R&D Centre for MINERAL and COAL TECHNOLOGY

COMPARATIVE PETROGRAPHY OF OMBILIN AND BAYAH COALS RELATED TO THEIR ORIGIN

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INTRODUCTION

• LACK OF PETROGRAPHIC COMPOSITION OF INDONESIAN TERTIARY COALS

• THE AIMS OF THE STUDY
  - to determine type and rank of the Ombilin and Bayah coals
  - to compare the petrography of the coals

• TO ACHIEVE THIS AIMS, OMBILIN & BAYAH COALS WERE ANALYSED
THE STUDIED AREAS
(darman&sidi, 2000)

OMBILIN

BAYAH
GEOLOGY

OMBILIN

✓ Back-arc, intermontane
✓ Terrestrial sequence
✓ Meandering & braided rivers
✓ Sawahlunto Formation (Late Eocene-Early Oligocene)
✓ 3 coal seams (up to 5 m)
✓ Andesite intrusion

References:
- Darman&Sidi (2000)
- Eubank&Makki (1981)
- Koesoemadinata (1978)
- Koning (1985)

BAYAH

✓ Fore-arc
✓ Terrestrial sequence
✓ Fluvial-paralic environment
✓ Bayah Formation (Eocene)
✓ Up to 9 coal seams (up to 1 m)
✓ Andesite intrusion

References:
- Darman&Sidi (2000)
- Koesoemadinata&Matasak (1981)
- Sujatmiko&Santosa (1990)
METHODS

• 36 coal samples (Ombilin) & 21 coal samples (Bayah) - core and spot

• procedures, preparation, terminology and techniques - Australian standards
PETROLOGY - OMBILIN

• **LITHOTYPE**
  bright-bright banded

• **MACERAL**
  vitrinite (90%)>>>liptinite (3%)>inertinite (2%)
  thermally affected-coal: >vitrinite (99%), rare inertinite, no recognisable liptinite

• **MINERAL**
  clay and pyrite (2%)

• **VITRINITE REFLECTANCE**
  0.55-4.69%

• **RANK (Australian Standard)**
  sub-bituminous – anthracite
PETROLOGY - BAYAH

- **LITHOTYPE**
  bright-bright banded

- **MACERAL**
  vitrinite (89%)>>>liptinite (3%)>inertinite (2%)
  thermally affected-coal: >vitrinite (96%), rare inertinite, no recognisable liptinite

- **MINERAL**
  clay and pyrite (5%)

- **VITRINITE REFLECTANCE**
  0.53-1.23%

- **RANK (Australian Standard)**
  sub-bituminous – medium volatile bituminous
BAYAH

CUTINITE

DETROVITRINITE

EXSUDATINITE

TELOVITRINITE

Field width 0.44 mm; Rvmax 0.64%

Field width 0.28 mm; Rvmax 0.65%
### OMBILIN vs BAYAH COALS

<table>
<thead>
<tr>
<th>MACERAL</th>
<th>OMBILIN</th>
<th>BAYAH</th>
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<tbody>
<tr>
<td>VITRINITE (%)</td>
<td>90.2</td>
<td>88.8</td>
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<tr>
<td></td>
<td>Dv, Tv, Gv</td>
<td>Tv, Dv, Gv</td>
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<tr>
<td>LIPTINITE (%)</td>
<td>3.4</td>
<td>2.7</td>
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<tr>
<td></td>
<td>Cut, Res, Sub</td>
<td>Cut, Res, Sub</td>
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<tr>
<td>INERTINITE (%)</td>
<td>2</td>
<td>2.5</td>
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<tr>
<td></td>
<td>Scl, Inert, Sf</td>
<td>Sf, Scl, Inert</td>
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<tr>
<td>MINERAL (%)</td>
<td>1.9</td>
<td>5.2</td>
</tr>
<tr>
<td></td>
<td>Cl, Py</td>
<td>Cl, Py</td>
</tr>
<tr>
<td>Rvmax (%)</td>
<td>0.55-4.69</td>
<td>0.53-1.23</td>
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<tr>
<td>RANK – Australia</td>
<td>Sub-bit – Anthracite</td>
<td>Sub-bit – Med.vol.bit</td>
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<td>ASTM</td>
<td>Sub-bit – Anthracite</td>
<td>Sub-bit.C – Med.vol.bit</td>
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COMPARATIVE PETROGRAPHY

- MACERAL COMPOSITION - INTRUSION EFFECT
  thermally affected-coals: vitrinite > 90%
                           liptinite <<
  thermally unaffected-coals: vitrinite < 90%
                            liptinite up to 10%

- RANK
  Rymax: Ombilin (0.55-4.69%) > Bayah (0.53-1.23%)
  the extent of rank increase – depends on distance from the intrusion; size and temperature of the intrusion

the heat source to the thermally affected-coals is closer in the Ombilin coal than that of in the Bayah coal
CLOSING REMARKS

THE INTRUSIVE ROCK INFLUENCES:

➢ COAL TYPE

thermally affected-coals: vitrinite > 90%
liptinite <<

thermally unaffected-coals: vitrinite < 90%
liptinite up to 10%

➢ COAL RANK

Ombilin > Bayah

THE OMBILIN COAL IS CLOSER TO THE HEAT SOURCE
(SUBJECTED TO REGIONAL COALIFICATION ONLY)