in	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD		Monthly		
14.5	No of wells into which fluids or gas were injected	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD		Monthly		
14.6	Total quantity of un reconciled Petroleum & water produced	Acrobat PDF (.pdf)		Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD		Monthly		
14.7	Total quantity of fluids and gas injected	Acrobat PDF (.pdf)	ASCII	Secured Managed File Transfer (SMFT) to PGSC	CDR/DVD		Monthly		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
14	PRODUCTION OPERATIONS								
14.8	Qty of Petroleum utilized, flared or vented, stored in and delivered from each production station	Acrobat PDF (.pdf)	ASCII	Online data submission			Monthly	Gas balancing at the platform	
14.9	Reconciled production of Petroleum (well)	Acrobat PDF (.pdf)	ASCII HYPAS	Secured Managed File Transfer (SMFT) to PGSC - Online data submission			Monthly		Based on each producing wells
14.10	Petroleum flow, pressure and temperature readings at each production station	Acrobat PDF (.pdf)	ASCII HYPAS	Secured Managed File Transfer (SMFT) to PGSC - Online data submission	CDR/DVD				
14.11	Monthly production allocation data		ASCII HYPAS	Online data submission			Monthly		
14.12	Daily gas injection data		.JSON DataGrab	Online data submission			Daily		
14.13	Daily water injection data		.JSON DataGrab	Online data submission			Daily		
14.14	Quarterly Crude Oil Production	MS Words, Excel and PowerPoint		Secured Managed File Transfer (SMFT) to PGSC and POM			Quarterly		
14.15	Quarterly Gas Production	MS Words, Excel and PowerPoint		Secured Managed File Transfer (SMFT) to PGSC and POM			Quarterly		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
14	PRODUCTION OPERATIONS								
14.16	Overall long-term maintenance programme for facilities and pipelines	Acrobat PDF (.pdf)		IOM	CDR/DVD		Quarterly		*IOM - Integrated Operation Meeting
14.17	Monthly operation and maintenance reports	Acrobat PDF (.pdf)		IOM	CDR/DVD		Monthly		*IOM - Integrated Operation Meeting
14.18	Facility modification and upgrading reports (including as built drawing update)	Acrobat PDF (.pdf)	Electronic CAD		CDR/DVD		Upon project completion		
14.19	Pipeline Fitness For Service (FFS) Report	Acrobat PDF (.pdf)	Electronic CAD		CDR/DVD		Submission after completion (3 months from start date)		FFS report is depending on availabilities of inspection data (i.e. IP, underwater inspection, riser inspection and etc.)
14.20.,	Pipeline Integrity Annual Report	Acrobat PDF (.pdf)	Electronic CAD	Pipeline Integrity Management System (PIMS)	CDR/DVD		Annually		
14.21	Operating Performance Report	MS Excel	Electronic	Online submission			Monthly (10th of subsequent month)	1. Target as per WPB for Production Volume and Deferment Volume 2. Actual TP 3. Actual Production System capacity (PSyC) 4. Total constraints 5. Actual planned deferment volume 6. Actual unplanned deferment volume as per coding 7. Total metered Production Deferment Event details including loss volume, duration and way forward	

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
14	PRODUCTION OPERATIONS								
14.22	Outstanding P1 Action Items Report	MS Excel	Electronic						
14.23	Bad Actor Initiatives Update	Acrobat PDF (.pdf)	Electronic						
14.24	Daily Operation Report		DataGrab	Online data submission			Daily	1. Crude Production 2. Condensate Production 3. Gas Production 4. Well Production 5. Customer Production 6. Environment/Flaring 7. Helicopter (Flights Details) 8. Highlight (Key Activities) 9. Injection and Lift 10. Logistics 11. POB 12. HSE Incidents 13. Utilities Stock and Consumption 14. Cargo 15. UPD/PD 16. Well Intervention 17. Well Interruption 18. Sand Production 19. Terminal Production 20. Chemical Injection 21. Trunkline Monitoring 22. Operational Pigging	

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
14	PRODUCTION OPERATIONS								
14.25	Production Planning – Gas		IGBO Planning Tool	Online data submission			Daily/ Monthly (As per deadline set by Network Integrator)	1. Unplanned deferment 2. Minimum production 3. Maximum production 4. Capacity/Availability 5. Gas Composition 6. Condensate Composition 7. Gas Heating Value (GHV) 8. GCR 9. Contaminants 10. Planned Activities Details 11. Unplanned Activities Details	
14.26	Operations Monitoring		PI Historian	Live connection			Real time	Minimum requirement (but not limited to): 1. Flow 2. Volume 3. Pressure 4. Temperature 5. Level 6. Composition 7. Equipment Operating Conditions 8. Metering	

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
15	SDP TECHNICAL DATA								
15.1	GEOLOGY AND STATIC MODEL								
15.1.1	Static model		Project Backup – Authorized application format (i.e. Petrel RMS)	Secure Managed File Transfer (SMFT)	Electronic file		As per requested by PETRONAS	Content of: 1. Review/validation of endorsed model includes reservoir properties & structural layers modification, model upscaling, additional aquifer/sub reservoir properties modeling, or 2. New model building including aquifer interval	The static model is for SDP purposes As per requested by PETRONAS
15.2	GEOMECHANICS AND GEOCHEMICAL MODEL								
15.2.1	Geomechanics model	ASCII or SEG-Y	Project Backup – Authorized application format (i.e. Petrel)	Secure Managed File Transfer (SMFT)	Electronic file		1 month (compliance) + 1 month (if required) after SDR3 approval- Subject to SDR Session Chairman's agreement	Content of: 1. Regional understanding on stress regimes, stress azimuth, anisotropy, magnitude & orientation 2. Rock properties for compaction calculation in dynamic model (reservoir pressure modeling) 3. Subsidence prediction for surface facilities & potential risk evaluation. 4. 1D geomechanics model & injection scenarios, calibrated with leak-off test, laboratory tests, in situ stress measurement & other pressure test data	SDR3 Approval Export file in workstation SEG-Y or ASCII export format e.g. Petrel, CMG, Eclipse, Visage
15.2.2	Geochemical model	ASCII or SEG-Y	Project Backup – Authorized application format (i.e. Petrel)	Secure Managed File Transfer (SMFT)	Electronic file		1 month (compliance) + 1 month (if required) after SDR3 approval- Subject to SDR Session Chairman's agreement	Content of: 1. Batch Modeling – Modeling of geochemical equilibrium condition before CO_2 injection (equilibrated mineral assemblages & water chemistry as initial geochemical condition to Reactive Transport Modeling where CO_2 injection is introduced)	SDR3 Approval Export file in workstation SEG-Y or ASCII export format e.g. Petrel, CMG, Eclipse, Visage

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
15	SDP TECHNICAL DATA								
15.3	RESERVOIR ENGINEERING								
15.3.1	Material Balance		Common commercial application format approved by PETRONAS (e.g. PeTex MBAL)	Secure Managed File Transfer (SMFT)	Electronic file		As per requested by PETRONAS		As per requested by PETRONAS
15.3.2	Dynamic Models		Common commercial application format approved by PETRONAS (e.g. Eclipse, CMG, INTERSECT, Petrel RE)	Secure Managed File Transfer (SMFT)	HDD		1 month (compliance) + 1 month (if required) after SDR3 approval- Subject to SDR Session Chairman's agreement	Entire working model with associated input files which includes: 1. Evaluation/validation of existing endorsed dynamic model, conversion of black oil into compositional model, extend history matching, match prediction to end of production/PSC, or 2. New model building for compositional model	SDR3 Approval Any changes to the dynamic model in subsequent SDR stage shall need to be submitted within 1 month (compliance) + 1 month (if required) after that SDR approval – Subject to SDR chairman's agreement
15.4	DYNAMIC – GEOMECHANICS COUPLED MODELLING								
15.4.1	Final approved 2-way or 3-way dynamic - geomechanics/ geochemical coupled model	ASCII or SEG-Y	Project Backup – Authorized application format (i.e. PETREL, CMG, ECLIPSE, VISAGE)	Secure Managed File Transfer (SMFT)	Electronic file		1 month (compliance) + 1 month (if required) after SDR3 approval- Subject to SDR Session Chairman's agreement	To include: 1. All final approved input data and parameters from dynamic, geomechanic and geochemical model which were used to build the 2-way/3-way coupled model. 2. All final approved output data and parameters such as CO2 storage capacity, CO2 injection profile, number of injection wells, well placement, caprock integrity, compaction and subsidence, reactive transport modelling, etc.	SDR3 Approval Any changes to the coupled model in subsequent SDR stage shall need to be submitted within 1 month (compliance) + 1 month (if required) after that SDR approval – Subject to SDR Session Chairman's agreement. Export file in workstation SEG-Y or ASCII export format e.g. Petrel, CMG, Eclipse, Visage

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
16	FDP TECHNICAL DATA								
16.1	GEOLOGY AND STATIC MODEL								
16.1.1	General Well Data	Acrobat PDF (.pdf)	Project Backup - Authorized application format (i.e. Petrel) Other application format, please follow the format as per attachment 1(o) to 1(r)	Secure Managed File Transfer (SMFT)	USB disk Electronic submission area for PSCs other than PCSB Petrel Studio Database (PCSB)		1 month (compliance) + 1 month (if required) after MR3 approval - Subject to MR Session Chairman's agreement.	Content of: 1. Well headers as used in the Study 2. Well Plan trajectory as used in the Study 3. Time-Depth data 4. Well Seismic/Checkshots data as used in the study 5. Well Tops/Markers/Points (X, Y, Z, MD)	MR2 Approval To include: 1. Only final approved version of report or data. 2. Suitable naming convention to describe the respective data content.
16.1.2	Well correlation and structural cross section	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT)	USB disk		1 month (compliance) + 1 month (if required) after MR3 approval - Subject to MR Session Chairman's agreement.	Content: 1. Two stratigraphic correlation panels (strike and dip direction) with key wells 2. Two structural cross section panels (strike and dip direction) with key wells and fluid contact	MR2 Approval
16.1.3	Facies or reservoir distribution map	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT) to PGSC	USB disk		1 month (compliance) + 1 month (if required) after MR3 approval - Subject to MR Session Chairman's agreement.	To include: 1. Maps of main reservoirs	MR2 Approval

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
16	FDP TECHNICAL DATA								
16.1	GEOLOGY AND STATIC MODEL								
16.1.4	Final approved static model or finally approved 2D reservoir map	Acrobat PDF (.pdf)	Project Backup – Authorized application format (i.e. Petrel RMS)	Secure Managed File Transfer (SMFT) to PGSC	Electronic file		1 month after MR2 approval	To include: 1. All final approved input data and parameters which were used to build the static model or maps. For example, approved depth converted seismic horizons and faults, inversion results, original and final well markers, LWD logs, interpreted petrophysical logs, license boundary, saturation function and etc. 2. All final approved output data and parameters such as structural, facies & property models or maps, volumetric calculations, uncertainly analysis and working workflow managers.	MR2 Approval. Any changes to the static model in subsequent milestone review stage shall need to be submitted within 1 month (compliance) + 1 month (if required) after that MR approval – Subject to MR Session Chairman's agreement.

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
16	FDP TECHNICAL DATA								
16.2	GEOPHYSICAL AND SEISMIC INTERPRETATION								
16.2.1	Seismic data used in FDP study	Acrobat PDF (.pdf)	Project Backup – Authorized application format (i.e. Petrel)	Secure Managed File Transfer (SMFT)	USB disk Electronic submission area for PSCs other than PCSB		1 month after MR2 approval	** Refer to item 1 on data submission guideline for SEISMIC DATA	MR2 Approval To include: 1. Only final approved version of report or data. 2. Suitable naming convention to describe the respective data content.
16.2.2	Seismic Interpretation Data	Acrobat PDF (.pdf)	Other application format, please follow the format as per attachment 1(o) to 1(r)	Secure Managed File Transfer (SMFT)	Petrel Studio Database (PCSB)		1 month after MR2 approval	Content of: 1. Horizon(s) interpretation (zones, layers, Gridded surfaces, etc.) 2. Geological models (source rock, maturity and hydrocarbon migration, etc.) 3. Geobodies, prospect maps and risked volumes 4. Fault(s) interpretation (Sticks/polygons) 5. Fault Modelling & properties analysis 6. Stratigraphic interpretation (Facies, Sequences analysis) 7. Synthetic seismogram	MR2 Approval To include: 1. Only final approved version of report or data. 2. Suitable naming convention to describe the respective data content.
16.2.3	Attribute Volume and Maps	Acrobat PDF (.pdf)	As above	Secure Managed File Transfer (SMFT)			As above	Content of: 1. Attributes generated cubes	MR2 Approval To include: 1. Only final approved version of report or data. 2. Suitable naming convention to describe the respective data content.

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
16	FDP TECHNICAL DATA								
16.2	GEOPHYSICAL AND SEISMIC INTERPRETATION								
16.2.4	General Well Data	Acrobat PDF (.pdf)	Project Backup - Authorized application format (i.e. Petrel) Other application format, please follow the format as per attachment 1(o) to 1(r)	Secure Managed File Transfer (SMFT)	USB disk Electronic submission area for PSCs other than PCSB Petrel Studio Database (PCSB)		1 month (compliance) + 1 month (if required) after MR3 approval - Subject to MR Session Chairman's agreement.	Content of: 1. Well headers as used in the Study 2. Well Plan trajectory as used in the Study 3. Time-Depth data 4. Well Seismic/Checkshots data as used in the study 5. Well Tops/Markers/Points	MR2 Approval To include: 1. Only final approved version of report or data. 2. Suitable naming convention to describe the respective data content.
16.2.5	Velocity model/ Velocity function	ASCII/ SEG-Y/ Excel	Project Backup - Authorized application format (i.e. Petrel) Other application format, please follow the format as per attachment 1(o) to 1(r)	Secure Managed File Transfer (SMFT)	USB disk Electronic submission area for PSCs other than PCSB Petrel Studio Database (PCSB)		1 month (compliance) + 1 month (if required) after MR3 approval - Subject to MR Session Chairman's agreement.	Content of: 1. Velocity modelling or Maps.	MR2 Approval To include: 1. Only final approved version of report or data. 2. Suitable naming convention to describe the respective data content.

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
16	FDP TECHNICAL DATA								
16.2	GEOPHYSICAL AND SEISMIC INTERPRETATION								
16.2.6	Geological Data	Acrobat PDF (.pdf)	Project Backup - Authorized application format (i.e. Petrel) Other application format, please follow the format as per attachment 1(o) to 1(r)	Secure Managed File Transfer (SMFT)	USB disk Electronic submission area for PSCs other than PCSB Petrel Studio Database (PCSB)		1 month (compliance) + 1 month (if required) after MR3 approval - Subject to MR Session Chairman's agreement.	Content of: 1. Mud logs as used in the Study 2. SCAL/RCAL as used in the Study	MR2 Approval To include: 1. Only final approved version of report or data. 2. Suitable naming convention to describe the respective data content.
16.2.7	Geomechanics		Project Backup - Authorized application format (i.e. Petrel) Other application format, please follow the format as per attachment 1(o) to 1(r)	Secure Managed File Transfer (SMFT)	USB disk Electronic submission area for PSCs other than PCSB Petrel Studio Database (PCSB)		1 month (compliance) + 1 month (if required) after MR3 approval - Subject to MR Session Chairman's agreement.	Content of: 1. Pore pressure as used in the Study 2. Geochemistry as used in the Study	MR2 Approval To include: 1. Only final approved version of report or data. 2. Suitable naming convention to describe the respective data content.

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
16	FDP TECHNICAL DATA								
16.2	GEOPHYSICAL AND SEISMIC INTERPRETATION								
16.2.8	Inversion or specialized processing results such as Seismic-Poro, Pore Prediction, Derived Density, Derived Hydrocarbon Saturation, Hydrocarbon Prediction and etc.	SEG-Y	Project backup	Secure Managed File Transfer (SMFT) to PGSC				To include: 1. Only final approved version of inversion or specialized processing results. 2. Export file in workstation SEG-Y export format e.g. Charisma, IESX, SeisWorks, SMT, Paradigm, Petrel and etc. 3. Suitable naming convention to describe the seismic inversion or specialized processing results.	
16.2.9	Structured surface or grid (time and depth)	ASCII	Project backup	Secure Managed File Transfer (SMFT) to PGSC				To include: 1. Only final approved structured surfaces or grids both in time & depth domain. 2. Export file in workstation SEG-Y export format e.g. Charisma, IESX, SeisWorks, SMT, Paradigm, Petrel and etc. 3. Clear indication of seismic data or velocity model/function used to produce the horizon data 4. Suitable naming convention to describe the surface feature.	
16.2.10	Geophysical interpreted or modelled logs such as Acoustic Impedance, Reflection Coefficient, Derived Angle Stack, Elastic Impedance logs and etc.	LAS	Project backup	Secure Managed File Transfer (SMFT) to PGSC				To include: 1. Only final approved structured surfaces or grids both in time & depth domain. 2. Export file in workstation SEG-Y export format e.g. Charisma, IESX, SeisWorks, SMT, Paradigm, Petrel and etc. 3. Clear indication of seismic data or velocity model/function used to produce the horizon data 4. Suitable naming convention to describe the surface feature.	

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
16	FDP TECHNICAL DATA								
16.2	GEOPHYSICAL AND SEISMIC INTERPRETATION								
16.2.11	Rock physics model results e.g. Angle Stack Elastic Impedance, Vp,Vs, Poisson ratio logs	ASCII/ SEG-Y	Project backup	Secure Managed File Transfer (SMFT) to PGSC				To include: 1. Only final approved of rock physics model results both time & depth domain. 2. Export file in workstation SEG-Y or ASCII export format e.g. Charisma, IESX, SeisWorks, SMT, Paradigm, Petrel and etc. 3. Suitable naming convention to describe each rock physics model results feature details.	

