Metadata System Development on Natural Gas Resources in Indonesia

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2Agency for Geological Research – Bandung, Indonesia

Workshop on CCOP Natural Gas Resource Metadata System in Davao Philippines, 7 – 9 October 2009
Content
(focused on the upstream activities)

1. Background of Oil & Gas activity in Indonesia
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   b) Data Management Policy and Strategy
   c) History of Petroleum database management
   d) Organization
   e) Operator

2. Oil and Gas Data Management in Business Upstream Activities
   a) Metadata Design and Structure
   b) International standard used
   c) Metadata Element used
   d) Quality Control
   e) System and Technologies used
   f) Data Flow and Access
   g) Challenges to Indonesia Database Management
   h) On going and Future Database Management

3. Recommendations
1. Background of Oil & Gas Activity in Indonesia
1.a) Petroleum Legislations

- The 1945 Constitution of Indonesian Republic (UUD’45). Article 33
- Law No. 22/2001 On Oil And Gas
  - Oil and Gas Business divided into the upstream and downstream activities
  - PERTAMINA be changed to be as state owned company only
- Law No. 30 / 2007 on Energy
- Gov. Regulation (PP) No 35/2004 On Oil and Gas Upstream Activity
  - Ministry of EMR offer/tender oil and gas working area to business entity
  - Contractor might stored and utilize the data that obtained from their general survey
  - All data that obtained from PSC’s activities are belonging to the state
- PP No.36/2004 On Oil and Gas Downstream Activity
- PP No.42/2002 On Executive Agency for Upstream Oil and Gas Activity
  - BPMIGAS decided as Regulator body for oil and gas upstream activity
  - BPMIGAS gives approval of PSC’s work plan and budget /financial expenditure
- PP No.67/2002 On Executive Agency for Downstream Oil and Gas Activity
- Presidential Decree No. 5 / 2006, on the National Energy Policy

Note: Hierarchy of Indonesia Regulation
1.b) Data Management Policy and Strategy

- The Regulation of Minister of EMR No.27/2006, on Data Management and Utilization of Data Generated from Oil and Gas General Survey, Exploration and Exploitation Activities.
  - All E&P oil and gas data type are belonging of Government.
  - To use the data has to obtain approval from Director General of Oil and Gas.
  - All E&P oil and gas data must be submitted to Data & Information Center EMR.
  - Contractors/Companies have a limited authorization of data utilization as long as its operation period within its contract area.
1.c) History of Petroleum database management

Before 1998, PERTAMINA, as a state company and government representative, arranged and managed all data E&P oil and gas. Its stored in Pertamina and PSC’s data warehouse. The national standard of data structure is not decided.

End of the nineties century – beginning of 2000 year, Directorate General of Oil and Gas issued the metadata standard structure of “Oil and Gas Data Management (MDM)” and referred to PetroBank data management system, held by Patra Nusa Data (PND), company which supported by Oil and Gas Directorate General and ELNUSA.

Beginning period of Law No.22/2001 validated, compiling of all natural resources database was proposed as National Data Center (NDC).

At present time, all of energy and mineral resources data are managed under Data & Information Center of EMR. (Pusdatin ESDM)
1.d) Organization

**MINISTRY OF ENERGY & MINERAL RESOURCES**

- **BOARD OF EXPERTS**
- **INSPECTOR GENERAL**
- **SECRETARY GENERAL**

**DIRECTORATE GENERAL OF MINERAL, COAL AND GEOTHERMAL**

**DIRECTORATE GENERAL OF ELECTRIC AND ENERGY UTILIZATION**

**DIRECTORATE GENERAL OF OIL AND GAS**

**R & D AGENCY FOR EMR**

**AGENCY OF GEOLOGY**

**E & T AGENCY FOR EMR**

**DIC of EMR**

**LEMIGAS**

**Oil and Gas metadata submission flow**

- **BPMIGAS**
  - Pertamina
  - PSCs
- **BPH MIGAS**
- **Oil & Gas Directorate General**
- **DIC of EMR operated by PND**
The Center for Data and Information on Energy and Mineral Resources (Pusdatin) plays a strategic role in managing the National Data Center which handles all data related to the energy and mineral resources sector, both classified and unclassified data.

