HARDY AND KIDD ACID DRAINAGE AND METAL LEACHING HISTORIES: CONTRASTS AND COMPARISONS

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Stantec Consulting Ltd.
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Vancouver, December 2-3, 2003
“THE” ARD / Metal Leaching MODEL

Acid + Metals

Time
“THE” ARD / Metal Leaching MODEL

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Vancouver, Dec 2003
Kidd Tailings and the Hardy Mine Site

• Kidd Tailings
  – Active
  – Zinc, Copper
  – High Sulphide
  – Treatment ongoing

• Hardy Mine Site
  – Inactive Since 1972
  – Nickel, copper
  – High Sulphide
  – No Treatment
Kidd Tailings (South Section)

1,200 hectares

Thickened Tailings Discharge

#1 Lime Station
#2 Lime Station

Pond D
North Cell

Pond D
South Cell

Pond A

Water Treatment

Drainage
Older Oxidized Tailings in Foreground – Freshly Deposited Tailings in Background
Spatial Trends of Dissolved Sulphate, Iron and Zinc in Pore Water (top 50 cm)
Tailings Deposition

#1 Lime Station
Pond D
South Cell

#2 Lime Station
Pond D
North Cell

Pond A
Tailings Deposition
Tailings Deposition

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Vancouver, Dec 2003
Tailings Deposition
Tailings Deposition
Lime Usage

<table>
<thead>
<tr>
<th>Date</th>
<th>Monthly Requirement</th>
<th>Cumulative Amount</th>
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<tr>
<td>Dec.96</td>
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<td>Jan.</td>
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<td>Dec.97</td>
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Calculated Lime Demand at Treatment Plant
(Assuming No Mitigative Action on Tailings)
Groudwater Below the Large Pyrrhotite Stockpile

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Groudwater Below the Small Pyrrhotite Stockpile

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Groundwater below the Former Waste Rock Stockpile Down Gradient of the Open Pit

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Groundwater below the Former Waste Rock Stockpile Down Gradient of the Tailings Beach

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Vancouver, Dec 2003
## Estimated Loadings from ALL Sources

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<tr>
<th>Constituent</th>
<th>Maximum Estimated Load From Hardy (kg/day)</th>
<th>Measured Load in Onaping River (kg/day)</th>
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<tbody>
<tr>
<td>Sulphate</td>
<td>1,100</td>
<td>26,000</td>
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<tr>
<td>Nickel</td>
<td>1.4</td>
<td>22</td>
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Concluding Remarks

- **Kidd**
  - Increased loadings during operation unexpected
  - Unique challenges being managed by selective tailings placement and progressive reclamation
  - Closure plan includes cover to reduce exposure and loadings
  - Conditions expected to alter dramatically after closure – but mat require indefinite treatment

- **Hardy**
  - Loadings generally diminishing after 30 years
  - Limited reclamation required
  - Groundwater pathways have provided natural mitigation
  - Complex mine site with surprisingly small impacts