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
16	FDP TECHNICAL DATA								
16.3	PETROPHYSICAL INTERPRETATION								
16.3.1	Final input logs (spliced and corrected raw data)		LAS 2.0/3.0	Secure Managed File Transfer (SMFT)	DVD/USB disk		To be submitted along with FDP report submission		1. Provide final approved version. 2. Refer to 11.3.9.2 - 11.3.9.4 for standard curve naming and units
16.3.2	Interpreted logs		LAS 2.0/3.0	Secure Managed File Transfer (SMFT)	DVD/USB disk		To be submitted along with FDP report submission	1. Lithology 2. Porosity 3. Permeability 4. Saturation from resisitivity 5. Saturation from Saturation Height Functions. 6. Facies/rock type (if applicable)	1. Provide final approved version. 2. Refer to 11.3.9.2 - 11.3.9.4 for standard curve naming and units
16.3.3	Survey data		Excel				To be submitted along with FDP report submission		
16.3.4	Reservoir Summation	Acrobat PDF (.pdf)	ASCII/Excel	Secure Managed File Transfer (SMFT)			To be submitted along with FDP report submission		As per requested by PETRONAS
16.3.5	Formation pressure & sampling	Acrobat PDF (.pdf)	ASCII/Excel	Secure Managed File Transfer (SMFT)			To be submitted along with FDP report submission		
16.3.6	Fluid typing and fluid contact analysis	Acrobat PDF (.pdf)	ASCII/Excel	Secure Managed File Transfer (SMFT)			To be submitted along with DP report submission		As per requested by PETRONAS

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
16	FDP TECHNICAL DATA								
16.3	PETROPHYSICAL INTERPRETATION								
16.3.7	Core analysis data and reports (RCA,SCAL)	Acrobat PDF (.pdf) Excel	ASCII	Secure Managed File Transfer (SMFT)			To be submitted along with FDP report submission	Only final approved version of Routine Core Analysis (RCA) and SCAL models are to be provided	As per requested by PETRONAS
16.3.8	Rock Strength/Tests results	Acrobat PDF (.pdf) Excel	MS Power Point	Secure Managed File Transfer (SMFT)			To be submitted along with FDP report submission		As above

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
16	FDP TECHNICAL DATA								
16.4	RESERVOIR ENGINEERING								
16.4.1	Upscaled Model		Common commercial application format approved by PETRONAS (i.e. Eclipse, CMG)		USB/DVD		Within 2 months after FDP has been completed and final report has been released.		Submission together with item 15.4.3
16.4.2	PVT Models		Common commercial application format approved by PETRONAS (e.g.PVTi , PVTSIM)						As per requested by PETRONAS
16.4.3	Dynamic Models		Common commercial application format approved by PETRONAS (e.g. Eclipse, CMG, INTERSECT, Petrel RE)	Asset Managers - RDM	HDD		1 month (compliance) + 1 month (if required) after MR4 approval - Subject to MR Session Chairman's agreement	Entire working model with associated input files	MR3 Approval. Any changes to the dynamic model in subsequent milestone review stage shall need to be submitted within 1 month (compliance) + 1 month (if required) after that MR approval – Subject to MR chairman's agreement
16.4.4	Material Balance		Common commercial application format approved by PETRONAS (e.g. PeTex MBAL)	Secure Managed File Transfer (SMFT)			As per requested by PETRONAS		As per requested by PETRONAS

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
16	FDP TECHNICAL DATA								
16.4	RESERVOIR ENGINEERING								
16.4.5	Fluid Data			Secure Managed File Transfer (SMFT)			Alongwith FDP		As above
16.4.6	DCA (Decline Curve Analysis)		Common commercial application format approved by PETRONAS (e.g. PeTex(.mbi) OFM) Microsoft Access (.mdb)	Secure Managed File Transfer (SMFT)			As per requested by PETRONAS		As per requested by PETRONAS
16.4.7	Workover History (Events)		Excel				As per requested by PETRONAS		As per requested by PETRONAS
16.4.8	Pressures (Static/Buildup)		ASCII/Excel	Secure Managed File Transfer (SMFT)			As per requested by PETRONAS		As per requested by PETRONAS
16.4.9	ARPR report (Annual Review of Petroleum Resource)			via Secure Managed File Transfer (SMFT)			Within 6 months after achieving First Hydrocarbon Date/Project Target Date		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
16	FDP TECHNICAL DATA								
16.5	PRODUCTION TECHNOLOGY								
16.5.1	Nodal Analysis Models	Prosper	Common commercial application format approved by PETRONAS (e.g. PeTex Prosper)	Secure Managed File Transfer (SMFT) RDM	DVD/USB disk		Within 2 months after FDP has approved and FDP report has been completed. Data needs to be submitted along with FDP report submission.	1. Provide only final approved version of each data class which was used as input to final FDP report. 2. PSC's own standard naming convention to describe data class feature details e.g. final Prosper model, final well trajectory, final well completion schematic in MS Visio project and etc.	In addition to initial models/data, updated models/data to be provided as and when updated/acquired Models are to be validated by RDM, MPM prior to submission to TD (based on process flow)
16.5.2	Network Model		Common commercial application format approved by PETRONAS (e.g. PeTex (.mbi), Prosper, GAP and OLGA)	Secure Managed File Transfer (SMFT)			As per requested by PETRONAS		As per requested by PETRONAS
16.5.3	VFP (Lift Curves Model)		Common commercial application format approved by PETRONAS	Secure Managed File Transfer (SMFT)			As per requested by PETRONAS		
16.5.4	Water Chemistry	MS Excel		Secure Managed File Transfer (SMFT)			Alongwith FDP		As above

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
16	FDP TECHNICAL DATA								
16.5	PRODUCTION TECHNOLOGY								
16.5.5	WellCat Data	MS Excel WellCat	Wellcat file	Secure Managed File Transfer (SMFT)			Alongwith FDP		As above
16.5.6	OLI Analyzer/Scale Chem	MS Excel OLI Analyzer/ Scale Chem		Secure Managed File Transfer (SMFT)			Alongwith FDP		As above
16.5.7	Well Completion Schematic	MS Excel/ MSVisio	MS Visio WellView	Secure Managed File Transfer (SMFT)			Alongwith FDP		As above
16.5.8	Pressures (Flowing)	MS Excel	ASCII	Secure Managed File Transfer (SMFT)			As per requested by PETRONAS		As per requested by PETRONAS
16.5.9	Sand Production Risk Assessment/ Sand retention test reports	Acrobat PDF (.pdf		Secure Managed File Transfer (SMFT)			Alongwith FDP		
16.5.10	IPR/VLP (Lift Curves Model)	Excel/ Graph	Common commercial application format approved by PETRONAS (e.g. Petex PROSPER)	Secure Managed File Transfer (SMFT)			As per requested by PETRONAS		As per requested by PETRONAS
16.5.11	Pressure Transient Analysis	Excel/ Graph	Common commercial application format approved by PETRONAS (e.g. KAPPA Saphir)				As above		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
17	PROJECT MANAGEMENT								
17.1	PROJECT MANAGEMENT - SDP								
17.1.1	PETRONAS endorsed/ approved Storage Development review (SDR)	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT)			Within 6 months after achieving final SDR stage endorsement e.g. SDR4		
17.1.2	Well Integrity Risk Assessment	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT)			Within 6 months after achieving final SDR stage endorsement e.g. SDR5	To include: 1. Assessment of P&A wells integrity in the storage field for long-term CO2 containment 2. Risk ranking of P&A wells & recommendations for identified high risk wells. Proposal for remedial procedures for high risk P&A wells & cost estimation 3. Risk ranking based on suitability to convert existing producers into injectors. Proposal for candidates for conversion	
17.1.3	Surveillance and MMV Plan	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT)			1 month (compliance) + 1 month (if required) after SDR3 approval- Subject to SDR Session Chairman's agreement	Technology screening selection – identify monitoring technology (geophysical, geochemical, in-well, surface), cost analysis, technology ranking	

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
17	PROJECT MANAGEMENT								
17.2	PROJECT MANAGEMENT - FDP								
17.2.1	FDP Feasibility study report (as per request)	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT)			Within 6 months after achieving First Hydrocarbon Date/Project Target Date		
17.2.2	PETRONAS endorsed/ approved Milestone Reviews, FDP and FIR	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT)			Within 6 months after achieving First Hydrocarbon Date/Project Target Date	Technical and commercial requirement	MR 1, 2, 3, 4, 5, FDP and FIR Presentation Pack and approval/ endorsement
17.2.3	Basis for Design (BFD)/Project Development Memorandum (PDM)	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT)			Within 6 months after achieving First Hydrocarbon Date/Project Target Date		
17.2.4	Project Specification (Conceptual Design Report Summary)/ Design Basis Memorandum (DBM)	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT)			Within 6 months after achieving First Hydrocarbon Date/Project Target Date		
17.2.5	Project Execution Plan (PEP) (including updates)	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT)			Within 6 months after achieving First Hydrocarbon Date/Project Target Date		
17.2.6	Management Review Report/ Independent Project Review Report for Detailed Design (executive summary only)	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT)			Within 6 months after achieving First Hydrocarbon Date/Project Target Date		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
17	PROJECT MANAGEMENT								
17.2	PROJECT MANAGEMENT - FDP								
17.2.7	Pre start-up HSE Audit/ Independent Project Review Report (executive summary only)	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT)			Within 6 months after achieving First Hydrocarbon Date/Project Target Date		
17.2.8	Project Close Out Reports (Final report and drilling report submission is 3 months after project completion and 90 days after drilling completion, respectively)	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT)			Within 6 months after achieving First Hydrocarbon Date/Project Target Date		
17.2.9	Platform facility design basis or philosophy	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT)			Within 6 months after achieving First Hydrocarbon Date/Project Target Date		
17.2.10	Project assessment report; if any	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT)			Within 6 months after achieving First Hydrocarbon Date/Project Target Date		
17.2.11	Special Engineering studies	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT)			Within 6 months after achieving First Hydrocarbon Date/Project Target Date		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
17	PROJECT MANAGEMENT								
17.2	PROJECT MANAGEMENT - FDP								
17.2.12	Major fabrication planning package and execution plan	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT)			Within 6 months after achieving First Hydrocarbon Date/Project Target Date		
17.2.13	Transportation and installation procedures for major facilities when available	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT)			Within 6 months after achieving First Hydrocarbon Date/Project Target Date		
17.2.14	Factory acceptance test procedure completion reports where applicable	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT)			Within 6 months after achieving First Hydrocarbon Date/Project Target Date		
17.2.15	Weekly and monthly engineering reports and main subcontractor progress reports (where applicable)	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT)			Within 6 months after achieving First Hydrocarbon Date/Project Target Date		
17.2.16	Main sub-contractor performance appraisal reports	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT) to PGSC			Within 6 months after achieving First Hydrocarbon Date/Project Target Date		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
17	PROJECT MANAGEMENT								
17.2	PROJECT MANAGEMENT - FDP								
17.2.17	As built drawings	Acrobat PDF (.pdf)	Electronic CAD	Secure Managed File Transfer (SMFT) to PGSC Upload to P-EDMS/ SEED (Solution End to End Documentation) (PCSB)			5 yearly	P&ID Cause & Effect Matrix (Process & FGS)	
17.2.18	Operating and start-up manual	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT) to PGSC			Within 6 months after achieving First Hydrocarbon Date/Project Target Date		
17.2.19	Facility modification and upgrading reports (including as built drawing update)	Acrobat PDF (.pdf)	Electronic CAD	Secure Managed File Transfer (SMFT) to PGSC			Within 6 months after achieving First Hydrocarbon Date/Project Target Date		
17.2.20	Risk assessment, environmental impact assessment, technical or safety audit and HAZOP study reports, if any	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT)			Within 6 months after achieving First Hydrocarbon Date/Project Target Date		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
17	PROJECT MANAGEMENT								
17.2	PROJECT MANAGEMENT - FDP								
17.2.21	PETRONAS endorsed/ approved Procurement Paper	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT)			Within 6 months after achieving First Hydrocarbon Date/Project Target Date	Overall Contracting Strategy, Tender Plan, Change Order, Salient Points from Committee etc.	
17.2.22	Authorities endorsed/ approved document	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT)			Within 6 months after achieving First Hydrocarbon Dateg/Project Target Date		MKN, MDTCC, DOE, Offshore Self Regulation etc.

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
18	MEASUREMENT FOR CUSTODY								
18.1	Detailed measurement procedures, design and operation of measurement systems	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT)			As when available		
18.2	Report of Result of the validation exercise performed	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT)			In the month after the calibration/validation has been done		
18.3	Detailed Petroleum accounting procedures	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT)			As when available		
18.4	Production, stock, sales or exports and losses figures	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT)			As when available		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
19	HEALTH, SAFETY & ENVIRONMENT								
EXPLORATION, DEVELOPMENT, PRODUCTION, ABANDONMENT									
19.1	HSSE MS Manual	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT) to PGSC			Upon request	Refer to Governing Standards, Volume 1	
19.2	HSE Plan	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT) to PGSC			Upon request	Refer to Governing Standards, Volume 1	
19.3	Emergency Response Plan	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT) to PGSC			Upon request	Refer to Governing Standards, Volume 1	
19.4	HSE KPI report	Acrobat PDF (.pdf)	myHSE	Secure Managed File Transfer (SMFT) to PGSC			Every 10th of the following month	Refer to Governing Standards, Volume 1	
19.5	HSE Audit report	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT) to PGSC			Upon request	Refer to Governing Standards, Volume 1	
19.6	HSE Alert	Acrobat PDF (.pdf)	myHSE	Secure Managed File Transfer (SMFT) to PGSC			1 week after incident occurred	(For Major & HIPO incident Only) Refer to Governing Standards, Volume 1	

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
19	HEALTH, SAFETY & ENVIRONMENT								
EXPLORATION, DEVELOPMENT, PRODUCTION, ABANDONMENT & DECOMMISSIONING									
19.7	Final Incident Investigation report	Acrobat PDF (.pdf)	myHSE	Secure Managed File Transfer (SMFT) to PGSC			2 weeks after conducting presentation to PETRONAS	(For Major & HIPO incident Only) Refer to Governing Standards, Volume 1	
19.8	HSE Lessons Learnt	Acrobat PDF (.pdf)	myHSE	Secure Managed File Transfer (SMFT) to PGSC			1 week after submission Final Incident Investigation Report to PETRONAS	(For Major & HIPO incident Only) Refer to Governing Standards, Volume 1	
19.9	Environment Impact Assessment report	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT) to PGSC			Upon request		
19.10	HSE & Security Risk Assessment report (HAZID report)	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT) to PGSC			Upon request		
19.11	EIA Approval Conditions and Environment Management Plan (EMP) report	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT) to PGSC			Upon request		
19.12	Post EIA monitoring report	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT) to PGSC			1 month after DOE approval		
19.13	HSE Legal Register	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT) to PGSC			Upon request		

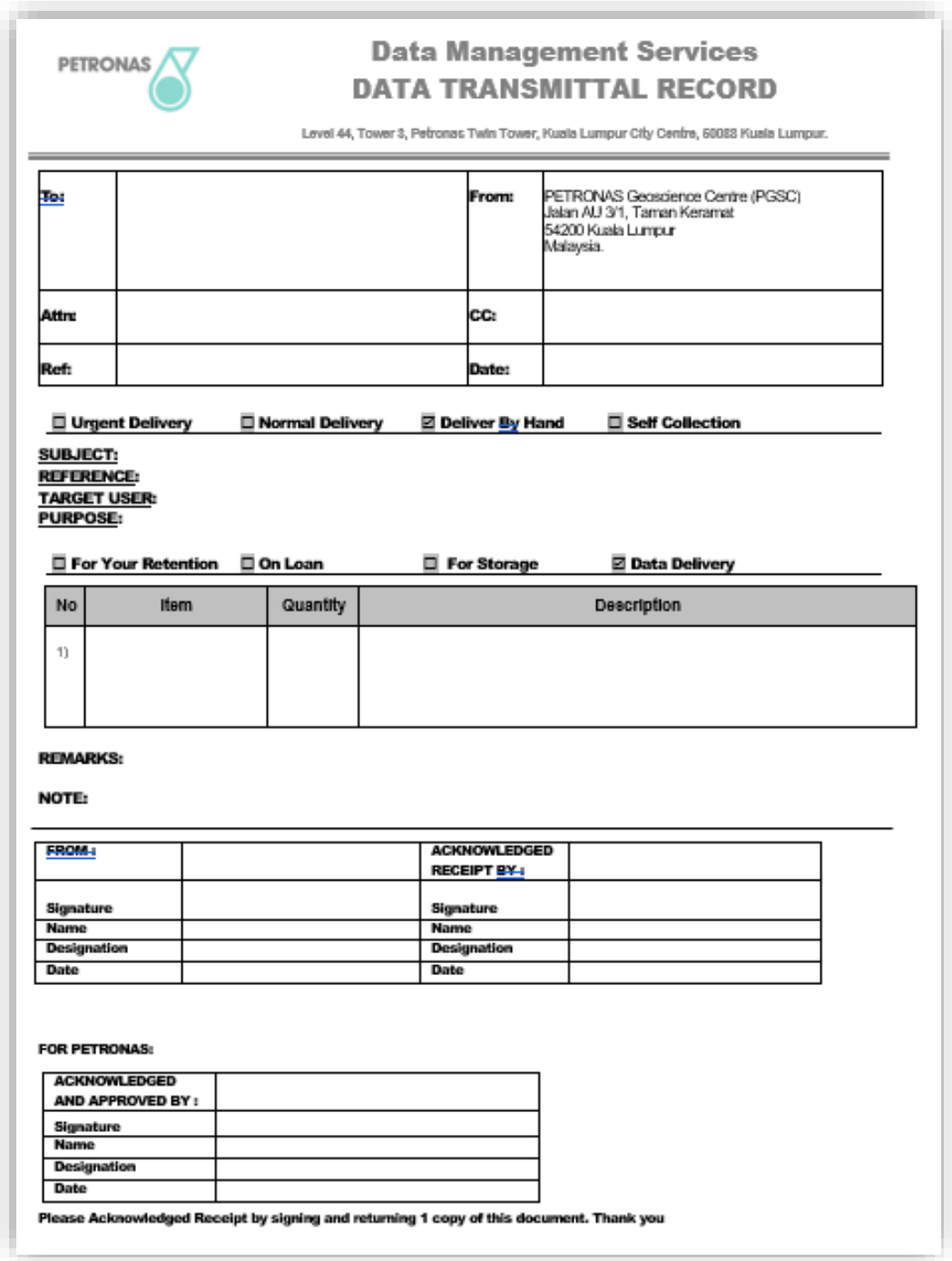
NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
19	HEALTH, SAFETY & ENVIRONMENT								
DEVELOPMENT, PRODUCTION, ABANDONMENT & DECOMMISSIONING									
19.14	Safety Risk Assessment report (HSE Case/CIMAH report)	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT) to PGSC			Upon request		
19.16	Hazard and Operability (HAZOP) report	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT) to PGSC			Upon request		
19.17	Quantitative Risk Assessment (QRA) report	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT) to PGSC			Upon request		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
20	RELINQUISHMENT								
20.1	Relinquishment status report	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT) to PGSC			Within 3 months prior to relinquishment		
20.2	Complete report listings	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT) to PGSC			Within 3 months prior to relinquishment		
20.3	Well, reservoir and field performance history	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT) to PGSC			Within 3 months prior to relinquishment		
20.4	Reservoir and well data	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT) to PGSC			Within 3 months prior to relinquishment		
20.5	Well status	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT) to PGSC			Within 3 months prior to relinquishment		
20.6	Reserve status	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT) to PGSC			Within 3 months prior to relinquishment		
20.7	Latest as-built drawing	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT) to PGSC			Within 3 months before expiry date		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
20	RELINQUISHMENT								
20.8	Major maintenance, improvement and modification records	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT) to PGSC			Within 3 months before expiry date		
20.9	Inspection records	Acrobat PDF (.pdf)		Secure Managed File Transfer (SMFT) to PGSC			Within 3 months before expiry date		
20.10	Complete report listings	All required formats as per checklist	All required formats as per checklist		All required media as per checklist		Within 3 months before expiry date		

NO.	DATA ENTITY	FORMAT		SUBMISSION METHOD	MEDIA	SCALE	SUBMISSION PERIOD	CONTENT	REMARKS
		REPORT/ LOGS	DIGITAL DATA						
21	Physical Asset Management								
21.1	3D Model		1. E3D 2. S3D 3. PDMS 4. RVM 5. CSV (for 3D tags model report)	Upload to P-EDMS	Native files	Within 1 month upon 90% project milestone and; Within 1 month upon 100% project milestone completion			Two (2) sets of 3D to be submitted based on: 1. 90% project completion 2. 100% project completion
21.2	Laser Scanning		1. ZFC 2. E57	Secured Managed File Transfer (SMFT) to PGSC	Native files	Within 1 month upon laser scan produced			Registered point cloud

Appendix 6: Transmittal form



PETRONAS

Data Management Services

DATA TRANSMITTAL RECORD

Level 44, Tower 3, Petronas Twin Tower, Kuala Lumpur City Centre, 50088 Kuala Lumpur.

