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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presented with permission and input from:

LUSCAR

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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

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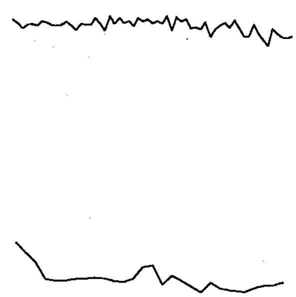
WHERE ARE WE AT?

Humidity Cell Example



Telkwa Coal

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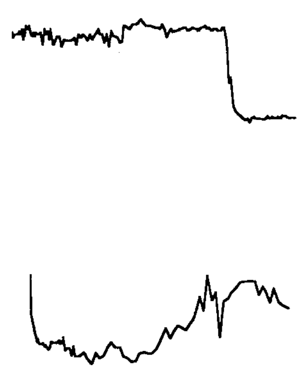
WHERE ARE WE AT?

LAB COLUMN TEST EXAMPLE



MEND 1.19.1

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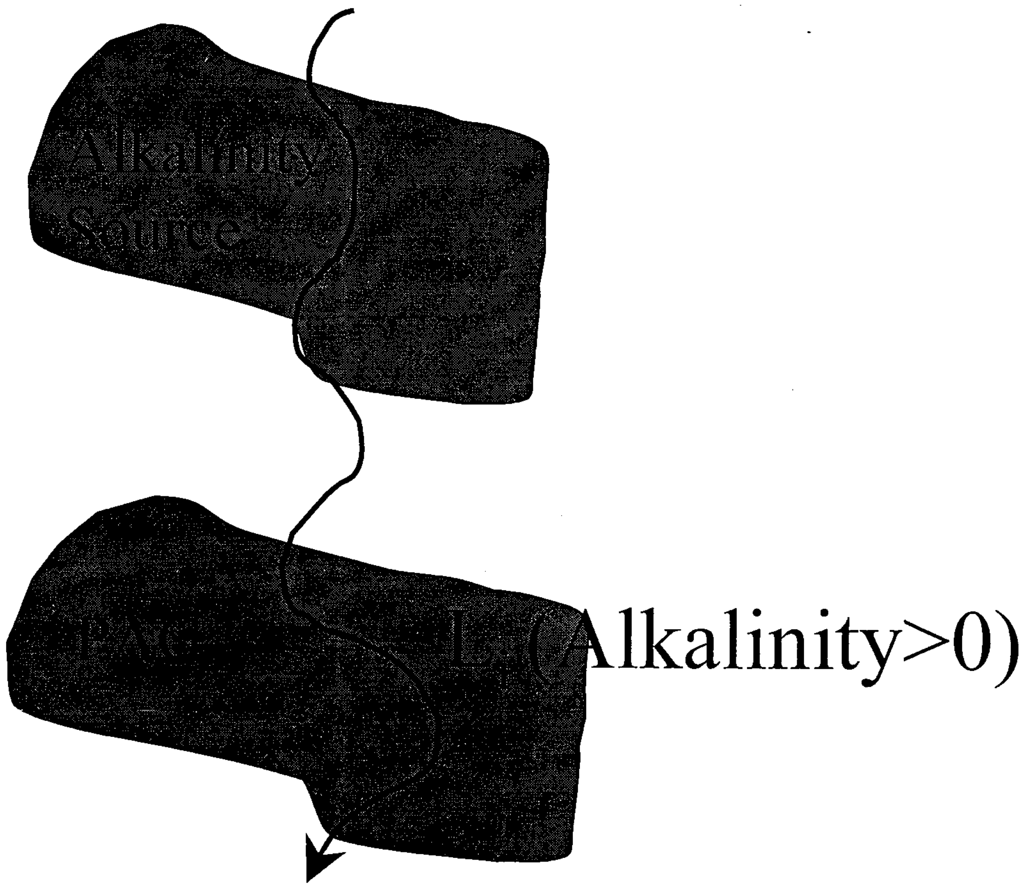
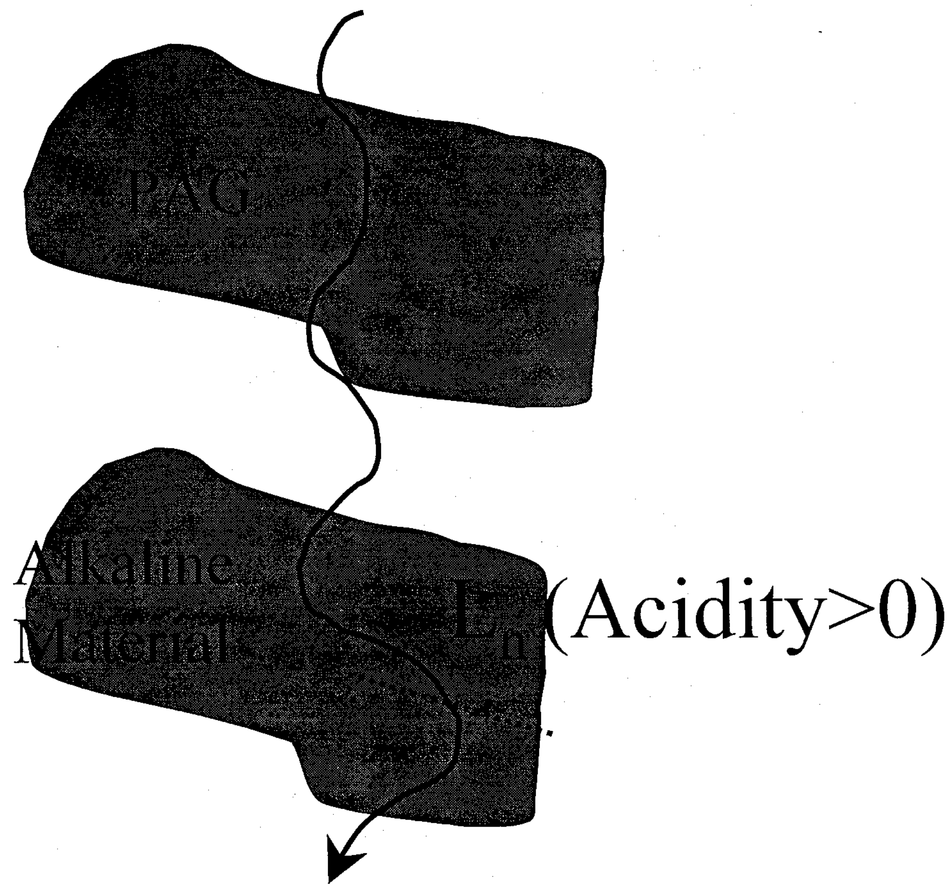
FLOW PATH LENGTH
(IDEAL BLEND)