Pusdatin have cooperated with PT Patra Nusa Data in managing oil and gas data. This is expected to further improved in the forthcoming future with the management of other energy and mineral resource sector data. Data from active working areas categorized as classified data.
PREFACE
PT. Patra Nusa Data as a member of PT. Elnusa was established in November 4th 1997, under the authority of Migas Data Management, Directorate General of Oil and Gas. PT. Patra Nusa Data has done many efforts to manage and rejuvenate the national exploration data asset in Indonesia and it has been a part of PUSDATIN.

VISION:
A reliable partner in petroleum EP information.

MISSION:
- To benefit petroleum EP data users through an integrated Data Management system that cover data storage, cataloguing, value adding, and promotion.
- To empower national resources in national petroleum data management.
PURPOSE:
• To preserve national asset
• To provide a fast and easy access to high quality data
• To attract more investors in oil and gas sector through an ‘open file’ system

PND ACTIVITY:
- To gather, to store, to re-master & to process (value adding), to maintain National EP data using international & industry standards in formats media and warehouse.
- To establish Indonesia petroleum EP Metadata base.
- To provide data review & access to data services
- To prepare and provide data packages for new Working Area offering
- To produce Indonesia Petroleum Working Area Map
- To help the industry in establishing integrated Petroleum EP Data Management and GIS based software applications
STEP
GETTING THE DATA AVAILABILITY INFORMATION

- Visit DAVAL (Data Availability Online) which covers GIS View of Exploration Data Information (Seismic, Well, Geo-Report/Map) and is accessible online through www.patranusa.com
- Arrange Data Corner at our sites which are available to adequate the needs to review data quality for your Selected Data
- Arrange Review Room which has been provided for having more private and convenience time and place to review data quality
- Directly contact Business Center Unit for further assistance
DATA REVIEW FACILITIES

◆ Review Room
  - Review Room for any requested data will be available at Data Room Site I & II every working day at 08.30 am until 4:00 pm and to ensure an uninterrupted schedule, representatives are required to propose the schedule tentatively not later than 5(five) working days.
  - For the session, an Existing Available Data Volume (Seismic, Well & Geo-Report/Map) covers a maximum of 4,000 sq-km area is prepared for One Day Review Room and no data can be taken out or reproduced in any form.

◆ Data Corner
  - Data Corner is arranged to support Indonesia Oil & Gas Open Acreages Bid Round for having Data Quality Review of Data Packages.
2. Standard and metadata structure Oil & Gas in Upstream Activities
2.a) Metadata design and structure

- Refer to Regulation of MEMR no.27/2006, classified data

<table>
<thead>
<tr>
<th>Base on type</th>
<th>Base on status</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Data</td>
<td>Restricted (Closed) data</td>
</tr>
<tr>
<td>Basic/Raw Data</td>
<td>Open data</td>
</tr>
<tr>
<td>Processed Data</td>
<td>Active data</td>
</tr>
<tr>
<td>Interpretation Data</td>
<td></td>
</tr>
</tbody>
</table>

Exploration and Exploitation data submission

1. Well Data
2. Seismic Data
3. Geological & Geophysical Data
4. Production
5. Reservoir
6. Study
2.b) International standard used

- GIS base technology
- Seismic data: SEGY, SEGB and SEGD format in Cartridge
- The number of character are adopted from POSC Epicenter
- Images use JPG or TIFF format
- Reporting in PDF file

2.c) Metadata elements used

Seismic Display Metadata

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<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
<th>Data type</th>
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<td>CONTRACTOR</td>
<td>Contractor who own the license</td>
<td>Varchar2(80)</td>
</tr>
<tr>
<td>WORKING AREA</td>
<td>Area where the survey is conducted</td>
<td>Varchar2(80)</td>
</tr>
<tr>
<td>FIELD_AREA</td>
<td>Part of working area</td>
<td>Varchar2(80)</td>
</tr>
<tr>
<td>COUNTRY</td>
<td>Country where it is conducted</td>
<td>Varchar2(40)</td>
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<tr>
<td>SURVEY_NAME</td>
<td>The name of survey</td>
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<td>The starting date of the survey</td>
<td>Date</td>
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<td>PROCESSING-CONTRACTOR</td>
<td>Contractor who process the data</td>
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<td>PROCESSING-DATE</td>
<td>The starting date of the processing</td>
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<tr>
<td>LINE NAME</td>
<td>The name of the line in the survey</td>
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<td>FIRST-SHOTPOINT</td>
<td>First shotpoint of line seismic</td>
<td>Number(5)</td>
</tr>
<tr>
<td>LAST-SHOTPOINT</td>
<td>Last shotpoint of line seismic</td>
<td>Number(5)</td>
</tr>
<tr>
<td>FIRST-CDP</td>
<td>First CDP of line seismic</td>
<td>Number(5)</td>
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<tr>
<td>LAST-CDP</td>
<td>Last CDP of line seismic</td>
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# TYPE OF EXPLORATION AND EXPLOITATION DATA