To:		**From:**	PETRONAS Geoscience Centre (PGSC) Jalan AU 3/1, Taman Keramat 54200 Kuala Lumpur Malaysia.
Attn:		**CC:**	
Ref:		**Date:**	

☐ **Urgent Delivery** ☐ **Normal Delivery** ☑ **Deliver By Hand** ☐ **Self Collection**

SUBJECT:
REFERENCE:
TARGET USER:
PURPOSE:

☐ **For Your Retention** ☐ **On Loan** ☐ **For Storage** ☑ **Data Delivery**

No	Item	Quantity	Description
1)			

REMARKS:

NOTE:

FROM :		**ACKNOWLEDGED RECEIPT BY :**	
Signature		**Signature**	
Name		**Name**	
Designation		**Designation**	
Date		**Date**	

FOR PETRONAS:

ACKNOWLEDGED AND APPROVED BY :	
Signature	
Name	
Designation	
Date	

Please Acknowledged Receipt by signing and returning 1 copy of this document. Thank you

ATTACHMENTS

ATTACHMENT 1(a)

PETRONAS Standard Seismic SEG-Y EBCDIC Header for NAV-MERGED SHOT GATHERS 2D MARINE

SAMPLE OF SEG-Y EBCDIC HEADER NAV-MERGED SHOT GATHERS 2D MARINE

C01 CLIENT : PETRONAS CARIGALI SDN BHD
C02 SURVEY : 2D BERANTAI AREA : BLOCK PM9 OFFSHORE TERENGGANU
C03 LINE : BR10-08-01A
C04 SP-RANGE : 1640 - 905 CDP-RANGE : 1 – 1662
C05 RELATIONSHIP: FSP/FCDP = 1640/192 LSP/LCDP = 905/1662
C06 SP ANNOTATED LOCATION: CDP POSITION
C07 DATASET : NAV-MERGED SHOT GATHER
C08 POLARITY : ZERO PHASE DATA: ACOUSTIC IMPEDANCE INCREASE CORRESPONDS TO
C09 ZERO-PHASE-WAVELET-PEAK AND WRITTEN AS A POSITIVE NUMBER ON TAPE.
C10 ##### ACQUISITION DATE: JAN-APR 2010 #### ACQUIRED BY WESTERNGECO
C11 SHOT INTERVAL : 25 M GRP INTERVAL : 12.5 M
C12 CABLE LENGTH : 4800 M GRPS PER CABLE : 384
C13 MIN OFFSET : 105 M MAX OFFSET : 4892.5 M
C14 GUN DEPTH : 6 M CABLE DEPTH : 7 M
C15 SOURCE PRESSURE : 2000 PSI SOURCE VOLUME : 2960 CU. IN.
C16 SAMPLE RATE (MS) : 2 MAX TIME (MS) : 6144
C17 DATUM : WGS84 PROJECTION : UTM ZONE 48N
C18 COORDINATE UNITS: METRES
C19 ##### PROCESSED DATE: MAY-AUG 2010 #### PROCESSED BY CGGVERITAS
C20 INPUT SEGD / BULK STATIC -50 MS / GUN & CABLE STATIC / ZERO PHASE
C21 NAV MERGE / LOAD WATER BOTTOM (WG PROVIDED)
C22 LOAD TIDAL STATICS (NOT APPLIED)
C23 LOAD GUN & CABLE STATICS CORRECTION (NOT APPLIED)
C24 TRACE FOR EDIT (FLAGGED)
C25 OUTPUT SEG-Y
C26
C27
C28
C29
C30
C31 ##### TRACE HEADER DEFINITION, BYTE LOCATION:
C32 **XY COORDINATE SCALAR: BYTE 071-072**(INT2) 2D CMP BYTE 129-130 (INT 2)
C33 OFFSET BYTE 037-040 (INT 4) GUN ARRAY BYTE 205-206(INT 2)
C34 LINE NUMBER BYTE 197-200 (INT 4) SEQUENCE NUM BYTE 201-202 (INT 2)
C35 XCORD SOURCE BYTE 073-076 (INT 4) YCORD SOURCE BYTE 077-080 (INT 4)

C36 XCORD DETECT	BYTE	081-084 (INT 4)	YCORD DETECT	BYTE	085-088 (INT 4)
C37 TIDAL HEIGHT	BYTE	125-126 (INT 2)	TIDAL STATIC	BYTE	127-128 (INT 4)
C38 SUBLINE	BYTE	189-192 (INT 4)	XLINE	BYTE	193-196 (INT 4)
C39 CDP-X	BYTE	181-184 (INT 4)	CDP-Y	BYTE	185-188 (INT 4)
C40 EDIT FLAG	BYTE	029-030(INT2)	WB_TIME	BYTE	137-138(INT 2)

ATTACHMENT 1(b)

PETRONAS Standard Seismic SEG-Y EBCDIC Header for NAV-MERGED SHOT GATHERS 3D MARINE

SAMPLE OF SEG-Y EBCDIC HEADER NAV-MERGED SHOT GATHERS 3D MARINE

C01 CLIENT : PC GABON UPSTREAM S.A PROJECT NO: PCGUSA/2020/PEX/1002
C02 SURVEY : GABON_F12_WAZ_3D_2020 AREA: BLOCK F12, OFFSHORE GABON
C03 SAIL LINE: GF12WA1750P1-006 SEQ: 6 DATE:20 DEC 2020
C04 FILE-RANGE:1002-1062 SP-RANGE:2560-2500 REEL:HQ0001
C05 DATA FORMAT: SEG-Y SAMPLE CODE: 4BYTE IBM 32-BIT FLOATING PT SAMPLE RATE: 2MS
C06 DATA TRACES/RECORD: 8040 AUX TRACES/RECORD: 0 BYTES/SAMPLE: 4
C07 DATASET : NAVIGATION-MERGED SHOT GATHERS
C08 POLARITY : **ZERO PHASE DATA: ACOUSTIC IMPEDANCE INCREASE CORRESPONDS TO**
C09 ZERO-PHASE-WAVELET-PEAK AND WRITTEN AS A POSITIVE NUMBER ON TAPE
C09 #### ACQUISITION DATE: DEC 2020 - JAN 2021 #### ACQUIRED BY POLARCUS ADIRA
C10 SHOT INTERVAL : 25 M (DUAL SOURCE) GROUP INTERVAL : 12.5 M
C11 CABLE LENGTH : 10050 M GRPS PER CABLE : 804
C12 MIN OFFSET : 150 M MAX OFFSET : 10200 M
C13 GUN DEPTH : 6 M CABLE DEPTH : 15 M
C14 SOURCE PRESSURE : 2000 PSI SOURCE VOLUME (ADI) : 4240 CU. IN.
C15 SAMPLE RATE(MS) : 2 SOURCE VOLUME (CHP, ODK) : 3880 CU. IN.
C16 DATUM : WGS84 MAX TIME (MS) : 10200
C17 COORDINATE UNITS: METRES PROJECTION : UTM ZONE 32S
C18 ####CDP BIN GRID (ORIGIN REFERS TO IL:XL=0:0)
C19 ORIGIN: X=558545.604; Y=9547944.214; DJ(XL INC)=30M; DI(IL INC)=6.25M;
C20 AZI(IL,LINE HEADING)=122 DEG; AZJ(XL)=32 DEG; (ALL CLOCKWISE FROM NORTH)
C21 GRID PERIMETER: INLINE=1001, XLINE=4004, X=595681.482, Y=9560149.872
C22 INLINE=2340, XLINE=4004, X=616968.335, Y=9594215.966
C23 INLINE=2340, XLINE=10244, X=650042.213, Y=9573549.118
C24 INLINE=1001, XLINE=10244, X=628755.359, Y=9539483.024
C25 CDP HEADER CALCULATION: CDP = IL * 100000 + XL
C26 ## PROCESSED DATE: DEC 2020 - JAN 2021 ## PROCESSED BY POLARCUS ADIRA AS
C27 REFORMAT FROM SEGD TO INTERNAL FORMAT 32 BIT; NAV/SEISMIC DATA MERGE;
C28 RECORDING LEAD CORRECTION -200 MS; GRIDDED BINNING; TIDAL CORR TO HEADER;
C29 WATERBOTTOM HORIZON TO HEADER; BAD SP AND TRACE FLAGGING;
C30 LOAD GUN & CABLE STATICS CORRECTION (NOT APPLIED); OUTPUT SEG-Y
C31 ##### TRACE HEADER DEFINITION, BYTES: SHOT TIME OFFSET BYTE 119-124(INT 2)
C32 3D CMP BYTE 021-024(INT 4) SRC VESSEL EDIT BYTE 095-096(INT 2)
C33 X-SOURCE BYTE 073-076(INT 4) Y-SOURCE BYTE 077-080(INT 4)
C34 X-RECEIVER BYTE 081-084(INT 4) Y-RECEIVER BYTE 085-088(INT 4)
C35 TIDAL HEIGHT BYTE 125-126(INT 2) TIDAL STATICS BYTE 127-128(INT 2)
C36 WB_TIME BYTE 137-138(INT 2) **XY COORDINATE SCALAR: BYTE 071-072**(INT2)
C37 INLINE BYTE 189-192(INT 4) XLINE BYTE 193-196(INT 4)
C38 CDP-X BYTE 181-184(INT 4) CDP-Y BYTE 185-188(INT 4)
C39 SP TIME DELTA BYTE 133-136(INT 4) STR SENS SCALAR BYTE 225-228(INT 4)
C40 TRC EDIT FLAG BYTE 029-030(INT 2) EBCDIC END

FOR GATHERS, INFORMATION ON 240-BYTE SEG-Y TRACE HEADER DETAILS ARE TO BE INCLUDED IN REPORT/TAPE LOG/DATA LOADING SHEET, IN ADDITION TO EBCDIC HEADERS, TO GIVE SPECIFIC DEFINITION TO BYTE LOCATIONS THAT MAY MISSED OUT IN EBCDIC HEADER DUE TO THE LIMITED SPACE, SOFTWARE LIMITATIONS, OR HAVE DIFFERENT/ EXTENDED DEFINITIONS FROM PETRONAS STANDARD DEFINITION GUIDELINE:

Example of the notes:

- This is a 3 vessels operation, with ADI as recording and source vessel, CHP as source vessel 1 and ODK as source vessel 2.
- Trace data values are in IBM 32-bit floating point format
- Any "Not used" byte locations in binary and trace headers have been set to 0
- All trace headers are integer numbers.
- 240-bytes SEG-Y trace header details:

From Byte	To Byte	Number of Bytes	Description
29	30	2	Trace identification code: 1 = Seismic data, 2 = Trace recommended for editing, 3 = Receiver depth outside contract specification.
133	134	2	Source vessel edit flag. 1-good trace, 2-edit CHP, 3-edit ODK, 4-edit CHP and ODK
205	206	2	Fired source number Gun Array number. Starboard source is 1. Port source is 2.
237	240	4	Start of record time in microsecs within the second. Fraction to add to time in bytes 157-166 to obtain accurate source fire time

ATTACHMENT 1(c)

PETRONAS Standard Seismic SEG-Y EBCDIC Header for NAV-MERGED SHOT GATHERS 2D LAND/OBN/OBC

SAMPLE OF SEG-Y EBCDIC HEADER FOR NAV-MERGED SHOT GATHERS 2D LAND/OBN/OBC

C01 CLIENT : PETRONAS CARIGALI SDN BHD
C02 SURVEY : 2D (4C) OBN CHO/2013/XTS/0013 AREA : BLOCK SB315
C03 LINE : KND2D4C14-001 SP-RANGE : 1000.5-1100.5
C04 RELATIONSHIP: FSP / FCDP = 1000.5 / 1 LSP / LCDP = 1100.5 / 200
C05 SP ANNOTATED LOCATION: CDP POSITION
C06 DATASET: NAV-MERGED SHOT GATHER
C07 POLARITY: ZERO PHASE DATA: ACCOUSTIC IMPEDANDE INCREASE CORRESPONDS TO
C08 ZERO-PHASE-WAVELET-PEAK AND WRITTEN AS A POSITIVE NUMBER ON TAPE
C09 ##### ACQUISITION DATE: MARCH – MAY 2014 ##### CONTRACTOR:
C10 SHOT INTERVAL : 25 M RECEIVER INTERVAL : 25 M
C11 SPREAD LENGTH : 6000 M TOTAL RECEIVER / SPREAD : 240
C12 MIN OFFSET : 27.95 M MAX OFFSET : 5987.51 M
C13 SOURCE DEPTH : 5 M RECEIVER DEPTHS : SEA FLOOR
C14 SOURCE PRESSURE : 2000 PSI SOURCE VOLUME : 1980 CU IN
C15 DYNAMITE CHARGE SIZE : XXXX DYNAMITE CHARGE DEPTH : XXXX
C16 DYNAMITE HOLE PATTERN : XXXX
C17 SAMPLE RATE (MS) : 2 MAX TIME (MS) : 8000
C18 DATUM : WGS-84 PROJECTION : UTM ZONE 50N
C19 COORDINATE UNITS : METRES
C20 ##### PROCESSED DATE: 25 MAY 2014 ##### CONTRACTOR:
C21 INPUT RAW OBN DATA / MERGE OBN DATA / OUTPUT SEGD / TILT CORRECTION / NAV MERGE / OUTPUT SEG-Y
C22
C23
C24
C25
C26
C27
C28
C29
C30
C31 ##### TRACE HEADER DEFINITION, BYTE LOCATION:
C32 2D CMP BYTE 021-024 (INT 4) CDP BIN NUMBER BYTE 171-172 (INT 4)
C33 OFFSET BYTE 037-040 (INT 4) CDP ELEVATION BYTE 211-214 (INT 4)
C34 SOURCE LINE NO. BYTE 197-200 (INT 4) SEQ NUM BYTE 201-202 (INT 2)
C35 XCORD SOURCE BYTE 073-076 (INT 4) YCORD SOURCE BYTE 077-080 (INT 4)
C36 XCORD DETECT BYTE 081-084 (INT 4) YCORD DETECT BYTE 085-088 (INT 4)
C37 TIDAL HEIGHT BYTE 125-126 (INT 2) TIDAL STATIC BYTE 127-128 (INT 2)
C38 CDP-X BYTE 181-184 (INT 4) CDP-Y BYTE 185-188 (INT 4)
Open

C39 SOURCE STATION NO BYTE 203-206 (INT 4) RECEIVER STATION BYTE 207-210 (INT 4)
C40 **XY COORDINATE SCALAR: BYTE 71-72 (INT2)** END EBCDIC

ATTACHMENT 1(d)

PETRONAS Standard Seismic SEG-Y EBCDIC Header for NAV-MERGED SHOT GATHERS 3D LAND/OBN/OBC

SAMPLE OF SEG-Y EBCDIC HEADER FOR NAV-MERGED SHOT GATHERS 3D LAND/OBN/OBC

C01 CLIENT : PETRONAS CARIGALI SDN BHD
C02 SURVEY : 3D (4C) OBN CHO/2013/XTS/0013 AREA : BLOCK SB315
C03 3D INLINE RANGE : 1001-4000 3D XLINE RANGE : 187-1992
C04 DATASET: NAV-MERGED SHOT GATHER
C05 POLARITY: ZERO PHASE DATA: ACCOUSTIC IMPEDANDE INCREASE CORRESPONDS TO
C06 ZERO-PHASE-WAVELET-PEAK AND WRITTEN AS A POSITIVE NUMBER ON TAPE
C07 ##### ACQUISITION DATE: MARCH – MAY 2014 ##### CONTRACTOR:
C08 BIN CENTER INTERVAL (SL x XL) = 12.5M x 12.5M, INCREMENT (SL: XL) = 1:1
C09 CORNERS : SL 1, XL 1 : CDP-X=504567.500000, CDP-Y=600389.750000
C10 : SL 1, XL 2250 : CDP-X=476602.250000, CDP-Y=603264.375000
C11 : SL 1350, XL 2250 : CDP-X=474877.937500, CDP-Y=586490.250000
C12 : SL 1350, XL 1 : CDP-X=502843.187500, CDP-Y=583615.625000
C13 SUBLINE ANGLE : 96(DEG); XLINE ANGLE : 6 (DEG)
C14 SPREAD LENGTH : 6000 M TOTAL RECEIVER / SPREAD : 240
C15 MIN OFFSET : 27.95 M MAX OFFSET : 5987.51 M
C16 SOURCE DEPTH : 5 M RECEIVER DEPTHS : SEA FLOOR
C17 SOURCE PRESSURE : 2000 PSI SOURCE VOLUME : 1980 CU IN
C18 DYNAMITE CHARGE SIZE : XXXX DYNAMITE CHARGE DEPTH : XXXX
C19 DYNAMITE HOLE PATTERN : XXXX
C20 SAMPLE RATE (MS) : 2 MAX TIME (MS) : 8000
C21 DATUM : WGS-84 PROJECTION : UTM ZONE 50N
C22 COORDINATE UNITS : METRES
C23 ##### PROCESSED DATE: 25 MAY 2014 ##### CONTRACTOR:
C24 INPUT RAW OBN DATA / MERGE OBN DATA / OUTPUT SEGD /
C25 TILT CORRECTION / NAV MERGE / OUTPUT SEG-Y
C26
C27
C28
C29
C30 ##### TRACE HEADER DEFINITION, BYTE LOCATION:
C31 3D CMP BYTE 021-024 (INT 4) 2D CMP BYTE 129-130 (INT 2)
C32 OFFSET BYTE 037-040 (INT 4) CDP ELEVATION BYTE 211-214 (INT 4)
C33 SOURCE LINE NO. BYTE 197-200 (INT 4) SEQUENCE NUM BYTE 201-202 (INT 2)
C34 XCORD SOURCE BYTE 073-076 (INT 4) YCORD SOURCE BYTE 077-080 (INT 4)
C35 XCORD DETECT BYTE 081-084 (INT 4) YCORD DETECT BYTE 085-088 (INT 4)
C36 TIDAL HEIGHT BYTE 125-126 (INT 2) TIDAL STATIC BYTE 127-128 (INT 2)
C37 CDP-X BYTE 181-184 (INT 4) CDP-Y BYTE 185-188 (INT 4)