$$L_i \ \alpha \ Q.a_{alkalinity}/R_{FeS\text{-}Ox,alk}$$

FLOW PATH LENGTH
(NON-IDEAL BLEND)



$$L_n \; \alpha \; \Sigma R_{FeS\text{-}Ox,acid} / C_{alk}$$

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

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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

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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
  - CO_2 pore pressure
  - Acid generation potential
- Limestone not necessarily best source of alkalinity.

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IDEAL BLEND
RATE AND VARIABILITY OF FLOW

- Controls pickup and delivery of alkalinity
- Timing critical
  - High flow variability, ineffective neutralization

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IDEAL BLEND
PARTICLE SIZE

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

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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

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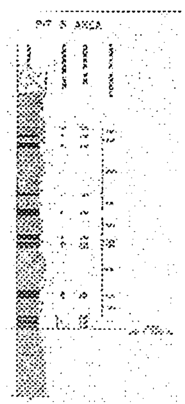
CASE EXAMPLE
TELKWA COAL PROJECT



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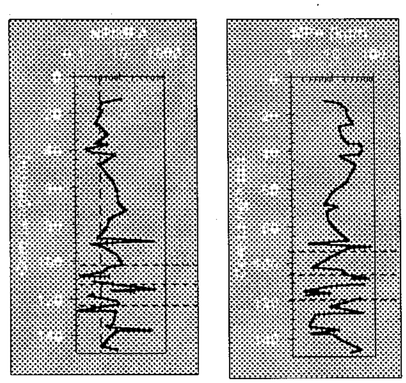
CASE EXAMPLE
TELKWA COAL
PROJECT



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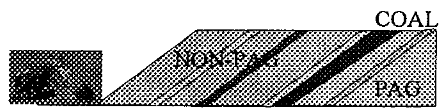
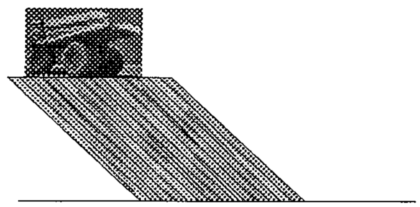
CASE EXAMPLE TELKWA COAL PROJECT

WORKING BENCH



ACTIVE DUMP FACE



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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

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TELKWA COAL PROJECT

Risk Assessment Inputs - Inter Zone

- Dumping method
- Dumped layer thickness
- Operational control

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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

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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.

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