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<th>No</th>
<th>Activities</th>
<th>General data</th>
<th>Basic data</th>
<th>Processed data</th>
<th>Interpretation data</th>
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<tr>
<td>1</td>
<td>Cartography Geography</td>
<td>General information</td>
<td></td>
<td>Brute Stack</td>
<td>Earth Modelling</td>
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<tr>
<td></td>
<td></td>
<td>Production Facilities Maps</td>
<td></td>
<td>Pre Stack</td>
<td>Geophysical Cross Section</td>
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<td></td>
<td></td>
<td>Oil and Gas Field Location Maps</td>
<td></td>
<td>Pre-Stack Migration (if exists)</td>
<td>Seismic Interpretive Data</td>
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<td></td>
<td></td>
<td>Well Location Maps</td>
<td></td>
<td>Stack</td>
<td>Subsurface Structural Maps (Time-Depth Contour Maps)</td>
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<td>Oil and Gas Working Area Maps</td>
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<td>Post Stack</td>
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<tr>
<td></td>
<td></td>
<td>etc</td>
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<td>2</td>
<td>Seismic</td>
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<td>Brute Stack</td>
<td>Earth Modelling</td>
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<td></td>
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<td>Weathering Zone Data</td>
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<td>Geophysical Cross Section</td>
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<td>instrument Test</td>
<td>Post Stack</td>
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<td>Reserve Simulation</td>
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<td></td>
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<td>Production Facilities:</td>
<td>- Qo, Qg, Qw</td>
<td>Pre Stack</td>
<td>Reserve Estimation</td>
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<td>- Pipeline</td>
<td>- GOR</td>
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<td>- Separator</td>
<td>- BS &amp; W</td>
<td>Stack</td>
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<td>- Compressor</td>
<td>- Ps, Pwf, Pwh</td>
<td>Post Stack</td>
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<td>- Accumulation Tank</td>
<td>EOR Data</td>
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<td>- Lifting Terminal</td>
<td>Production Test Data</td>
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<tr>
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<td>- Well Status</td>
<td>Temperature Gradient</td>
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<td></td>
<td>Pertamina/ Contractor Production</td>
<td>Pressure Gradient</td>
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<td>4</td>
<td>Reservoir</td>
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<td>Reservoir Formation</td>
<td>PVT Reservoir</td>
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<td>Analysis</td>
<td>Post Stack</td>
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<td>Acreage Calculation</td>
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<td>Seismic 4 D Data Analysis</td>
<td>Reserve Simulation</td>
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<td></td>
<td></td>
<td></td>
<td>(related to reservoir condition)</td>
<td>Reserve Estimation</td>
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</tbody>
</table>
2.d) Quality Control

- MIGAS DIRECTORATE and DIC of EMR

2.e) System and technologies used

- Present technology, ex. POSC Epicenter (Petrotechnical Open Software Corporation), Inameta

2.f) Data flow and access

- Submission/request: Business Entity => Migas Directorate => DIC of EMR
- For the Active Data: BPMIGAS ⇔ Internal Policy of Pertamina/PSCs
- Public domain: see DIC of EMR web (operated by PND)
Indonesian gas reserves, proven and potential are increasing. In 2006, total gas reserves were 182.5 trillion cubic feet (TCF). This is made up of 94.78 TCF proven reserves, and 87.73 TCF potential, able to be produced in 64 years. The gas reserves are concentrated in the Western part of Indonesia, therefore in the future, the exploration activities needs to be emphasized in the eastern part of Indonesia.
Examples: access data from web site DIC of EMR

INDONESIAN GAS PIPELINES NETWORKS

TRANSMISSION PIPELINE & FLOW
1. Gresik - Dunia : Ø 28" x 530 Km, 500 MMSCFD
2. West Natuna - P. Saka : Ø 36" x 656 Km, 325 MMSCFD
3. Hangtuah (Mappu) - Duyong : Ø 28" x 98 Km, 250 MMSCFD
4. Gresik - P. Saka : Ø 28" x 490 Km, 250 MMSCFD
5. Pagenongan - Gresik : Ø 28" x 380 Km, 450 MMSCFD
Examples: access data from web site DIC of EMR