C38 3D INLINE BYTE 189-192 (INT 4) 3D CROSSLINE BYTE 193-196 (INT 4)
C39 SOURCE STATION NO. BYTE 203-206 (INT 4) RECEIVER STATION BYTE 207-210 (INT 4)
C40 **XY COORDINATE SCALAR: BYTE 71-72 (INT2)** END EBCDIC

ATTACHMENT 1(e)

PETRONAS Standard Seismic SEG-Y EBCDIC Header for PRE-MIGRATION SHOT GATHERS 3D

SAMPLE OF SEG-Y EBCDIC HEADER PRE-MIGRATION SHOT GATHERS 3D SURVEY

```
*** SEGY EBCDIC HEADER ***

C01 CLIENT  : PETRONAS CARIGALI SDN BHD
C02 SURVEY  : 2G2J 2019 REPROCESSING,  AREA : OFFSHORE SABAH,  DATE : DEC 2019
C03 LINE NAME : LPM_1510_023,      SHOTPOINT RANGE : 1012-5343
C04 MEDIA    : 3592JC4TB    TAPE ID/NUM: DC4003/01 OF 01   COPY: 01 OF 02
C05 DATASET : PRE-MIGRATION SHOT GATHERS (LPM SURVEY)
C06 POLARITY  : ZERO PHASE DATA: ACOUSTIC IMPEDANCE INCREASE CORRESPONDS TO
C07 ZERO-PHASE-WAVELET-PEAK AND WRITTEN AS A POSITIVE NUMBER ON TAPE
C08 ### ACQUISITION YEAR: APRIL - JUNE 2001     ACQUIRED BY WESTERNGECO ###
C09 BIN CENTER INTERVAL (SL x XL) = 9.375mX12.5m   INCREMENT(SL:XL) = 1:1
C10 CORNERS    :  1138 ,  9029 :  CDP-X : 283609.3419, CDP-Y : 625776.3701
C11            :  1138 , 15923 :  CDP-X : 214853.0539, CDP-Y : 677725.4171
C12            : 13576 ,  9029 :  CDP-X : 353903.3200, CDP-Y : 718812.7833
C13            : 13576 , 15923 :  CDP-X : 285147.0320, CDP-Y : 770761.8303
C14 SUBLINE ANGLE    : 307.073DEG              XLINE ANGLE : 37.073DEG
C15 SAMPLE RATE  : 2MS
C16 RECORD LENGTH : 8000MS
C17 GPS DATUM : WGS 84      PROJECTION : UTM 50N    CENTRAL MERIDIAN : 117E
C18 COORDINATE UNITS : METERS
C19 ##  PROCESSING DATE : NOV 2018 - JULY 2019 ## PROCESSED BY WESTERNGECO KL ##
C20 SEGD DECODE, NAVIGATION MERGE,
C21 BAD TRACE EDIT, LOW CUT FILTER 2.0 HZ, DEBUBBLE
C22 DIRECT ARRIVAL NOISE ATTENUATION, NOISE ATTENUATION,
C23 SHOT CHANNEL SCALING, RECEIVER MOTION CORRECTION, ZERO PHASING,
C24 ADAPTIVE DEGHOSTING (SOURCE AND RECEIVER REDATUM DEPTH 6M),
C25 DETERMINISTIC WATER LAYER DEMULTIPLE COMPUTATION,3D SRME MODEL COMPUTATION,
C26 TIDAL STATICS, DWD AND 3D SRME MULTI LEAST SQUARE ADAPTIVE SUBTRACTION,
C27 RESIDUAL DEMULTIPLE, VEL ANALYSIS (VA02) 500MX500M, OFFSET SPLIT,
C28 REGRID 2G2J (9.375MX12.5M), SURVEY MATCHING, CROSSLINE DENOISE,
C29 SORT TO SHOT DOMAIN, OUTPUT SEGY
C30
C31
C32 #### TRACE HEADER DEFINITION, BYTE LOCATION ####
C33 TRACE NUM: BYTE 1-4, SHOTPOINT NUM: BYTE 17-20, 3D CMP: BYTE 21-24
C34 OFFSET: BYTE 37-40
C35 XCORD SOURCE (X100): BYTE 73-76, YCORD SOURCE (X100): BYTE 77-80
C36 XCORD DETECT (X100): BYTE 81-84, YCORD DETECT (X100): BYTE 85-88
C37 WATER BOTTOM TIME MIDPT: BYTE 137-140,
C38 XCORD CELCTR (X100): BYTE 181-184, YCORD CELCTR (X100): BYTE 185-188
C39  SUBLINE:BYTE189-192,XLINE: BYTE193-196,
C40 END OF EBCDIC
```

ATTACHMENT 1(f)

PETRONAS Standard Seismic SEG-Y EBCDIC Header for PRE-STACK TIME MIGRATION CMP GATHERS 3D

SAMPLE OF SEG-Y EBCDIC HEADER FOR APSTM POST-MIGRATION CMP GATHERS 3D SURVEY

```
 ************************************************************
 S E G Y   EBCDIC IDENTIFICATION HEADER - LINE: [Y  : 2G2J   ]
 ************************************************************

C01 CLIENT  : PETRONAS CARIGALI SDN BHD
C02 SURVEY  : 2G2J 2019 REPROCESSING,  AREA : OFFSHORE SABAH,  DATE : JAN 2020
C03 SUBLINE : 7000-7009,      XLINE : 10912-11861
C04 MEDIA    : 3592JC4TB    TAPE ID/NUM: DC1001/01 OF 05   COPY: 01 OF 02
C05 DATASET : APSTM POST MIGRATION CMP GATHERS WITH NMO CORRECTION
C06 POLARITY  : ZERO PHASE DATA: ACOUSTIC IMPEDANCE INCREASE CORRESPONDS TO
C07 ZERO-PHASE-WAVELET-PEAK AND WRITTEN AS A POSITIVE NUMBER ON TAPE
C08 ######  ACQUISITION YEAR: 1995-2003 ####### ACQUIRED BY WGC, WG, PGS  ######
C09 BIN CENTER INTERVAL (SL x XL) = 9.375mX12.5m   INCREMENT(SL:XL) = 1:1
C10 CORNERS   :  1138 ,  9029 :  CDP-X : 283609.3419, CDP-Y : 625776.3701
C11           :  1138 , 15923 :  CDP-X : 214853.0539, CDP-Y : 677725.4171
C12           : 13576 ,  9029 :  CDP-X : 353903.3200, CDP-Y : 718812.7833
C13           : 13576 , 15923 :  CDP-X : 285147.0320, CDP-Y : 770761.8303
C14 SUBLINE ANGLE    : 307.073DEG              XLINE ANGLE : 37.073DEG
C15 SAMPLE RATE(MS)  : 2                  RECORD LENGTH(MS) : 8192
C16 GPS DATUM : WGS 84      PROJECTION : UTM 50N    CENTRAL MERIDIAN : 117E
C17 COORDINATE UNITS : METERS
C18 ##  PROCESSING DATE : NOV 2018 - JULY 2019 ## PROCESSED BY WESTERNGECO KL ##
C19 SEGD DECODE, NAVMERGE, BAD TRACE EDIT, LOW CUT FILTER 2.0 HZ, DEBUBBLE,
C20 DIRECT ARRIVAL NOISE ATTENUATION, NOISE ATTENUATION,
C21 SHOT CHANNEL SCALING, RECEIVER MOTION CORRECTION, ZERO PHASING,
C22 ADAPTIVE DEGHOSTING, DETERMINISTIC WATER LAYER DEMULTIPLE (DWD) COMPUTATION,
C23 3D SRME MODEL COMPUTATION, TIDAL STATICS,
C24 DWD AND 3D SRME MULTI LEAST SQUARE ADAPTIVE SUBTRACTION,
C25 RESIDUAL DEMULTIPLE, VEL ANALYSIS (VA02) 500MX500M, OFFSET SPLIT,
C26 REGRID 2G2J (9.375MX12.5M), SURVEY MATCHING, CROSSLINE DENOISE,
C27 INTERPOLATION (MPFI), SPATIALLY RELATIVE AMPLITUDE CORRECTION (SRAC),
C28 TIME VARIANT FILTER, INVERSE Q PHASE ONLY Q=100, VORONOI NORMALIZATION,
C29 ANISOTROPHY KIRCHHOFF PRE STACK TIME MIGRATION (APER 6KM, DIP 85DEG),
C30 SORT TO CMP, HIGH DENSITY VEL ANALYSIS 50M X 50M, RESIDUAL LNA & DEMULTIPLE,
C31 GATHER FLATTENING (FORT), Q AMP COMP 10DB (QPICK), PRE STACK FK DEMULTIPLE,
C32 OUTPUT SEGY
C33 SEGY SUBLINE RANGE: 7000-7009,      SEGY CROSSLINE RANGE : 10912-11861
C33 TAPE SUBLINE RANGE: 6999-8109,      SEGY CROSSLINE RANGE : 10242-13989
C33 FULL SUBLINE RANGE: 6999-10837,     SEGY CROSSLINE RANGE : 10025-14452
C36 ##################   TRACE HEADER DEFINITION, BYTE LOCATION   ##################
C37 CDP: BYTE 21-24 , FOLD: BYTE 33-34, OFFSET: BYTE 37-40,
C38 CDP-X (x100): BYTE 181-184, CDP-Y (x100): BYTE 185-188
C39 SUBLINE: BYTE 189-192, XLINE: BYTE 193-196, WB TIME (x100): 197-200
C40 END OF EBCDIC
```

ATTACHMENT 1(g)

PETRONAS Standard Seismic SEG-Y EBCDIC Header for PRE-STACK DEPTH MIGRATION CIP GATHERS 3D

SAMPLE OF SEG-Y EBCDIC HEADER APSDM POST-MIGRATION CIP GATHERS 3D SURVEY

```
 ************************************************************
 S E G Y   EBCDIC IDENTIFICATION HEADER - LINE: [Y  : 2G2J   ]
 ************************************************************

C01 CLIENT  : PETRONAS CARIGALI SDN BHD
C02 SURVEY  : 2G2J 2019 REPROCESSING,  AREA : OFFSHORE SABAH,  DATE : JAN 2020
C03 SUBLINE : 10478-10487,      XLINE : 10030-14393
C04 MEDIA    : 3592JC4TB    TAPE ID/NUM: DC7004/04 OF 05   COPY: 01 OF 02
C05 DATASET : APSDM POST MIGRATION CMP GATHERS WITH NMO CORRECTION DEPTH DOMAIN
C06 POLARITY  : ZERO PHASE DATA: ACOUSTIC IMPEDANCE INCREASE CORRESPONDS TO
C07 ZERO-PHASE-WAVELET-PEAK AND WRITTEN AS A POSITIVE NUMBER ON TAPE
C08 ######  ACQUISITION YEAR: 1995-2003 ####### ACQUIRED BY WGC, WG, PGS  ######
C09 BIN CENTER INTERVAL (SL x XL) = 9.375mX12.5m   INCREMENT(SL:XL) = 1:1
C10 CORNERS   :  1138 ,  9029 :  CDP-X : 283609.3419, CDP-Y : 625776.3701
C11           :  1138 , 15923 :  CDP-X : 214853.0539, CDP-Y : 677725.4171
C12           : 13576 ,  9029 :  CDP-X : 353903.3200, CDP-Y : 718812.7833
C13           : 13576 , 15923 :  CDP-X : 285147.0320, CDP-Y : 770761.8303
C14 SUBLINE ANGLE    : 307.073DEG              XLINE ANGLE : 37.073DEG
C15 SAMPLE RATE(M)  : 3                 RECORD LENGTH(M) : 9999
C16 GPS DATUM : WGS 84      PROJECTION : UTM 50N    CENTRAL MERIDIAN : 117E
C17 COORDINATE UNITS : METERS
C18 ##  PROCESSING DATE : NOV 2018 - JULY 2019 ## PROCESSED BY WESTERNGECO KL ##
C19 SEGD DECODE, NAVMERGE, BAD TRACE EDIT, LOW CUT FILTER 2.0 HZ, DEBUBBLE,
C20 DIRECT ARRIVAL NOISE ATTENUATION, NOISE ATTENUATION,
C21 SHOT CHANNEL SCALING, RECEIVER MOTION CORRECTION, ZERO PHASING,
C22 ADAPTIVE DEGHOSTING, DETERMINISTIC WATER LAYER DEMULTIPLE (DWD) COMPUTATION,
C23 3D SRME MODEL COMPUTATION, TIDAL STATICS,
C24 DWD AND 3D SRME MULTI LEAST SQUARE ADAPTIVE SUBTRACTION,
C25 RESIDUAL DEMULTIPLE, VEL ANALYSIS (VA02) 500MX500M, OFFSET SPLIT,
C26 REGRID TO 2016 2G2J SURVEY (9.375MX12.5M), SURVEY MATCHING, XLINE DENOISE,
C27 INTERPOLATION (MPFI), SPATIALLY RELATIVE AMPLITUDE CORRECTION (SRAC), TVF,
C28 VORONOI NORMALIZATION, FWI (UP TO ~16HZ PEAK), TOMOGRAPHY UPDATE,
C29 Q-APSDM (APER 6KM, DIP 85DEG,QAMP 15DB), DEPTH TO TIME (SMOOTHED MIG VEL),
C30 SORT TO CMP, HIGH DENSITY VEL ANALYSIS 50M X 50M,
C31 RESIDUAL NOISE ATTENUATION & DEMULTIPLE, GATHER FLATTENING (FORT),
C32 PRE STK FK DEMULTIPLE, CONVERT TO OWD USING SMOOTH MIGR VEL, OUTPUT SEGY
C33 SEGY SUBLINE RANGE: 10478-10487,      SEGY CROSSLINE RANGE : 10030-14393
C34 TAPE SUBLINE RANGE: 9778-10557,      SEGY CROSSLINE RANGE : 10027-14405
C35 FULL SUBLINE RANGE: 6999-10837,     SEGY CROSSLINE RANGE : 10025-14452
C36 #################   TRACE HEADER DEFINITION, BYTE LOCATION   #################
C37 CDP: BYTE 21-24 , FOLD: BYTE 33-34, OFFSET: BYTE 37-40,
C38 CDP-X (x100): BYTE 181-184, CDP-Y (x100): BYTE 185-188
C39 SUBLINE: BYTE 189-192, XLINE: BYTE 193-196, WB DEPTH (x100): 197-200
C40 END OF EBCDIC
```

ATTACHMENT 1(h)

PETRONAS Standard Seismic SEG-Y EBCDIC Header for RTM SUBSURFACE ANGLE GATHERS (SAG)

SAMPLE OF SEG-Y EBCDIC HEADER FOR RTM SUBSURFACE ANGLE GATHERS (SAG)

C1 CLIENT : PETRONAS CARIGALI SDN BHD

C2 SURVEY : SABAH LPM 3D AREA : BLOCK G OFFSHORE SABAH

C3 INLINE : 30800 - 30960 CROSSLINE: 19292 - 22236

C4 PROJECT : 2016 LIMBAYONG MARINE 3D APSDM REEL NO. : 1/20

C5 DATASET : Q-TTI-RTM SUBSURFACE ANGLE GATHERS SAG (TIME)

C6

C7 #### ACQUISITION DATE : 2001 ##### ACQUIRED BY WESTERNGECO

C8 BIN CENTER INTERVAL (XL X IL) = 12.5M X 6.25M INCREMENTAL (XL:IL) = 1:1

C9 CORNERS : IL 30800 XL 19292 CDP-X 511051.62 CDP-Y 644055.12

C10 IL 30800 XL 22236 CDP-X 536915.56 CDP-Y 670233.31

C11 IL 34000 XL 19292 CDP-X 525278.93 CDP-Y 629998.62

C12 IL 34000 XL 22236 CDP-X 551142.81 CDP-Y 656176.87

C13 INLINE ANGLE (DEG) : 44.654 EAST OF NORTH

C14 CROSSLINE ANGLE (DEG) : 134.654 EAST OF NORTH

C15 SAMPLE INTERVAL(MS) : 4 RECORD LENGTH(MS) : 8000

C16 DATUM : WGS84 PROJECTION : UTM 50N COORDINATE UNITS : METRES

C17 ### PROCESSED DATE : JUL 2016-MAC 2017 ### PROCESSED BY CGG MALAYSIA ###

C18 REFORMAT (2 SOURCE/10 CABLES/480 GROUPS/9216MS RECORD LENGTH/2MS SAMPLE

C19 NAVIGATION MERGE, GUN CABLE & RECORDING DELAY CORRECTION

C20 SPHERICAL DIVERGENCE, SWELL NOISE ATTENUATION, LINEAR NOISE ATTENUATION

C21 RECEIVER DEGHOSTING, DEBUBBLE & ZERO PHASE FILTER, TIDAL STATICS CORRECTION

C22 Q-COMPENSATION (PHASE), 3D SRME + 3D MWD, SOURCE DEGHOSTING

C23 SURFACE CONSISTENT AMPLITUDE CORRECTION, LATERAL SPECTRAL COMPENSATION

C24 WATER COLUMN STATICS CORRECTION, FORWARD NMO, RADON DEMULTIPLE

C25 DIFFRACTED MULTIPLE ATTENUATION

C26 REVERSE NMO, REVERSE SPHERICAL DIVERGENCE

C27 Q-TTI-RTM ANGLE GATHER WITH 3-24HZ FWI VEL MODEL & Q MODEL

C28 DEPTH (8M) TO TIME (4MS) CONVERSION, POST-MIG RADON DEMULTIPLE

C29 OUTPUT TO SEG-Y

C30

C31

C32 SEG-Y OUTPUT GRID: 12.5M X 6.25M (XL X IL)

C33

C34 ################ TRACE HEADER DEFINITION, BYTE LOCATION: ################

C35 CDP 021-024(INT 4) ANGLE 037-040(INT 4)

C36 CDPX COORDINATE(X100) 181-184(INT 4) CDPY COORDINATE(X100) 185-188(INT 4)

C37 INLINE NUMBER 189-192(INT 4) CROSSLINE NUMBER 196-196(INT 4)

C38 CDP=((SUBLINE-30000)*100000)+CROSSLINE

C39

C40 END EBCDIC

ATTACHMENT 1(i)

PETRONAS Standard Seismic SEG-Y EBCDIC Header for RTM SURFACE OFFSET GATHERS (SOG)

SAMPLE OF SEG-Y EBCDIC HEADER FOR RTM SURFACE OFFSET GATHERS (SOG)

