SECTION B.13

RISK ASSESSMENT AND MANAGEMENT ASSOCIATED WITH BLENDING WASTE ROCK

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RISK ASSESSMENT
AND MANAGEMENT
ASSOCIATED WITH
BLENDING WASTE
ROCK

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BLENDING DEFINITION

• Mixing of PAG and non-PAG to produce a benign composite
• Types of Blends
  – IDEAL - Non-acid, low loads
  – NON-IDEAL - Non-acid, high loads
  – NON-BLEND - Acid.
• Continuum of conditions
FLOW PATH LENGTH
(IDEAL BLEND)

\[ L_i \propto \frac{Q \cdot a_{\text{alkalinity}}}{R_{\text{FeS-Ox,alk}}} \]

Blending
FLOW PATH LENGTH
(NON-IDEAL BLEND)

\[ L_n \propto \sum R_{FeS-Ox,acid} / C_{alk} \]

Blending
### IDEAL BLEND FACTORS

- Thickness of alkaline zones
- Thickness of PAG zones
- Rate of alkalinity release from alkaline zones
- Variability of rate of oxidation in PAG zones
- Rate of flow
- Variability of rate of flow through alkaline and PAG zones
- Particle size

### IDEAL BLEND

**THICKNESS OF PAG ZONES**

- Controls consumption of alkalinity
- Several scales
  - Within particle
  - Rock type within management unit
  - Between management units
- Risk assessed by understanding mineralogical, geological and physical variability
IDEAL BLEND
RATE OF ALKALINITY
RELEASE

• Partly determines amount of alkalinity provided to PAG layers
• Several factors
  – Types of minerals
  – Reactivity of minerals
  – Particle size
  – CO₂ pore pressure
  – Acid generation potential
• Limestone not necessarily best source of alkalinity.

IDEAL BLEND
RATE AND VARIABILITY
OF FLOW

• Controls pickup and delivery of alkalinity
• Timing critical
  – High flow variability, ineffective neutralization
IDEAL BLEND
PARTICLE SIZE

- Controls
  - Availability of alkalinity
  - Rate of oxidation in PAG zones
  - Limitation of oxygen access to PAG zones
  - Variability of flow

NON-IDEAL BLEND FACTORS

- Overall geochemical balance
- Variability of flow through PAG and alkaline zones
- Rate of neutralization
- Oxidation state in alkaline layers
- Particle size
CASE EXAMPLE
TELKWA COAL PROJECT

Blending

CASE EXAMPLE
TELKWA COAL PROJECT

Blending
CASE EXAMPLE
TELKWA COAL
PROJECT

WORKING BENCH

ACTIVE DUMP FACE

TELKWA COAL
PROJECT

Risk Assessment Inputs - Intra Zone

- Distribution of MPA/NP in zone
- Frequency of high S zones (waste coal)
- Oxidation rates (kinetic tests)
- Alkalinity generation (kinetic tests)
- Particle size effects
TELKWA COAL PROJECT
Risk Assessment Inputs - Inter Zone

- Dumping method
- Dumped layer thickness
- Operational control

TELKWA COAL PROJECT
MITIGATION

- In-pit geochemical control
- Initial non-PAG dump wedge to provide high face for dumping of PAG.
- Coal cleaning to limit waste.
- Till covers to limit oxygen availability
BLENDING
CONCLUSIONS

• IDEAL BLEND
  − Account for flow path length in PAG materials
  − Account for variability in oxidation rates, flow rates, oxygen availability

• NON-IDEAL BLEND
  − Overall geochemical balance
  − Flow rate variations
  − Oxidation conditions in alkaline layers.

Blending