Natural Gas, Supply and Demand

Deficit (Opportunity to Build CNG, LNG Receiving Terminal)
Examples: access data from Inameta
Examples: access data from Inameta

INDONESIA PETROLEUM BIDDING 2nd ROUND YEAR 2008

Legend:
- Green: Regular
- Red: Tender
- Direct Proposal

OFFERED AREA:

REGULAR TENDER:
1. ANDAMAN-I
2. ANDAMAN-II
3. ANDAMAN-III
4. WEST GELAGAH KAMBUNA
5. SOUTH BENTU SEGAI
6. NORTH SUBAHA-I
7. SW TANJUNG AREA
8. SOUTH RILI UNGAN
9. NORTH SURUMANA
10. KARAENG
11. SELAYAK
12. KAMBUNO
13. SE HAI MAHFA
14. EAST BULA
15. ARU
16. WEST PAPUA-IV

DIRECT PROPOSAL:
1. SOUTH BLOCK "A"
2. EAST PAMAI
3. PENYU
4. SOKANG
5. SENAMI-BAHAR
6. WEST BELIDA
7. TERUMBU
8. SE MADURA
9. PASIR
10. SOUTH SESULU
11. SERMATA
12. KUMAWA
13. KOFIAU
14. CENDRAWASIH
15. NORTHERN PAPUA
## Fiscal Term and Condition Tender Year 2006 (New Acreage)

<table>
<thead>
<tr>
<th>NO</th>
<th>BLOCK</th>
<th>LOCATION</th>
<th>SIZE (Sq Km)</th>
<th>Government Take (%)</th>
<th>Contractor Take (%)</th>
<th>Investment Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>AFTER TAX</td>
<td>FIRST TRANCHE PETROLEUM</td>
<td>AFTER TAX</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>OIL</td>
<td>GAS</td>
<td>OIL</td>
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<tr>
<td>1</td>
<td>CUCUT</td>
<td>OFF. NATUNA</td>
<td>5,742.69</td>
<td>75</td>
<td>60</td>
<td>10</td>
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<tr>
<td>2</td>
<td>TUNA</td>
<td>OFF. NATUNA</td>
<td>4,991.96</td>
<td>75</td>
<td>60</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>DOLPHIN</td>
<td>OFF. NATUNA</td>
<td>5,374.76</td>
<td>75</td>
<td>60</td>
<td>10</td>
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<tr>
<td>4</td>
<td>WEST AIR KOMERING</td>
<td>ON. SUMSEL</td>
<td>3,988.23</td>
<td>85</td>
<td>70</td>
<td>10</td>
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<tr>
<td>5</td>
<td>S.E. MAHAKAM</td>
<td>OFF. KALTIM</td>
<td>2,004.58</td>
<td>80</td>
<td>70</td>
<td>10</td>
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<tr>
<td>6</td>
<td>KARAMA</td>
<td>NAKASSAR STRAIT</td>
<td>4,287.37</td>
<td>65</td>
<td>60</td>
<td>10</td>
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<tr>
<td>7</td>
<td>MALUNDA</td>
<td>NAKASSAR STRAIT</td>
<td>5,148.68</td>
<td>65</td>
<td>60</td>
<td>10</td>
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<td>8</td>
<td>MANDAR</td>
<td>NAKASSAR STRAIT</td>
<td>4,196.25</td>
<td>65</td>
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<td>9</td>
<td>SADANG</td>
<td>NAKASSAR STRAIT</td>
<td>3,700.54</td>
<td>65</td>
<td>60</td>
<td>10</td>
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<td>10</td>
<td>SOUTH MANDAR</td>
<td>NAKASSAR STRAIT</td>
<td>3,882.08</td>
<td>65</td>
<td>60</td>
<td>10</td>
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<tr>
<td>11</td>
<td>SAGERI</td>
<td>NAKASSAR STRAIT</td>
<td>3,878.19</td>
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<td>10</td>
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<td>12</td>
<td>SOUTH SAGERI</td>
<td>NAKASSAR STRAIT</td>
<td>3,889.10</td>
<td>65</td>
<td>60</td>
<td>10</td>
</tr>
</tbody>
</table>