C 1 CLIENT: PETRONAS COMPANY: SCHLUMBERGER
C 2 PROJECT: CAMPECHE TLALOC LSMI DATE: MARCH 2021
C 3 ==========INPUT DATA PARAMETERS==========
C4 DATASET: 30Hz LSRTM ENH SOG GATHERS
C5
C6 ACQUISITION PARAMETERS: TO INCLUDE ACQUISITION INFO & PARAMETERS
C7
C8
C9
C10
C11 PROCESSING HISTORY: INPUT SEGD/ SVD NOISE ATTENUATION/
C12 TRACE EDIT AND DESPIKE/ TRACE INTERPOLATION/ DGF TO 12.5M/
C13 NAVIGATION MERGE/ RESAMPLE 4MS/ CMS DEBUBBLE/ RECEIVER MOTION CORRECTION/
C14 3D ADNA/ZERO PHASING/ MULTI-CABLE ADAPTIVE DEGHOSTING/ 3D GSMP/
C15 LEAST SQUARE ADAPTIVE SUBTRACTION/ CABLE INTERPOLATION/
C16 STATISTICAL RESIDUAL DEBUBBLE/ INV-Q (100 PHASE)/RESAMPLE 8MS/ TVF/
C17 SEDIMENT TOMOGRAPHY/ OVERHANG TOMOGRAPHY/ REPEAT SECTION TOMOGRAPHY/
C18 REFLECTION FWI/ MJU TOMOGRPAHY/ PRE-SALT TREND/ ANISOTROPIC TTI FINAL
C19 SALT BODY VEL MODEL/ 30Hz LSRTM SURFACE OFFSET GATHERS
C20 LSRTM SURFACE OFFSET GATHERS - 30 OFFSETS - 350-9050M EVERY 300M/
C21 GRID: 25M X 25M/ MAX DEPTH 10000 M AT 8 M/ RADON DEMULTIPLE/
C22 NON RIGID MATCHING/ Q COMPENSATION (AMP)/ RESIDUAL NOISE ATTENUATION/
C23 TMF/ LSMI INVERSION/ SALT ADD BACK/SEG-Y/
C24
C24 ALL COORDS SCALED BY 100
C25 XCORD BYTE: 181-184; YCORD BYTE: 185-188; INLINE BYTE: 189-192
C26 XLINE BYTE: 193-196; WATER DEPTH BYTE: 137-138
C28 CMP BYTE: 21-24 OFFSET BYTE: 37-40
C29==========GRID PARAMETERS FOR THIS PRODUCT==========
C30 MAP PROJECTION: UTM, SPHEROID: WGS-84, GRID UNITS: METERS
C31 DATUM: WGS-84, SCALE FACTOR: 0.9996, CENTRAL MERIDIAN: -93
C32 LAT. OF ORIGIN: 0, FALSE NORTHING: 0, FALSE EASTING: 500000
C33 GRID ORIGIN: X: 362776.8430 Y: 1951426.3672
C34 CORNER 2: X: 129165.1783 Y: 2313920.7156
C35 CORNER 3: X: 688496.4024 Y: 2161338.2978
C36 CORNER 4: X: 454884.7378 Y: 2523832.6462
C37 CELL SIZE: 25 M X 25 M ORDINAL INCR: 4(XL) 50(IL)
C38 AZIMUTH: 327 DEGREES
C39
C40

ATTACHMENT 1(j)

PETRONAS Standard Seismic SEG-Y EBCDIC Header for UNFILTERED UNSCALED STACK 2D (PSTM)

SAMPLE OF SEG-Y EBCDIC HEADER FOR UNFILTERED UNSCALED STACK 2D (PSTM)

C01 CLIENT : PETRONAS CARIGALI SDN BHD
C02 SURVEY : 2D BERANTAI AREA : BLOCK PM9 OFFSHORE TERENGGANU
C03 LINE : BR10-08-01A
C04 SP-RANGE: 1640 - 905 CDP-RANGE : 1 – 1662
C05 RELATIONSHIP: FSP/FCDP = 1640/192 LSP/LCDP = 905/1662
C06 SP ANNOTATED LOCATION: CDP POSITION
C07 DATASET : ~~RAW~~ UNFILTERED UNSCALED PSTM STACK
C08 POLARITY : ZERO PHASE DATA: ACOUSTIC IMPEDANCE INCREASE CORRESPONDS TO
C09 ZERO-PHASE-WAVELET-PEAK AND WRITTEN AS A POSITIVE NUMBER ON TAPE.
C10 ##### ACQUISITION DATE: JAN-APR 2010 #### ACQUIRED BY WESTERN GECO
C11 SHOT INTERVAL : 25 M GRP INTERVAL : 12.5 M
C12 CABLE LENGTH : 4800 M GRPS PER CABLE : 384
C13 MIN OFFSET : 105 M MAX OFFSET : 4892.5 M
C14 GUN DEPTH : 6 M CABLE DEPTH : 7 M
C15 SOURCE PRESSURE: 2000 PSI SOURCE VOLUME : 2960 CU. IN.
C16 SAMPLE RATE (MS): 2 MAX TIME (MS) : 6144
C17 DATUM : WGS84 PROJECTION : UTM ZONE 48N
C18 COORDINATE UNITS: METRES
C19
C20 ##### PROCESSED DATE: MAY-AUG 2010 #### PROCESSED BY CGGVERITAS
C21 INPUT SEGD / BULK STATIC -50 MS / GUN & CABLE STATIC / ZERO PHASE
C22 NAV MERGE / LO-CUT FILTER 3 HZ @ 18 DB/OCT / SWELL NOISE ATTENUATION
C23 LINEAR TAUP RADON NOISE ATTENUATION / SRME / TAUP DECONVOLUTION
C24 VELOCITY ANALYSIS 1 & 2 / CMP RADON / TRACE MIX & DECIMATION
C25 PHASE ONLY INVERSE Q FILTER / COMMON OFFSET RANDOM NOISE ATTENUATION
C26 SURFACE CONSISTENT AMPLITUDE SCALING /
C27 VELOCITY ANALYSIS / KIRCHHOFF PSTM / VELOCITY ANALYSIS
C28 RESIDUAL CMP RADON / NMO (4TH ORDER) / OUTER MUTE / INNER MUTE
C29 STACK (1/SQRTN) / AMPLITUDE INVERSE Q FILTER / RANDOM NOISE ATTENUATION
C30 F-K FILTER / 2DB/SEC TIME GAIN
C31 OUTPUT SEG-Y
C32
C33
C34**##### TRACE HEADER DEFINITION, BYTE LOCATION:**
C35 XY COORD SCALAR: BYTE 071 - 072 2INTEGER
C36 SHOTPOINT BYTE 017 - 020 4INTEGER
C37 CDP BYTE 021 - 024 4INTEGER
C38 CDP-X BYTE 181 - 184 4INTEGER

C39 CDP-Y BYTE 185 - 188 4INTEGER

C40 END OF EBCDIC HEADER

ATTACHMENT 1(k)

PETRONAS Standard Seismic SEG-Y EBCDIC Header for FILTERED SCALED STACK 3D

SAMPLE OF SEG-Y EBCDIC HEADER FOR FILTERED SCALED STACK 3D (PSDM IN DEPTH)

```
*** SEGY EBCDIC HEADER ***

C01 CLIENT  : PETRONAS CARIGALI SDN BHD
C02 SURVEY  : 2G2J 2019 REPROCESSING,  AREA : OFFSHORE SABAH,  DATE : JAN 2020
C03 SUBLINE : 6999-10837,       XLINE : 10025-14452
C04 MEDIA    : 3592JC4TB    TAPE ID/NUM: DC6001/01 OF 01   COPY: 01 OF 02
C05 DATA:2019 REPRO QKDM FINAL FILTERED & SCALED STACK, DEPTH DOMAIN
C06 POLARITY  : ZERO PHASE DATA: ACOUSTIC IMPEDANCE INCREASE CORRESPONDS TO
C07 ZERO-PHASE-WAVELET-PEAK AND WRITTEN AS A POSITIVE NUMBER ON TAPE
C08 ######  ACQUISITION YEAR: 1995-2003 ####### ACQUIRED BY WGC, WG, PGS  ######
C09 BIN CENTER INTERVAL (SL x XL) = 9.375mX12.5m   INCREMENT(SL:XL) = 1:1
C10 CORNERS   :  1138 ,  9029 :  CDP-X : 283609.3419, CDP-Y : 625776.3701
C11           :  1138 , 15923 :  CDP-X : 214853.0539, CDP-Y : 677725.4171
C12           : 13576 ,  9029 :  CDP-X : 353903.3200, CDP-Y : 718812.7833
C13           : 13576 , 15923 :  CDP-X : 285147.0320, CDP-Y : 770761.8303
C14 SUBLINE ANGLE    : 307.073DEG              XLINE ANGLE : 37.073DEG
C15 SAMPLE RATE  : 3M                  RECORD LENGTH : 9999M
C16 GPS DATUM : WGS 84      PROJECTION : UTM 50N    CENTRAL MERIDIAN : 117E
C17 COORDINATE UNITS : METERS
C18 ##  PROCESSING DATE : NOV 2018 - OCT 2019 ## PROCESSED BY WESTERNGECO KL ##
C19 SEGD DECODE, NAVMERGE, BAD TRACE EDIT, LOW CUT FILTER 2.0 HZ, DEBUBBLE,
C20 DIRECT ARRIVAL NOISE ATTENUATION, NOISE ATTENUATION,
C21 SHOT CHANNEL SCALING, RECEIVER MOTION CORRECTION, ZERO PHASING,
C22 ADAPTIVE DEGHOSTING, DETERMINISTIC WATER LAYER DEMULTIPLE (DWD) COMPUTATION,
C23 3D SRME MODEL COMPUTATION, TIDAL STATICS,
C24 DWD AND 3D SRME MULTI LEAST SQUARE ADAPTIVE SUBTRACTION,
C25 RESIDUAL DEMULTIPLE, VEL ANALYSIS (VA02) 500MX500M, OFFSET SPLIT,
C26 REGRID TO 2016 2G2J SURVEY (9.375MX12.5M), SURVEY MATCHING, XLINE DENOISE,
C27 INTERPOLATION (MPFI), SPATIALLY RELATIVE AMPLITUDE CORRECTION (SRAC), TVF,
C28 VORONOI NORMALIZATION, FWI (UP TO ~16HZ PEAK), TOMOGRAPHY UPDATE,
C29 Q-APSDM (APER 6KM, DIP 85DEG,QAMP 15DB), DEPTH TO TIME (SMOOTHED MIG VEL),
C30 SORT TO CMP, HIGH DENSITY VEL ANALYSIS 50M X 50M,
C31 RESIDUAL NOISE ATTENUATION & DEMULTIPLE, GATHER FLATTENING (FORT),
C32 PRE STACK FK DEMULTIPLE, 3-30 DEG ANGLE MUTE, STACK, FOOTPRINT REMOVAL,
C33 PRINCIPLE COMPONENT RECONSTRUCTION (PCR), BANDWIDTH EXTENSION,
C34 TIME VARIANT FILTER, MEDIAN GAIN,
C35 STRETCH TIME TO DEPTH (SMOOTHED MIG VEL), OUTPUT TO SEGY
C36 ################   TRACE HEADER DEFINITION, BYTE LOCATION   ################
C37 CDP: BYTE 21-24 , COORD SCALAR: BYTE 71-72
C38 CDP-X (x100): BYTE 181-184, CDP-Y (x100): BYTE 185-188
C39 SUBLINE: BYTE 189-192, XLINE: BYTE 193-196, WB DEPTH (x100): 197-200
C40 END OF EBCDIC
```

ATTACHMENT 1(I)

PETRONAS Standard Seismic SEG-Y EBCDIC Header for UNFILTERED UNSCALED ANGLE STACK 3D

SAMPLE OF SEG-Y EBCDIC HEADER FOR UNFILTERED UNSCALED ANGLE STACK 3D (PSTM)

```
C01 CLIENT  : PETRONAS CARIGALI SDN BHD
C02 SURVEY  : 2G2J 2019 REPROCESSING,  AREA : OFFSHORE SABAH,  DATE : JAN 2020
C03 SUBLINE : 6999 - 10837,      XLINE : 10025 - 14452
C04 MEDIA    : 3592JC4TB    TAPE ID/NUM: DC0002/01 OF 01   COPY: 01 OF 02
C05 DATA: APSTM ANGLE STACK (10-20DEG), TIME DOMAIN
C06 POLARITY  : ZERO PHASE DATA: ACOUSTIC IMPEDANCE INCREASE CORRESPONDS TO
C07 ZERO-PHASE-WAVELET-PEAK AND WRITTEN AS A POSITIVE NUMBER ON TAPE
C08 ######  ACQUISITION YEAR: 1995-2003 ####### ACQUIRED BY WGC, WG, PGS  ######
C09 BIN CENTER INTERVAL (SL x XL) = 9.375mX12.5m   INCREMENT(SL:XL) = 1:1
C10 CORNERS   :  1138 ,  9029 :  CDP-X : 283609.3419, CDP-Y : 625776.3701
C11           :  1138 , 15923 :  CDP-X : 214853.0539, CDP-Y : 677725.4171
C12           : 13576 ,  9029 :  CDP-X : 353903.3200, CDP-Y : 718812.7833
C13           : 13576 , 15923 :  CDP-X : 285147.0320, CDP-Y : 770761.8303
C14 SUBLINE ANGLE    : 307.073DEG              XLINE ANGLE : 37.073DEG
C15 SAMPLE RATE(MS)  : 2                  RECORD LENGTH(MS) : 8192
C16 GPS DATUM : WGS 84      PROJECTION : UTM 50N    CENTRAL MERIDIAN : 117E
C17 COORDINATE UNITS : METERS
C18 ##  PROCESSING DATE : NOV 2018 - JULY 2019 ## PROCESSED BY WESTERNGECO KL ##
C19 SEGD DECODE, NAVMERGE, BAD TRACE EDIT, LOW CUT FILTER 2.0 HZ, DEBUBBLE,
C20 DIRECT ARRIVAL NOISE ATTENUATION, NOISE ATTENUATION,
C21 SHOT CHANNEL SCALING, RECEIVER MOTION CORRECTION, ZERO PHASING,
C22 ADAPTIVE DEGHOSTING, DETERMINISTIC WATER LAYER DEMULTIPLE (DWD) COMPUTATION,
C23 3D SRME MODEL COMPUTATION, TIDAL STATICS,
C24 DWD AND 3D SRME MULTI LEAST SQUARE ADAPTIVE SUBTRACTION,
C25 RESIDUAL DEMULTIPLE, VEL ANALYSIS (VA02) 500MX500M, OFFSET SPLIT,
C26 REGRID TO 2016 2G2J SURVEY (9.375MX12.5M), SURVEY MATCHING, XLINE DENOISE,
C27 INTERPOLATION (MPFI), SPATIALLY RELATIVE AMPLITUDE CORRECTION (SRAC),
C28 TIME VARIANT FILTER, INVERSE Q PHASE ONLY Q=100, VORONOI NORMALIZATION,
C29 ANISOTROPHY KIRCHHOFF PRE STACK TIME MIGRATION (APER 6KM, DIP 85DEG),
C30 SORT TO CMP, HIGH DENSITY VEL ANALYSIS 50M X 50M, RESIDUAL LNA & DEMULTIPLE,
C31 GATHER FLATTENING (FORT), Q AMP COMP 10DB (QPICK), PRE STACK FK DEMULTIPLE,
C32 ANGLE MUTE (10-20DEG), STACK,
C33 EXP GAIN 4DB/SEC, CORRECT TO MSL,
C34 OUTPUT TO SEGY
C35
C36 #################   TRACE HEADER DEFINITION, BYTE LOCATION   #################
C37 CDP: BYTE 21-24 , COORD SCALAR: BYTE 71-72
C38 CDP-X (x100): BYTE 181-184, CDP-Y (x100): BYTE 185-188
C39 SUBLINE: BYTE 189-192, XLINE: BYTE 193-196, WB TIME (x100): 197-200
C40 END OF EBCDIC
```

ATTACHMENT 1(m)

PETRONAS Standard Seismic SEG-Y EBCDIC Header for Velocity

SAMPLE OF SEG-Y EBCDIC HEADER FOR PSDM MIGRATION INTERVAL VELOCITY

```
 ************************************************************
 S E G Y   EBCDIC IDENTIFICATION HEADER - LINE: [Y  : 2G2J   ]
 ************************************************************

C01 CLIENT  : PETRONAS CARIGALI SDN BHD
C02 SURVEY  : 2G2J 2019 REPROCESSING,  AREA : OFFSHORE SABAH,  DATE : JAN 2020
C03 SUBLINE : 6999-10837,      XLINE : 10025-14452
C04 MEDIA    : 3592JC4TB    TAPE ID/NUM: DC9004/01 OF 01   COPY: 01 OF 02
C05DATA:2019 REPRO QKDM MIG INT VEL SMOOTH FOR DOMAIN CONVERSION, DEPTH DOMAIN
C06 POLARITY  : ZERO PHASE DATA: ACOUSTIC IMPEDANCE INCREASE CORRESPONDS TO
C07 ZERO-PHASE-WAVELET-PEAK AND WRITTEN AS A POSITIVE NUMBER ON TAPE
C08 ######  ACQUISITION YEAR: 1995-2003 ####### ACQUIRED BY WGC, WG, PGS  ######
C09 BIN CENTER INTERVAL (SL x XL) = 9.375mX12.5m   INCREMENT(SL:XL) = 1:1
C10 CORNERS   :  1138 ,  9029 :  CDP-X : 283609.3419, CDP-Y : 625776.3701
C11           :  1138 , 15923 :  CDP-X : 214853.0539, CDP-Y : 677725.4171
C12           : 13576 ,  9029 :  CDP-X : 353903.3200, CDP-Y : 718812.7833
C13           : 13576 , 15923 :  CDP-X : 285147.0320, CDP-Y : 770761.8303
C14 SUBLINE ANGLE    : 307.073DEG              XLINE ANGLE : 37.073DEG
C15 SAMPLE RATE  : 3M                  RECORD LENGTH : 9999M
C16 GPS DATUM : WGS 84      PROJECTION : UTM 50N    CENTRAL MERIDIAN : 117E
C17 COORDINATE UNITS : METERS
C18 ##  PROCESSING DATE : NOV 2018 - OCT 2019 ## PROCESSED BY WESTERNGECO KL ##
C19 SEGD DECODE, NAVMERGE, BAD TRACE EDIT, LOW CUT FILTER 2.0 HZ, DEBUBBLE,
C20 DIRECT ARRIVAL NOISE ATTENUATION, NOISE ATTENUATION,
C21 SHOT CHANNEL SCALING, RECEIVER MOTION CORRECTION, ZERO PHASING,
C22 ADAPTIVE DEGHOSTING, DETERMINISTIC WATER LAYER DEMULTIPLE (DWD) COMPUTATION,
C23 3D SRME MODEL COMPUTATION, TIDAL STATICS,
C24 DWD AND 3D SRME MULTI LEAST SQUARE ADAPTIVE SUBTRACTION,
C25 RESIDUAL DEMULTIPLE, VEL ANALYSIS (VA02) 500MX500M, OFFSET SPLIT,
C26 REGRID TO 2016 2G2J SURVEY (9.375MX12.5M), SURVEY MATCHING, XLINE DENOISE,
C27 INTERPOLATION (MPFI), SPATIALLY RELATIVE AMPLITUDE CORRECTION (SRAC), TVF,
C28 VORONOI NORMALIZATION, FWI (UP TO ~16HZ PEAK), TOMOGRAPHY UPDATE,
C29 OUTPUT INTERVAL VELOCITY WITH SMOOTH FOR DOMAIN CONVERSION (DEPTH DOMAIN)
C30 OUTPUT SEGY
C31
C32
C33
C34
C35
C36 #################   TRACE HEADER DEFINITION, BYTE LOCATION   #################
C37 CDP: BYTE 21-24 , COORD SCALAR: BYTE 71-72
C38 CDP-X (x100): BYTE 181-184, CDP-Y (x100): BYTE 185-188
C39 SUBLINE: BYTE 189-192, XLINE: BYTE 193-196, WB DEPTH (x100): 197-200
C40 END OF EBCDIC
```

ATTACHMENT 1(n)

PETRONAS Standard Seismic SEG-Y EBCDIC Header for Eta Field

SAMPLE OF SEG-Y EBCDIC HEADER FOR ETA FIELD

```
 *************************************************************
 S E G Y   EBCDIC IDENTIFICATION HEADER - LINE: [Y  : 2G2J   ]
 *************************************************************

C01 CLIENT  : PETRONAS CARIGALI SDN BHD
C02 SURVEY  : 2G2J 2019 REPROCESSING,  AREA : OFFSHORE SABAH,  DATE : JAN 2020
C03 SUBLINE : 6999 - 10837,       XLINE : 10025 - 14452
C04 MEDIA    : 3592JC4TB    TAPE ID/NUM: DC5001/01 OF 01   COPY: 01 OF 02
C05 DATA: APSTM  EFFECTIVE ETA FIELD VELOCITY, TIME DOMAIN
C06 POLARITY  : ZERO PHASE DATA: ACOUSTIC IMPEDANCE INCREASE CORRESPONDS TO
C07 ZERO-PHASE-WAVELET-PEAK AND WRITTEN AS A POSITIVE NUMBER ON TAPE
C08 ######  ACQUISITION YEAR: 1995-2003 ####### ACQUIRED BY WGC, WG, PGS  ######
C09 BIN CENTER INTERVAL (SL x XL) = 9.375mX12.5m   INCREMENT(SL:XL) = 1:1
C10 CORNERS   :  1138 ,  9029 :  CDP-X : 283609.3419, CDP-Y : 625776.3701
C11           :  1138 , 15923 :  CDP-X : 214853.0539, CDP-Y : 677725.4171
C12           : 13576 ,  9029 :  CDP-X : 353903.3200, CDP-Y : 718812.7833
C13           : 13576 , 15923 :  CDP-X : 285147.0320, CDP-Y : 770761.8303
C14 SUBLINE ANGLE    : 307.073DEG              XLINE ANGLE : 37.073DEG
C15 SAMPLE RATE(MS)  : 2                  RECORD LENGTH(MS) : 8192
C16 GPS DATUM : WGS 84      PROJECTION : UTM 50N    CENTRAL MERIDIAN : 117E
C17 COORDINATE UNITS : METERS
C18 ##  PROCESSING DATE : NOV 2018 - JULY 2019 ## PROCESSED BY WESTERNGECO KL ##
C19 SEGD DECODE, NAVMERGE, BAD TRACE EDIT, LOW CUT FILTER 2.0 HZ, DEBUBBLE,
C20 DIRECT ARRIVAL NOISE ATTENUATION, NOISE ATTENUATION,
C21 SHOT CHANNEL SCALING, RECEIVER MOTION CORRECTION, ZERO PHASING,
C22 ADAPTIVE DEGHOSTING, DETERMINISTIC WATER LAYER DEMULTIPLE (DWD) COMPUTATION,
C23 3D SRME MODEL COMPUTATION, TIDAL STATICS,
C24 DWD AND 3D SRME MULTI LEAST SQUARE ADAPTIVE SUBTRACTION,
C25 RESIDUAL DEMULTIPLE, VEL ANALYSIS (VA02) EFFECTIVE ETA 500MX500M
C26 SCALED EFFECTIVE ETA (x1000), OUTPUT TO SEGY
C27
C28
C29
C30
C31
C32
C33
C34
C35
C36 #################   TRACE HEADER DEFINITION, BYTE LOCATION   #################
C37 CDP: BYTE 21-24 , COORD SCALAR: BYTE 71-72
C38 CDP-X (x100): BYTE 181-184, CDP-Y (x100): BYTE 185-188
C39 SUBLINE: BYTE 189-192, XLINE: BYTE 193-196, WB TIME (x100): 197-200
C40 END OF EBCDIC
```

ATTACHMENT 1(o)

PETRONAS Standard Seismic SEG-Y EBCDIC Header for Delta Field

SAMPLE OF SEG-Y EBCDIC HEADER FOR PSDM DELTA FIELD DEPTH DOMAIN

```
 ************************************************************
 S E G Y   EBCDIC IDENTIFICATION HEADER - LINE: [Y  : 2G2J   ]
 ************************************************************

C01 CLIENT  : PETRONAS CARIGALI SDN BHD
C02 SURVEY  : 2G2J 2019 REPROCESSING,  AREA : OFFSHORE SABAH,  DATE : JAN 2020
C03 SUBLINE : 6999-10837,      XLINE : 10025-14452
C04 MEDIA    : 3592JC4TB    TAPE ID/NUM: DC9002/01 OF 01   COPY: 01 OF 02
C05DATA:2019 REPRO QKDM MIGRATION DELTA FIELD, DEPTH DOMAIN
C06 POLARITY  : ZERO PHASE DATA: ACOUSTIC IMPEDANCE INCREASE CORRESPONDS TO
C07 ZERO-PHASE-WAVELET-PEAK AND WRITTEN AS A POSITIVE NUMBER ON TAPE
C08 ######  ACQUISITION YEAR: 1995-2003 ####### ACQUIRED BY WGC, WG, PGS  ######
C09 BIN CENTER INTERVAL (SL x XL) = 9.375mX12.5m   INCREMENT(SL:XL) = 1:1
C10 CORNERS   :  1138 ,  9029 :  CDP-X : 283609.3419, CDP-Y : 625776.3701
C11           :  1138 , 15923 :  CDP-X : 214853.0539, CDP-Y : 677725.4171
C12           : 13576 ,  9029 :  CDP-X : 353903.3200, CDP-Y : 718812.7833
C13           : 13576 , 15923 :  CDP-X : 285147.0320, CDP-Y : 770761.8303
C14 SUBLINE ANGLE    : 307.073DEG              XLINE ANGLE : 37.073DEG
C15 SAMPLE RATE  : 3M                  RECORD LENGTH : 9999M
C16 GPS DATUM : WGS 84      PROJECTION : UTM 50N    CENTRAL MERIDIAN : 117E
C17 COORDINATE UNITS : METERS
C18 ##  PROCESSING DATE : NOV 2018 - OCT 2019 ## PROCESSED BY WESTERNGECO KL ##
C19 SEGD DECODE, NAVMERGE, BAD TRACE EDIT, LOW CUT FILTER 2.0 HZ, DEBUBBLE,
C20 DIRECT ARRIVAL NOISE ATTENUATION, NOISE ATTENUATION,
C21 SHOT CHANNEL SCALING, RECEIVER MOTION CORRECTION, ZERO PHASING,
C22 ADAPTIVE DEGHOSTING, DETERMINISTIC WATER LAYER DEMULTIPLE (DWD) COMPUTATION,
C23 3D SRME MODEL COMPUTATION, TIDAL STATICS,
C24 DWD AND 3D SRME MULTI LEAST SQUARE ADAPTIVE SUBTRACTION,
C25 RESIDUAL DEMULTIPLE, VEL ANALYSIS (VA02) 500MX500M, OFFSET SPLIT,
C26 REGRID TO 2016 2G2J SURVEY (9.375MX12.5M), SURVEY MATCHING, XLINE DENOISE,
C27 INTERPOLATION (MPFI), SPATIALLY RELATIVE AMPLITUDE CORRECTION (SRAC), TVF,
C28 VORONOI NORMALIZATION, FWI (UP TO ~16HZ PEAK), TOMOGRAPHY UPDATE,
C29 OUTPUT MIGRATION DELTA FIELD IN DEPTH
C30 OUTPUT SEGY
C31
C32
C33
C34
C35
C36 #################   TRACE HEADER DEFINITION, BYTE LOCATION   #################
C37 CDP: BYTE 21-24 , COORD SCALAR: BYTE 71-72
C38 CDP-X (x100): BYTE 181-184, CDP-Y (x100): BYTE 185-188
C39 SUBLINE: BYTE 189-192, XLINE: BYTE 193-196, WB DEPTH (x100): 197-200
C40 END OF EBCDIC
```

ATTACHMENT 1(p)

PETRONAS Standard Seismic SEG-Y EBCDIC Header for Epsilon Field

SAMPLE OF SEG-Y EBCDIC HEADER FOR PSDM EPSILON FIELD DEPTH DOMAIN

```
 ************************************************************
 S E G Y   EBCDIC IDENTIFICATION HEADER - LINE: [Y  : 2G2J   ]
 ************************************************************

C01 CLIENT  : PETRONAS CARIGALI SDN BHD
C02 SURVEY  : 2G2J 2019 REPROCESSING,  AREA : OFFSHORE SABAH,  DATE : JAN 2020
C03 SUBLINE : 6999-10837,      XLINE : 10025-14452
C04 MEDIA    : 3592JC4TB    TAPE ID/NUM: DC9002/01 OF 01   COPY: 01 OF 02
C05DATA:2019 REPRO QKDM MIGRATION EPSILON FIELD, DEPTH DOMAIN
C06 POLARITY  : ZERO PHASE DATA: ACOUSTIC IMPEDANCE INCREASE CORRESPONDS TO
C07 ZERO-PHASE-WAVELET-PEAK AND WRITTEN AS A POSITIVE NUMBER ON TAPE
C08 ######  ACQUISITION YEAR: 1995-2003 ####### ACQUIRED BY WGC, WG, PGS  ######
C09 BIN CENTER INTERVAL (SL x XL) = 9.375mX12.5m   INCREMENT(SL:XL) = 1:1
C10 CORNERS    :  1138 ,  9029 :  CDP-X : 283609.3419, CDP-Y : 625776.3701
C11            :  1138 , 15923 :  CDP-X : 214853.0539, CDP-Y : 677725.4171
C12            : 13576 ,  9029 :  CDP-X : 353903.3200, CDP-Y : 718812.7833
C13            : 13576 , 15923 :  CDP-X : 285147.0320, CDP-Y : 770761.8303
C14 SUBLINE ANGLE    : 307.073DEG              XLINE ANGLE : 37.073DEG
C15 SAMPLE RATE  : 3M                  RECORD LENGTH : 9999M
C16 GPS DATUM : WGS 84      PROJECTION : UTM 50N    CENTRAL MERIDIAN : 117E
C17 COORDINATE UNITS : METERS
C18 ##  PROCESSING DATE : NOV 2018 - OCT 2019 ## PROCESSED BY WESTERNGECO KL ##
C19 SEGD DECODE, NAVMERGE, BAD TRACE EDIT, LOW CUT FILTER 2.0 HZ, DEBUBBLE,
C20 DIRECT ARRIVAL NOISE ATTENUATION, NOISE ATTENUATION,
C21 SHOT CHANNEL SCALING, RECEIVER MOTION CORRECTION, ZERO PHASING,
C22 ADAPTIVE DEGHOSTING, DETERMINISTIC WATER LAYER DEMULTIPLE (DWD) COMPUTATION,
C23 3D SRME MODEL COMPUTATION, TIDAL STATICS,
C24 DWD AND 3D SRME MULTI LEAST SQUARE ADAPTIVE SUBTRACTION,
C25 RESIDUAL DEMULTIPLE, VEL ANALYSIS (VA02) 500MX500M, OFFSET SPLIT,
C26 REGRID TO 2016 2G2J SURVEY (9.375MX12.5M), SURVEY MATCHING, XLINE DENOISE,
C27 INTERPOLATION (MPFI), SPATIALLY RELATIVE AMPLITUDE CORRECTION (SRAC), TVF,
C28 VORONOI NORMALIZATION, FWI (UP TO ~16HZ PEAK), TOMOGRAPHY UPDATE,
C29 OUTPUT MIGRATION EPSILON FIELD IN DEPTH
C30 OUTPUT SEGY
C31
C32
C33
C34
C35
C36 #################   TRACE HEADER DEFINITION, BYTE LOCATION   #################
C37 CDP: BYTE 21-24 , COORD SCALAR: BYTE 71-72
C38 CDP-X (x100): BYTE 181-184, CDP-Y (x100): BYTE 185-188
C39 SUBLINE: BYTE 189-192, XLINE: BYTE 193-196, WB DEPTH (x100): 197-200
C40 END OF EBCDIC
```

ATTACHMENT 1(q)

PETRONAS Standard Seismic SEG-Y EBCDIC Header for Dip Field

SAMPLE OF SEG-Y EBCDIC HEADER FOR PSDM DIP FIELD DEPTH DOMAIN

```
 ************************************************************
 S E G Y   EBCDIC IDENTIFICATION HEADER - LINE: [Y  : 2G2J   ]
 ************************************************************

C01 CLIENT  : PETRONAS CARIGALI SDN BHD
C02 SURVEY  : 2G2J 2019 REPROCESSING,  AREA : OFFSHORE SABAH,  DATE : JAN 2020
C03 SUBLINE : 6999-10837,      XLINE : 10025-14452
C04 MEDIA    : 3592JC4TB    TAPE ID/NUM: DC9002/01 OF 01   COPY: 01 OF 02
C05DATA:2019 REPRO QKDM MIGRATION DIP FIELD, DEPTH DOMAIN
C06 POLARITY  : ZERO PHASE DATA: ACOUSTIC IMPEDANCE INCREASE CORRESPONDS TO
C07 ZERO-PHASE-WAVELET-PEAK AND WRITTEN AS A POSITIVE NUMBER ON TAPE
C08 ######  ACQUISITION YEAR: 1995-2003 ####### ACQUIRED BY WGC, WG, PGS  ######
C09 BIN CENTER INTERVAL (SL x XL) = 9.375mX12.5m   INCREMENT(SL:XL) = 1:1
C10 CORNERS    :  1138 ,  9029 :  CDP-X : 283609.3419, CDP-Y : 625776.3701
C11            :  1138 , 15923 :  CDP-X : 214853.0539, CDP-Y : 677725.4171
C12            : 13576 ,  9029 :  CDP-X : 353903.3200, CDP-Y : 718812.7833
C13            : 13576 , 15923 :  CDP-X : 285147.0320, CDP-Y : 770761.8303
C14 SUBLINE ANGLE    : 307.073DEG              XLINE ANGLE : 37.073DEG
C15 SAMPLE RATE  : 3M                  RECORD LENGTH : 9999M
C16 GPS DATUM : WGS 84      PROJECTION : UTM 50N    CENTRAL MERIDIAN : 117E
C17 COORDINATE UNITS : METERS
C18 ##  PROCESSING DATE : NOV 2018 - OCT 2019 ## PROCESSED BY WESTERNGECO KL ##
C19 SEGD DECODE, NAVMERGE, BAD TRACE EDIT, LOW CUT FILTER 2.0 HZ, DEBUBBLE,
C20 DIRECT ARRIVAL NOISE ATTENUATION, NOISE ATTENUATION,
C21 SHOT CHANNEL SCALING, RECEIVER MOTION CORRECTION, ZERO PHASING,
C22 ADAPTIVE DEGHOSTING, DETERMINISTIC WATER LAYER DEMULTIPLE (DWD) COMPUTATION,
C23 3D SRME MODEL COMPUTATION, TIDAL STATICS,
C24 DWD AND 3D SRME MULTI LEAST SQUARE ADAPTIVE SUBTRACTION,
C25 RESIDUAL DEMULTIPLE, VEL ANALYSIS (VA02) 500MX500M, OFFSET SPLIT,
C26 REGRID TO 2016 2G2J SURVEY (9.375MX12.5M), SURVEY MATCHING, XLINE DENOISE,
C27 INTERPOLATION (MPFI), SPATIALLY RELATIVE AMPLITUDE CORRECTION (SRAC), TVF,
C28 VORONOI NORMALIZATION, FWI (UP TO ~16HZ PEAK), TOMOGRAPHY UPDATE,
C29 OUTPUT MIGRATION DIP FIELD IN DEPTH
C30 OUTPUT SEGY
C31
C32
C33
C34
C35
C36 #################   TRACE HEADER DEFINITION, BYTE LOCATION   #################
C37 CDP: BYTE 21-24 , COORD SCALAR: BYTE 71-72
C38 CDP-X (x100): BYTE 181-184, CDP-Y (x100): BYTE 185-188
C39 SUBLINE: BYTE 189-192, XLINE: BYTE 193-196, WB DEPTH (x100): 197-200
C40 END OF EBCDIC
```

ATTACHMENT 1(r)

PETRONAS Standard Seismic SEG-Y EBCDIC Header for Azimuth Field

SAMPLE OF SEG-Y EBCDIC HEADER FOR PSDM AZIMUTH FIELD DEPTH DOMAIN

```
 ************************************************************
 S E G Y   EBCDIC IDENTIFICATION HEADER - LINE: [Y  : 2G2J   ]
 ************************************************************

C01 CLIENT  : PETRONAS CARIGALI SDN BHD
C02 SURVEY  : 2G2J 2019 REPROCESSING,  AREA : OFFSHORE SABAH,  DATE : JAN 2020
C03 SUBLINE : 6999-10837,      XLINE : 10025-14452
C04 MEDIA    : 3592JC4TB    TAPE ID/NUM: DC9002/01 OF 01   COPY: 01 OF 02
C05DATA:2019 REPRO QKDM MIGRATION AZIMUTH FIELD, DEPTH DOMAIN
C06 POLARITY  : ZERO PHASE DATA: ACOUSTIC IMPEDANCE INCREASE CORRESPONDS TO
C07 ZERO-PHASE-WAVELET-PEAK AND WRITTEN AS A POSITIVE NUMBER ON TAPE
C08 ######  ACQUISITION YEAR: 1995-2003 ####### ACQUIRED BY WGC, WG, PGS  ######
C09 BIN CENTER INTERVAL (SL x XL) = 9.375mX12.5m   INCREMENT(SL:XL) = 1:1
C10 CORNERS   :  1138 ,  9029 :  CDP-X : 283609.3419, CDP-Y : 625776.3701
C11           :  1138 , 15923 :  CDP-X : 214853.0539, CDP-Y : 677725.4171
C12           : 13576 ,  9029 :  CDP-X : 353903.3200, CDP-Y : 718812.7833
C13           : 13576 , 15923 :  CDP-X : 285147.0320, CDP-Y : 770761.8303
C14 SUBLINE ANGLE    : 307.073DEG              XLINE ANGLE : 37.073DEG
C15 SAMPLE RATE  : 3M                  RECORD LENGTH : 9999M
C16 GPS DATUM : WGS 84      PROJECTION : UTM 50N    CENTRAL MERIDIAN : 117E
C17 COORDINATE UNITS : METERS
C18 ##  PROCESSING DATE : NOV 2018 - OCT 2019 ## PROCESSED BY WESTERNGECO KL ##
C19 SEGD DECODE, NAVMERGE, BAD TRACE EDIT, LOW CUT FILTER 2.0 HZ, DEBUBBLE,
C20 DIRECT ARRIVAL NOISE ATTENUATION, NOISE ATTENUATION,
C21 SHOT CHANNEL SCALING, RECEIVER MOTION CORRECTION, ZERO PHASING,
C22 ADAPTIVE DEGHOSTING, DETERMINISTIC WATER LAYER DEMULTIPLE (DWD) COMPUTATION,
C23 3D SRME MODEL COMPUTATION, TIDAL STATICS,
C24 DWD AND 3D SRME MULTI LEAST SQUARE ADAPTIVE SUBTRACTION,
C25 RESIDUAL DEMULTIPLE, VEL ANALYSIS (VA02) 500MX500M, OFFSET SPLIT,
C26 REGRID TO 2016 2G2J SURVEY (9.375MX12.5M), SURVEY MATCHING, XLINE DENOISE,
C27 INTERPOLATION (MPFI), SPATIALLY RELATIVE AMPLITUDE CORRECTION (SRAC), TVF,
C28 VORONOI NORMALIZATION, FWI (UP TO ~16HZ PEAK), TOMOGRAPHY UPDATE,
C29 OUTPUT MIGRATION AZIMUTH FIELD IN DEPTH
C30 OUTPUT SEGY
C31
C32
C33
C34
C35
C36 ##################   TRACE HEADER DEFINITION, BYTE LOCATION   ##################
C37 CDP: BYTE 21-24 , COORD SCALAR: BYTE 71-72
C38 CDP-X (x100): BYTE 181-184, CDP-Y (x100): BYTE 185-188
C39 SUBLINE: BYTE 189-192, XLINE: BYTE 193-196, WB DEPTH (x100): 197-200
C40 END OF EBCDIC
```