**NOTES:**
- First Tranche Petroleum (FTP) undivided (not to be shared with Contractor)
GAS UTILIZATION

- Increasing of Gas utilization for domestic demand;
- Business Entity or Permanent Establishment shall submit 25% of their production as Domestic Market Obligation (DMO);
- Optimal utilization of gas resources in specific area by concerning reserves, demand/market (capacity/location), and gas infrastructures, technical and economical feasibility (specification / deliverability).
Examples: access data from PND (Inameta)
Examples: access data from Inameta
Examples: access data from Inameta

<table>
<thead>
<tr>
<th>WELL NAME</th>
<th>CONTRACTOR</th>
<th>WELL LOCATION</th>
<th>SPUD DATE</th>
<th>LOGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>KATIALAU-1</td>
<td>ESSO EXPLORATION AND PRODUCTION DUMAI INC.</td>
<td>1° 11’ 32,076</td>
<td>101° 44’ 18,8</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>14/03/1989</td>
<td></td>
</tr>
<tr>
<td>UNGUS-1</td>
<td>ESSO EXPLORATION AND PRODUCTION DUMAI INC.</td>
<td>1° 3’ 26,73 N</td>
<td>101° 49’ 29,6</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>27/03/1989</td>
<td></td>
</tr>
</tbody>
</table>

Number of Well(s): 2
Total Log(s): 16
Examples: access data from Inameta

## Migas Data Management (MDM)

### WELL REPORT

<table>
<thead>
<tr>
<th>Well Name</th>
<th>Contractor</th>
<th>Well Location</th>
<th>Spud Date</th>
<th>Report Title</th>
<th>Report Date</th>
<th>Report Author</th>
<th>Pages</th>
<th>Encl</th>
<th>Format</th>
<th>Barcode</th>
<th>Box</th>
</tr>
</thead>
<tbody>
<tr>
<td>KATIALAU-1</td>
<td>ESSO EXPLORATION AND PRODUCTION DUMAI INC.</td>
<td>1° 11' 32.076 101° 44' 18.83</td>
<td>14/03/1989</td>
<td>A PETROLEUM GEOCHEMICAL EVALUATION</td>
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<td>BIOSTRATIGRAPHY AND ENVIRONMENT</td>
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<td>GEOLOGIC COMPLETION REPORT</td>
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<tr>
<td>UNGU-1</td>
<td>ESSO EXPLORATION AND PRODUCTION DUMAI INC.</td>
<td>1° 3' 26.73 N 101° 49' 29.67</td>
<td>27/03/1989</td>
<td>A PETROLEUM GEOCHEMICAL EVALUATION OF THE 230 TO 4098</td>
<td>01/06/1989</td>
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2.g) Challenges to Indonesia national database management

- Huge and spread of the existing data
- Less Communication among adjacent institutions
- Lost information/record of vital content
- Various database system, especially in navigation references system
- Very high cost of investment
- Less of high competency of local human resources

2.h) Ongoing or future plans to improve database management

- Indexation/catalog & classification
- Digitalization of physical old data/document that obtained before year nineties, ex. Core data, seismic, well log and others related exploration oil and gas data.(before 1980)
- Competency improvements of local human resource, especially, in quality control system, data management and entrepreneur ship
- Modern National Data Warehouse/Storage Building
- Applied one standard, well organization relationship, easy to access/web base, cheap and user friendly
AVAILABLE AND ACCESS DATA

Seismic Data
Available
Stack Seismic = 204.35 Km
Migration Seismic = 25.47 Km

Accessible
Stack Seismic = 111.5 Km
Migration Seismic = 19.2 Km

Well Data
Standard Logs
Well Report

= 8 Well

Previous Study
AVAILABLE AND ACCESS DATA

ACCESSABLE DATA DISTRIBUTION
3. Recommendations
3.a) CCOP natural gas metadata design and structure

- Continue improvements and promote general design interface that could be applied by members
- Suggestions general standard for the CCOP purposes

3.b) Required capacities to be developed by member countries

- Held the advance course to achieve personal capability
- Technical assistance by sponsor/donor institutions that approved by CCOP TS

3.c) How knowledge learned from the CCOP Metadata workshops can be shared to your organization

- Joint study
- Published frequently by using the CCOP’s media and institutional access to member country and it’s personal expert
Thank you – terima kasih