ATTACHMENT 1(s)

PETRONAS Standard Seismic SEG-Y EBCDIC Header for Q-Model

SAMPLE OF SEG-Y EBCDIC HEADER FOR PSDM Q-MODEL DEPTH DOMAIN

```
 ************************************************************
 S E G Y   EBCDIC IDENTIFICATION HEADER - LINE: [Y  : 2G2J   ]
 ************************************************************

C01 CLIENT  : PETRONAS CARIGALI SDN BHD
C02 SURVEY  : 2G2J 2019 REPROCESSING,  AREA : OFFSHORE SABAH,  DATE : JAN 2020
C03 SUBLINE : 6999-10837,      XLINE : 10025-14452
C04 MEDIA    : 3592JC4TB    TAPE ID/NUM: DC9002/01 OF 01   COPY: 01 OF 02
C05DATA:2019 REPRO QKDM MIGRATION QMODEL FIELD, DEPTH DOMAIN
C06 POLARITY  : ZERO PHASE DATA: ACOUSTIC IMPEDANCE INCREASE CORRESPONDS TO
C07 ZERO-PHASE-WAVELET-PEAK AND WRITTEN AS A POSITIVE NUMBER ON TAPE
C08 ######  ACQUISITION YEAR: 1995-2003 ####### ACQUIRED BY WGC, WG, PGS  ######
C09 BIN CENTER INTERVAL (SL x XL) = 9.375mX12.5m   INCREMENT(SL:XL) = 1:1
C10 CORNERS   :  1138 ,  9029 :  CDP-X : 283609.3419, CDP-Y : 625776.3701
C11           :  1138 , 15923 :  CDP-X : 214853.0539, CDP-Y : 677725.4171
C12           : 13576 ,  9029 :  CDP-X : 353903.3200, CDP-Y : 718812.7833
C13           : 13576 , 15923 :  CDP-X : 285147.0320, CDP-Y : 770761.8303
C14 SUBLINE ANGLE    : 307.073DEG              XLINE ANGLE : 37.073DEG
C15 SAMPLE RATE  : 3M                  RECORD LENGTH : 9999M
C16 GPS DATUM : WGS 84      PROJECTION : UTM 50N    CENTRAL MERIDIAN : 117E
C17 COORDINATE UNITS : METERS
C18 ##  PROCESSING DATE : NOV 2018 - OCT 2019 ## PROCESSED BY WESTERNGECO KL ##
C19 SEGD DECODE, NAVMERGE, BAD TRACE EDIT, LOW CUT FILTER 2.0 HZ, DEBUBBLE,
C20 DIRECT ARRIVAL NOISE ATTENUATION, NOISE ATTENUATION,
C21 SHOT CHANNEL SCALING, RECEIVER MOTION CORRECTION, ZERO PHASING,
C22 ADAPTIVE DEGHOSTING, DETERMINISTIC WATER LAYER DEMULTIPLE (DWD) COMPUTATION,
C23 3D SRME MODEL COMPUTATION, TIDAL STATICS,
C24 DWD AND 3D SRME MULTI LEAST SQUARE ADAPTIVE SUBTRACTION,
C25 RESIDUAL DEMULTIPLE, VEL ANALYSIS (VA02) 500MX500M, OFFSET SPLIT,
C26 REGRID TO 2016 2G2J SURVEY (9.375MX12.5M), SURVEY MATCHING, XLINE DENOISE,
C27 INTERPOLATION (MPFI), SPATIALLY RELATIVE AMPLITUDE CORRECTION (SRAC), TVF,
C28 VORONOI NORMALIZATION, FWI (UP TO ~16HZ PEAK), TOMOGRAPHY UPDATE,
C29 OUTPUT MIGRATION Q-MODEL FIELD IN DEPTH
C30 OUTPUT SEGY
C31
C32
C33
C34
C35
C36 ##################   TRACE HEADER DEFINITION, BYTE LOCATION   ##################
C37 CDP: BYTE 21-24 , COORD SCALAR: BYTE 71-72
C38 CDP-X (x100): BYTE 181-184, CDP-Y (x100): BYTE 185-188
C39 SUBLINE: BYTE 189-192, XLINE: BYTE 193-196, WB DEPTH (x100): 197-200
C40 END OF EBCDIC
```

ATTACHMENT 1(t)

PETRONAS Standard Seismic SEG-Y EBCDIC Header for Far Field Signature

SAMPLE OF SEG-Y EBCDIC HEADER FOR FAR FIELD SIGNATURE

C01 CLIENT : PETRONAS CARIGALI SDN. BHD.

CO2 PROCESSED YEAR : 2020 AREA PENINSULAR MALAYSIA

CO3 LINE

C04 PROJECT : BLOCK PM-3 CAA

CO5 DATASET : PM3 FAR FIELD SIGNATURE (DERIVED FROM NFH)

C06 POLARITY : MINIMUM PHASE DATA : ACOUSTIC IMPEDANCE DECREASE;

C07 NEGATIVE NUMBER ON TAPE AND DISPLAYED AS TROUGH

C08 ACQUISITION INFORMATION: PM3 STREAMER

C09 DATE : JAN-APRIL 2020

C10 ACQUIRED BY : SHEARWATER

C11 SHOT INTERVAL : 12.5M GRP INTERVAL : 12.5M

C12 CABLE LENGTH : 6000M GRPS PER CABLE : 480

C13 MIN OFFSET : 103M MAX OFFSET : 6109M

C14 GUN DEPTH : 7M CABLE DEPTH : 15M

C15 SOURCE PRESSURE : 2000PSI SRC VOLUME : 3390CU"

C16 SAMPLE RATE : 2MS MAX TIME : 7166MS

C17 DATUM : WGS84 PROJECTION : UTM ZONE 48N

C18 COORDINATE UNITS: METERS

C19 BIN CENTRE INTERVAL (ILXCL)= 12.5MX12.5M INCREMENT (IL:XL)=1:1

C20 CORNERS : SL 1, XL O CDP-X=368969.711 CDP-Y=825541.692

C21 : SL 1, XL 8800 CDP-X=459076.600 CDP-Y=762448.183

C22 : SL 2901, XL 0 CDP-X=348177.535 CDP-Y=795847.374

C23 : SL 2901, XL 8800 CDP-X=438284.421 CDP-Y=732753.871

C24 PROCESSED DATE: JUNE-FEB 2021 == PROCESSED BY : DOWNUNDER GEOSOLUTIONS

C25 NAVIGATION MERGED; REFORMAT TO DUG FORMAT; RESAMPLED TO 2MS;

C26 FAR FIELD SIGNATURE (WITHOUT GHOST); STACKING; OUTPUT REFERENCE WAVELET;

C27 OUTPUT SEG-Y

C28

C29

C30

C32

C33

C34

C35

C36 *** TRACE HEADER DEFINITION, BYTE LOCATION:

C37 SUBLINE BYTE 189-192(INT4) XLINE BYTE 193-196 (INT4)

C38 CDP-X BYTE 181-184(INT) CDP-Y BYTE 185-188 (INT4)

C39 CDP BYTE 021-024(INT4) NS BYTE 115-116 (INT2)

C40 DT BYTE 117-118 (INT2)

ATTACHMENT 1(u)

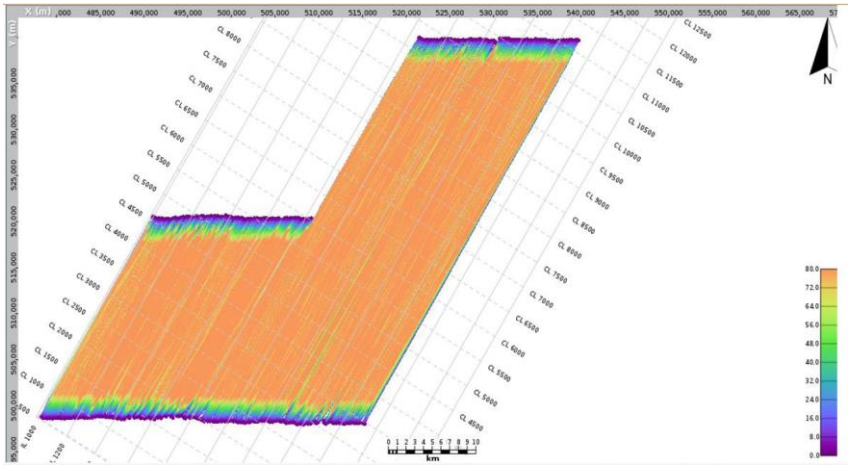
PETRONAS Standard Data Seismic Data Loading Form - Data loading form need to be attached for ALL processed seismic SEG-Y deliverables (via FTP, USB, tapes etc.) to aid in smooth data loading process.

Example on Data Loading Form for FILTERED SCALED PSTM FULL STACK

Record Length	5500 ms
Sample Interval	2 ms
Inline Increment	1
Crossline Increment	1
Inline Range	xxxxx-xxxxx
Crossline Range	xxxx-xxxx
Bin grid size	12.5 m x 12.5 m increment
Datum	WGS84
Projection	UTM 50N
Format	SEG-Y 32-BIT

4-CORNER POINTS GRID

Corners	X	Y	Crossline	Inline
1	xxxxxx.xx	xxxxxx.xx	xxxx	xxxx
2	xxxxxx.xx	xxxxxx.xx	xxxx	xxxx
3	xxxxxx.xx	xxxxxx.xx	xxxx	xxxx
4	xxxxxx.xx	xxxxxx.xx	xxxx	xxxx



Open

Note: Picture is for reference only. Mandatory to include a map of time/depth slice or fold map within the 4-corner points to show data coverage, including the extent of data, i.e: extent of inline and crossline, X and Y coordinate range.

Trace Header Byte Location

Subline : Byte 189 – 192 (INT) two complement

Crossline : Byte 193 – 196 (INT) two complement

X : Byte 181 – 184 (INT) two complement

Y : Byte 185 – 188 (INT) two complement

CDP : Byte 021 – 024 (INT) two complement

ATTACHMENT 1(v)

PETRONAS Standard Data Type Naming Convention

STANDARD NAMING FOR SEISMIC DATA TYPE FOR SEG-Y HEADER & TAPE LABELLING

NAVIGATION

RAW NAVIGATION IOGP P2/11

FINAL/PROCESS NAVIGATION IOGP P1/11

BIN CENTER COORDINATE IOGP P6/11

Please consult MPM for any deviation/exception to the format mentioned above.

PRE-STACK

FIELD RAW SHOT

NAV-MERGED SHOT GATHERS

PRE-MIGRATION SHOT GATHERS

PRE-STACK TIME MIGRATION CIP GATHERS

PRE-STACK DEPTH MIGRATION CIP GATHERS

VELOCITY

TIME PROCESSING	1.1.1.1.1.1.1.1 DEPTH PROCESSING
1. MIGRATION VELOCITY: - RMS - INTERVAL - AVERAGE 2. STACKING OR HDVA VELOCITY - RMS - INTERVAL - AVERAGE 3. DOMAIN CONVERSION VELOCITY - RMS - INTERVAL - AVERAGE 4. ANISOTROPIC PARAMETERS - ETA ETC. 5. OTHERS - SHOT & RECEIVER STATICS, TIDAL STATICS, - NEAR SURFACE VELOCITY MODEL	1. MIGRATION VELOCITY: - RMS - INTERVAL - AVERAGE 2. STACKING OR HDVA VELOCITY - RMS - INTERVAL - AVERAGE 3. DOMAIN CONVERSION VELOCITY - RMS - INTERVAL - AVERAGE 4. ANISOTROPIC PARAMETERS - DELTA, EPSILON, DIP, AZIMUTH, ORTHORHOMBIC ANISOTROPY, ETC. 5. OTHERS - FWI VELOCITY - Q-MODEL - GAMMA (Vp/Vs)

POST-STACK (TIME & DEPTH)

TIME PROCESSING	DEPTH PROCESSING
UNFILTERED UNSCALED STACK FILTERED SCALED STACK UNFILTERED UNSCALED ANGLE STACKS IF APPLICABLE: ACOUSTIC IMPEDANCE ANGLE STACKS AVO ENVELOPE AVO FLUID FACTOR AVO GRADIENT (G) AVO INTERCEPT (P) AVO INTERCEPT X GRADIENT (P*G)	UNFILTERED UNSCALED STACK IN TIME AND DEPTH FILTERED SCALED STACK IN TIME AND DEPTH UNFILTERED UNSCALED ANGLE STACKS IN TIME AND DEPTH IF APPLICABLE: ACOUSTIC IMPEDANCE ANGLE STACKS AVO DEPTH ENVELOPE AVO DEPTH FLUID FACTOR AVO DEPTH GRADIENT (G) AVO DEPTH INTERCEPT (P)

AVO LAMBDA	AVO DEPTH INTERCEPT X GRADIENT (P*G)
AVO MU	AVO DEPTH LAMBDA
AVO SINE OF INTERCEPT X GRADIENT	AVO DEPTH MU
	AVO DEPTH SINE OF INTERCEPT X GRADIENT

INVERSION & PORE PRESSURE

INVERSION	PORE PRESSURE
COAL PROBABILITY	FRACTURE GRADIENT
ACOUSTIC IMPEDANCE INVERTED	HORIZONTAL PRESSURE
POISSON RATIO	OVERBURDEN GRADIENT
RHOB INVERTED	OVER PRESSURE
SAND PROBABILITY	PORE PRESSURE
SHALE PROBABILITY	RETENTION CAPABILITY
VP/VS RATIO	

ATTACHMENT 1(w)

PETRONAS Standard Convention on Processed SEG-Y SEISMIC POLARITY

PETRONAS Convention on Seismic Polarity
POLARITY: ACOUSTIC IMPEDANCE INCREASE CORRESPONDS TO ZERO-PHASE-WAVELET-PEAK AND WRITTEN AS A POSITIVE NUMBER ON TAPE Note: ALL seismic deliverables shall follow this convention and this information is to be stated in all SEG-Y EBCDIC headers, with exception of navigation-merged data and far (or near) field signatures.

ATTACHMENT 1(x)

PETRONAS Standard SEG-Y TRACE HEADER SCALAR

THE XY COORDINATE SCALAR STANDARD

(SEG-Y TRACE HEADER BYTE 71-72)

1.1.1.1.1.1.1.1.1 XY SCALAR	IMPLICATION	EXAMPLE
1	X or Y coordinate multiply 1	234544 x1 = 234544
100	X or Y coordinate multiply by 100	2345 x 100 = 234500
-100	X or Y coordinate divide by 100	23454480 ÷ 100 = 234544.80

ATTACHMENT 1(y)

PETRONAS Standard SEG-Y Trace Header for POST-STACK DATASET

STANDARD SEG-Y TRACE HEADER BYTE LOCATION FOR 2D AND 3D POST-STACK DATA

2D SURVEY

PARAMETER	BYTE LOCATION	FORMAT	REMARKS
SP	17-20	INTEGER	MANDATORY
CDP	21-24	INTEGER	MANDATORY
CDP-X	181-184	INTEGER	MANDATORY
CDP-Y	185-188	INTEGER	MANDATORY
XY SCALAR	71-72	INTEGER	MANDATORY

3D SURVEY

PARAMETER	BYTE LOCATION	REMARKS	REMARKS
INLINE	9-12	INTEGER	OPTIONAL
XLINE	21-24	INTEGER	OPTIONAL
INLINE/XLINE	25-28	INTEGER	OPTIONAL
XY SCALAR	71-72	INTEGER	MANDATORY
XCORD SOURCE	73-76	INTEGER	OPTIONAL
YCORD SOURCE	77-80	INTEGER	OPTIONAL
CDP-X	181-184	INTEGER	MANDATORY
CDP-Y	185-188	INTEGER	MANDATORY
INLINE	189-192	INTEGER	MANDATORY
XLINE	193-196	INTEGER	MANDATORY

ATTACHMENT 1(z)

PETRONAS 240-BYTE STANDARD SEG-Y TRACE HEADER FOR PRE-STACK DATASET

This is based on SEG-Y revision 2.0 released in January 2017.

Note: Where not otherwise indicated, a value of zero indicates an unknown or unspecified value.

240-byte SEG-Y Standard Trace Header					
FIRST BYTE	LAST BYTE	FORMAT	DESCRIPTION	CATEGORY	OPTIONAL - REASSIGNED (RECOMMENDED)
1	4	4I	Trace sequence number within line — Numbers continue to increase if the same line continues across multiple SEG-Y files.	MANDATORY	
5	8	4I	Trace sequence number within SEG-Y file — Each file starts with trace sequence one.	MANDATORY	
9	12	4I	Original field record number.	MANDATORY	
13	16	4I	Trace number within the original field record. If supplying multi-cable data with identical channel numbers on each cable, either supply the cable ID number in bytes 153–156 of SEG-Y Trace Header Extension 1 or enter (cable-1)*nchan_per_cable +channel_no here.	MANDATORY	
17	20	4I	Energy source point number — Used when more than one record occurs at the same effective surface location. It is recommended that the new entry defined in Trace Header bytes 197–202 be used for shotpoint number.	MANDATORY	
21	24	4I	Ensemble number (i.e. CDP, CMP, CRP, etc.)	MANDATORY	
25	28	4I	Trace number within the ensemble — Each ensemble starts with trace number one.	MANDATORY	
29	30	2I	Trace identification code: −1 = Other 0 = Unknown 1= Time domain seismic data 2 = Dead 3 = Dummy 4 = Time break 5 = Uphole 6 = Sweep 7 = Timing 8 = Waterbreak 9 = Near-field gun signature 10 = Far-field gun signature 11 = Seismic pressure sensor 12 = Multicomponent seismic sensor – Vertical component	MANDATORY	

			13 = Multicomponent seismic sensor – Cross-line component 14 = Multicomponent seismic sensor – In-line component 15 = Rotated multicomponent seismic sensor – Vertical component 16 = Rotated multicomponent seismic sensor – Transverse component 17 = Rotated multicomponent seismic sensor – Radial component 18 = Vibrator reaction mass 19 = Vibrator baseplate 20 = Vibrator estimated ground force 21 = Vibrator reference 22 = Time-velocity pairs 23 = Time-depth pairs 24 = Depth-velocity pairs 25 = Depth domain seismic data 26 = Gravity potential 27 = Electric field – Vertical component 28 = Electric field – Cross-line component 29 = Electric field – In-line component 30 = Rotated electric field – Vertical component 31 = Rotated electric field – Transverse component 32 = Rotated electric field – Radial component 33 = Magnetic field – Vertical component 34 = Magnetic field – Cross-line component 35 = Magnetic field – In-line component 36 = Rotated magnetic field – Vertical component 37 = Rotated magnetic field – Transverse component 38 = Rotated magnetic field – Radial component 39 = Rotational sensor – Pitch 40 = Rotational sensor – Roll 41 = Rotational sensor – Yaw 42 ... 255 = Reserved 256 ... N = optional use, (maximum N = 16,383) N+16,384 = Interpolated, i.e. not original, seismic trace.		
31	32	2I	Number of vertically summed traces yielding this trace. (1 is one trace, 2 is two summed traces, etc.)	**MANDATORY**	
33	34	2I	Number of horizontally stacked traces yielding this trace. (1 is one trace, 2 is two stacked traces, etc.)	**MANDATORY**	
35	36	2I	Data use: 1 = Production 2 = Test	**MANDATORY**	
37	40	4I	Distance from center of the source point to the center of the receiver group (negative if opposite to direction in which line is shot).	**MANDATORY**	

41	44	4I	Elevation of receiver group. This is, of course, normally equal to or lower than the surface elevation at the group location.	The scalar in Trace Header bytes 69–70 applies to these values. The units in feet or meters should be clearly specified in EBCDIC header. Elevations and depths and their signs (+ve or –ve) are tied to a vertical CRS Historical usage had been that all elevations above the vertical datum were positive and below were negative. Elevations should now be defined with respect to the CRS.	**MANDATORY**	
45	48	4I	Surface elevation at source location.		**MANDATORY**	
49	52	4I	Source depth below surface[1]		**MANDATORY**	
53	56	4I	Seismic Datum[2] elevation at receiver group. (If different from the survey vertical datum, Seismic Datum should be defined in header		**MANDATORY**	
57	60	4I	Seismic Datum elevation at source. (As above)		**MANDATORY**	
61	64	4I	Water column height at source location (at time of source event).		**MANDATORY**	
65	68	4I	Water column height at receiver group location (at time of recording of first source event into that receiver).		**MANDATORY**	
69	70	2I	Scalar to be applied to all elevations and depths specified in Standard Trace Header bytes 41–68 to give the real value. Scalar = 1, ±10, ±100, ±1000, or ±10,000. If positive, scalar is used as a multiplier; if negative, scalar is used as a divisor. A value of zero is assumed to be a scalar value of 1.		**MANDATORY**	
71	72	2I	Scalar to be applied to all coordinates specified in Standard Trace Header bytes 73–88 and to bytes Trace Header 181–188 to give the real value. Scalar = 1, ±10, ±100, ±1000, or ±10,000. If positive, scalar is used as a multiplier; if negative, scalar is used as divisor. A value of zero is assumed to be a scalar value of 1.		**MANDATORY**	
73	76	4I	Source coordinate – X.	The coordinate reference system should be clearly specified in EBCDIC header. If the coordinate units are in seconds of arc, decimal degrees or DMS, the X values represent	**MANDATORY**	
77	80	4I	Source coordinate – Y.		**MANDATORY**	
81	84	4I	Group coordinate – X.		**MANDATORY**	
85	88	4I	Group coordinate – Y.		**MANDATORY**	

[1] Historically, taken as positive below the surface. We also note that bytes 41–48 of SEG-Y Trace Header Extension 1 provide a method for calculating receiver depth below the surface.
[2] Typically a floating or flat seismic processing datum that has been used in preprocessing the data in this SEG-Y dataset.
.

				longitude and the Y values latitude. A positive value designates east of Greenwich Meridian or north of the equator and a negative value designates south or west.		
89	90	2I	Coordinate units: 1 = Length (meters or feet) 2 = Seconds of arc (deprecated) 3 = Decimal degrees (preferred degree representation) 4 = Degrees, minutes, seconds (DMS)[3] Note: To encode ±DDDMMSS set bytes 73–88 = ±DDD*10^4 + MM*10^2 + SS with bytes 71–72 set to 1; To encode ±DDDMMSS.ss set bytes 73–88 = ±DDD*10^6 + MM*10^4 + SS*10^2 + ss with bytes 71–72 set to –100.		**MANDATORY** The units (meters) need to be clearly specified in EBCDIC header.	
91	92	2I	Weathering velocity. (m/s)		Optional	Source XL Number
93	94	2I	Subweathering velocity. (m/s)		Optional	Source IL Number
95	96	2I	Uphole time at source in milliseconds.	Time in milliseconds as scaled by the scalar specified in Standard Trace Header bytes 215-216.	Optional	Receiver XL Number
97	98	2I	Uphole time at group in milliseconds.		Optional	Receiver IL Number
99	100	2I	Source static correction in milliseconds.		Optional	
101	102	2I	Group static correction in milliseconds.		Optional	
103	104	2I	Total static applied in milliseconds. (Zero if no static has been applied.)		**MANDATORY**	
105	106	2I	Lag time A — Time in milliseconds between end of 240-byte trace identification header and time break. The value is positive if time break occurs after the end of header; negative if time break occurs before the end of header. Time break is defined as the initiation pulse that may be recorded on an auxiliary trace or as otherwise specified by the recording system.		Optional	
107	108	2I	Lag Time B — Time in milliseconds between time break and the initiation time of the energy source. May be positive or negative.		Optional	
109	110	2I	Delay recording time — Time in milliseconds between initiation time of energy source and the time when recording of data samples begins. In		**MANDATORY**	

[3] With two decimal places (±DDMMSS.ss) resolution is approximately ±0.3 meters. If longitudes are in the range ±180 degrees, a third decimal place is available.

			SEG-Y rev 0 this entry was intended for deep-water work if data recording did not start at zero time. The entry can be negative to accommodate negative start times (i.e. data recorded before time zero, presumably as a result of static application to the data trace). If a non-zero value (negative or positive) is recorded in this entry, a comment to that effect should appear in the Textual File Header.			
111	112	2I	Mute time — Start time in milliseconds.		**MANDATORY**	
113	114	2I	Mute time — End time in milliseconds.		**MANDATORY**	
115	116	2I	Number of samples in this trace. The number of bytes in a trace record must be consistent with the number of samples written in the Binary File Header and/or the SEG-defined Trace Header(s). This is important for all recording media; but it is particularly crucial for the correct processing of SEG-Y data in disk files. If the fixed length trace flag in bytes 3503–3504 of the Binary File Header is set, the number of samples in every trace in the SEG-Y file is assumed to be the same as the value recorded in the Binary File Header and this field is ignored. If the fixed length trace flag is not set, the number of samples may vary from trace to trace.		**MANDATORY**	
117	118	2I	Sample interval for this trace. Microseconds (µs) for time data, Hertz (Hz) for frequency data, meters (m) or feet (ft) for depth data. If the fixed length trace flag in bytes 3503–3504 of the Binary File Header is set, the sample interval in every trace in the SEG-Y file is assumed to be the same as the value recorded in the Binary File Header and this field is ignored. If the fixed length trace flag is not set, the sample interval may vary from trace to trace.		**MANDATORY**	
119	120	4I	Gain type of field instruments: 1 = fixed 2 = binary 3 = floating point ... N = optional use		Optional	
121	122	2I	Instrument gain constant (dB).		Optional	Source Depth (MANDATORY for nav-merged and pre-migration gathers)
123	124	2I	Instrument early or initial gain (dB).		Optional	Receiver Depth X10 (MANDATORY for nav-merged and pre-migration gathers)
125	126	2I	Correlated: 1 = no		Optional	Tidal Height X1000

			2 = yes		
127	128	2I	Sweep frequency at start (Hz).	Optional	Tidal Statics X1000
129	130	2I	Sweep frequency at end (Hz).	Optional	2D CMP number
131	132	2I	Sweep length in milliseconds.	Optional	2D line number. SSL (SubSurface line)-Pseudo 2D (MANDATORY for 2D)
133	134	2I	Sweep type: 0 = Linear 1 = parabolic 2 = exponential 3 = other	Optional	Byte 133-136 (4 integer format). For nav-merged gathers, this field could be used for continuous recording shot time delta in microseconds. Time of overlapping (N+1) shot time break in microseconds in reference to the current shot. Gives accurate base for de-blend processing. Zero if there is no overlapping SP.
135	136	2I	Sweep trace taper length at start in milliseconds.	Optional	
137	138	2I	Sweep trace taper length at end in milliseconds.	Optional	Water bottom TWT (ms) at midpoint (MANDATORY for nav-merged and pre-migration gathers)
139	140	2I	Taper type 1 = linear 2 = $\cos^2$ 3 = other	Optional	Source Vessel ID (MANDATORY for multi-vessel operation)
141	142	2I	Alias filter frequency (Hz), if used.	Optional	
143	144	2I	Alias filter slope (dB/octave).	Optional	
145	146	2I	Notch filter frequency (Hz), if used.	Optional	
147	148	2I	Notch filter slope (dB/octave).	Optional	
149	150	2I	Low-cut frequency (Hz), if used.	Optional	
151	152	2I	High-cut frequency (Hz), if used.	Optional	
153	154	2I	Low-cut slope (dB/octave)	Optional	
155	156	2I	High-cut slope (dB/octave)	Optional	
157	158	2I	Year data recorded — The 1975 standard was unclear as to whether this should be recorded as a 2-digit or a 4-digit year and both have been used. For SEG-Y revisions beyond rev 0, the year should be recorded as the complete 4-digit Gregorian calendar year, e.g., the year 2001 should be recorded as 2001_{10} ($07D1_{16}$).	**MANDATORY**	

159	160	2I	Day of year[4] (Range 1–366 for GMT, UTC, and GPS time basis).	**MANDATORY**	
161	162	2I	Hour of day (24 hour clock).	**MANDATORY**	
163	164	2I	Minute of hour.	**MANDATORY**	
165	166	2I	Second of minute.	**MANDATORY**	
167	168	2I	Time basis code. If nonzero, overrides Binary File Header bytes 3511–3512. 1 = Local 2 = GMT (Greenwich Mean Time) 3 = Other, should be defined in EBCDIC Header 4 = UTC (Coordinated Universal Time) 5 = GPS (Global Positioning System Time)	**MANDATORY**	
169	170	2I	Trace weighting factor — Defined as 2^{-N} units (volts unless bytes 203–204 specify a different unit) for the least significant bit. (N = 0, 1, ..., 32767)	Optional	First break mute (MANDATORY if applied during migration)
171	172	2I	Geophone group number of roll switch position one.	Optional	Source Vessel ID (MANDATORY for multi-vessel operation)
173	174	2I	Geophone group number of trace number one within original field record.	Optional	
175	176	2I	Geophone group number of last trace within original field record.	Optional	
177	178	2I	Gap size (total number of groups dropped).	Optional	
179	180	2I	Over travel associated with taper at beginning or end of line: 1 = down (or behind) 2 = up (or ahead)	Optional	
181	184	4I	X coordinate of ensemble (CDP) position of this trace (scalar in Standard Trace Header bytes 71–72 applies). The coordinate reference system should be identified in EBCDIC header.	MANDATORY	
185	188	4I	Y coordinate of ensemble (CDP) position of this trace (scalar in Standard Trace Header bytes 71–72 applies). The coordinate reference system should be identified in EBCDIC header	MANDATORY	
189	192	4I	For 3-D poststack data, this field should be used for the in-line number.	**MANDATORY**	
193	196	4I	For 3-D poststack data, this field should be used for the cross-line number. This will typically be the same value as the ensemble (CDP) number in Standard Trace Header bytes 21–24, but this does not have to be the case.	**MANDATORY**	
197	200	4I	Shotpoint number — This is probably only applicable to 2-D poststack data. Note that it is assumed that the shotpoint number refers to the source location nearest to the ensemble (CDP) location for a particular trace. If this is not the case, there should be a comment in the Textual File Header explaining what the shotpoint number actually refers to.	MANDATORY	Sail Line Number for 3D data

[4] Also known as Julian Day, albeit distinguished from the Julian Day in the Julian Date system that astronomers use.

201	202	2I	Scalar to be applied to the shotpoint number in Standard Trace Header bytes 197–200 to give the real value. If positive, scalar is used as a multiplier; if negative as a divisor; if zero the shotpoint number is not scaled (i.e. it is an integer. A typical value will be –10, allowing shotpoint numbers with one decimal digit to the right of the decimal point).	MANDATORY	Sail Line Sequence Number for 3D gathers data
203	204	2I	Trace value measurement unit –1 = Other (should be defined in EBCDIC Header) 0 = Unknown 1 = Pascal (Pa) 2 = Volts (v) 3 = Millivolts (mV) 4 = Amperes (A) 5 = Meters (m) 6 = Meters per second (m/s) 7 = Meters per second squared (m/s2) 8 = Newton (N) 9 = Watt (W) 10= Cubic inch 11-255 = reserved for future use 256 ... N = optional use. (maximum N = 32,767)	Optional	Gun Volume (MANDATORY for nav-merged and pre-migration gathers)
205	210	2I	Transduction Constant — The multiplicative constant used to convert the Data Trace samples to the transduction Units (specified in Standard Trace Header bytes 211–212). The constant is encoded as a four-byte, two's complement integer (bytes 205–208) which is the mantissa and a two-byte, two's complement integer (bytes 209–210) which is the power of ten exponent (i.e. Bytes 205–208 * 10**Bytes 209–210).	MANDATORY	Byte 205-206 (2 integer format) Gun Array Number (MANDATORY for nav-merged and pre-migration gathers) I.e.: Gun/Source 1, Gun/Source 2, etc.
		2I		MANDATORY	Byte 207-208 (2 integer format) Cable Number for multi-cable acquisition or Recording Device/Sensor ID number. (MANDATORY for nav-merged and pre-migration gathers)
		2I		Optional	Byte 209-210 (2 integer format) Unassigned - For optional information
211	212	2I	Transduction Units-The unit of measurement of the Data Trace samples after they have been multiplied by the	Optional	Water depth (depth) (MANDATORY for

			Transduction Constant specified in Standard Trace Header bytes 205–210. –1 = Other (should be defined in EBCDIC Header) 0 = Unknown 1 = Pascal (Pa) 2 = Volts (v) 3 = Millivolts (mV) 4 = Amperes (A) 5 = Meters (m 6 = Meters per second (m/s) 7 = Meters per second squared (m/s2) 8 = Newton (N) 9 = Watt (W)		nav—merged and pre-migration gathers)
213	214	2I	Device/Trace Identifier — The unit number or id number of the device associated with the Data Trace (i.e. 4368 for vibrator serial number 4368 or 20316 for gun 16 on string 3 on vessel 2). This field allows traces to be associated across trace ensembles independently of the trace number (Standard Trace Header bytes 25–28).	Optional	Receiver Vessel ID (MANDATORY for multiple receiver vessel operation)
215	216	2I	Scalar to be applied to times specified in Trace Header bytes 95–114 to give the true time value in milliseconds. Scalar = 1, +10, +100, +1000, or +10,000. If positive, scalar is used as a multiplier; if negative, scalar is used as divisor. A value of zero is assumed to be a scalar value of 1.	MANDATORY	
217	218	2I	Source Type/Orientation — Defines the type and the orientation of the energy source. The terms vertical, cross-line and in-line refer to the three axes of an orthogonal coordinate system. The absolute azimuthal orientation of the coordinate system axes should be defined in the CRS. –1 to –n = Other (should be defined in EBCDIC Header) 0 = Unknown 1 = Vibratory - Vertical orientation 2 = Vibratory - Cross-line orientation 3 = Vibratory - In-line orientation 4 = Impulsive - Vertical orientation 5 = Impulsive - Cross-line orientation 6 = Impulsive - In-line orientation 7 = Distributed Impulsive - Vertical orientation 8 = Distributed Impulsive - Cross-line orientation = Distributed Impulsive - In-line orientation	Optional	Byte 217-220(4I): Section/cable sensitivity scalar. Calculated scalars divided by 10000 to be applied to trace amplitudes to adjust for sensitivity
219	224	6I	Source Energy Direction with respect to the source orientation — Three twobyte two's complement binary integers for vertical, cross-line and in-line inclinations respectively. The positive orientation direction is defined in Bytes 217–218 of the Standard Trace Header. The energy direction is encoded in tenths of degrees (i.e. 347.8° is encoded as 3478_{10} ($0D96_{16}$)).	Optional	Byte 221-224(4I): Survey Match Scalar (x100)

225	230	6I	Source Measurement — Describes the source effort used to generate the trace. The measurement can be simple, qualitative measurements such as the total weight of explosive used or the peak air gun pressure or the number of vibrators times the sweep duration. Although these simple measurements are acceptable, it is preferable to use true measurement units of energy or work. The constant is encoded as a four-byte, two's complement integer (bytes 225– 228) which is the mantissa and a two-byte, two's complement integer (bytes 209–230) which is the power of ten exponent (i.e. Bytes 225–228 * 10**Bytes 229–230).	Optional	Gun Pressure (MANDATORY for nav-merged and pre-migration gathers)
231	232	2I	Source Measurement Unit — The unit used for the Source Measurement, Standard Trace header bytes 225–230. –1 = Other (should be defined in EBCDIC Header) 0 = Unknown 1 = Joule (J) 2 = Kilowatt (kW) 3 = Pascal (Pa) 4 = Bar (Bar) 5= Bar-meter (Bar-m) 6= Newton (N) 7= Kilograms (kg) 8=Psi	Optional	
233	240	2I	Either binary zeros or the eight characters trace header name "SEG00000". May be ASCII or EBCDIC text.	MANDATORY	Byte 233-236(4I): Start of record time in microsecs within the second. Fraction to add to time in bytes 157-166 to obtain accurate source fire time. Byte 237-240 Unassigned - For optional information

CONTACT US

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