• Placement data

• Stability
  – Compaction
  – Inspections
  – Slope monitoring

• Water level data

• Precipitation data

• Water quality at internal monitoring sites

• ABA data

• General site management
2010 Satellite Photograph
Site 23/D, Mill Site and 1350
Appendix 2 Site 23/D Conceptual Cross Section
### Table 3.1 Site 23 Placement Data

<table>
<thead>
<tr>
<th>Date</th>
<th>Surveyed (cy)</th>
<th>Surveyed (tons)</th>
<th>Hauled To Tails from</th>
<th>From UG Truck Counts (tons)</th>
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<tr>
<td></td>
<td>Monthly</td>
<td>Cumulative</td>
<td>Monthly</td>
<td>Cumulative</td>
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<tr>
<td>1/31/2010</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>2/25/2010</td>
<td>1,810</td>
<td>1,810</td>
<td>3,064</td>
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<td>3/31/2010</td>
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<td>1,810</td>
<td>0</td>
<td>3,064</td>
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<td>4/30/2010</td>
<td>3,397</td>
<td>5,207</td>
<td>5,750</td>
<td>8,814</td>
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<td>5/30/2010</td>
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<td>5,207</td>
<td>0</td>
<td>8,814</td>
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<tr>
<td>6/30/2010</td>
<td>4,091</td>
<td>9,298</td>
<td>6,925</td>
<td>15,740</td>
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<tr>
<td>7/31/2010</td>
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<td>9,298</td>
<td>0</td>
<td>15,740</td>
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<td>8/31/2010</td>
<td>1,188</td>
<td>10,486</td>
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<td>11,279</td>
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<td>11/30/2010</td>
<td>0</td>
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<td>12,069</td>
<td>1,337</td>
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<td><strong>TOTAL</strong></td>
<td><strong>12,069</strong></td>
<td><strong>20,430</strong></td>
<td><strong>20,221</strong></td>
<td><strong>27,881</strong></td>
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</table>

*No survey taken due to equipment failure or excessive snow

Current volume ~647,127 cy (1,095,115 tons)
Site 23/D Stability

- Compaction
  - Method specification includes spreading in less than 24” lifts with at least one pass with a bulldozer and four passes with a vibratory compactor

- Inspections
  - Results of operator, engineering, environmental and regulatory inspections revealed no visible signs of instability
  - No issues of non-compliance were noted in 16 USFS and 6 ADEC/ADNR inspections during 2010

- Slope monitoring
  - 10 survey hubs monitored with GPS during 2010
    • No large movements were identified
  - Inclinometer readings
    • Minor creep at 80’ (~3mm/yr)
Figure 3.30 Inclinometer Incremental Displacement
Site 23/D Water Level Data

- Water table is below base of pile
- Well-drained pile and foundation indicate pile stability is maximized
- Perched water tables in colluvial wedge and alluvial sands
- Braided flow paths

- Distinct seasonal pattern, especially in alluvial sands
- Silt/clay till below colluvial wedge inhibits downward water movement
Figure 3.1 Pressure Data for Piezometer 52

- Ground surface 932'
- Base of pile ~ 908'
- Transducer elevation ~905'

HEAD (ft) vs. Time (Jan 04-Jul 04)
Figure 3.6/7 Water Levels
MW-23-A2S/D
Figure 3.9 Water Level Data for Well MW-23-A4

Ground surface 925'

Base of pile ~ 904'

Base of screen 876'

[Graph showing water level data with dates and elevations]
Figure 3.11 Water Level Data for Well MW-94-D3
<table>
<thead>
<tr>
<th>Month</th>
<th>Avg Temp (°C)</th>
<th>Precipitation (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>-1.04</td>
<td>3.57</td>
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<tr>
<td>February</td>
<td>1.23</td>
<td>2.26</td>
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<td>March</td>
<td>0.67</td>
<td>6.73</td>
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<td>April</td>
<td>3.49</td>
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<td>May</td>
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<td>1.57</td>
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<td>June</td>
<td>9.86</td>
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<td>July</td>
<td>11.15</td>
<td>3.25</td>
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<td>August</td>
<td>12.25</td>
<td>5.07</td>
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<td>September</td>
<td>10.00</td>
<td>7.44</td>
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<td>October</td>
<td>4.42</td>
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<td>November</td>
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<td>December</td>
<td>-4.13</td>
<td>0.98</td>
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<tr>
<td>2010</td>
<td>4.73</td>
<td>59.38</td>
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Site 23/D Internal Monitoring Sites: Water Quality Data

- Internal site waters are captured, treated, and discharged per HGCMC’s NPDES/APDES permit.

- pH values are between 6.0 and 8.5 (high buffering capacity).

- Conductivities are between 200 and 5000 umho/cm.

- Variations in conductivity reflect differences in contributions of groundwater and infiltration, seasonal fluctuations.

- Zinc concentrations are variable (typically less than 5 mg/l).

- Precipitation, mixing, and sorption mechanisms determine metals concentrations.
Figure 3.14a Site 23 Finger Drains pH
Figure 3.17a Site 23 Finger Drains Conductivity

Graph showing conductivity levels over time for different finger drains (FD2 to FD6) with date ranges from 1/1/99 to 1/4/11.
Figure 3.20a Site 23 Finger Drains
Dissolved Zinc
Site 23/D Wells and D Pond
Figure 3.14b  pH
Site 23/D Wells and D Pond
Figure 3.17b Conductivity
Site 23/D Wells and D Pond
Figure 3.20b Dissolved Zinc
Figure 3.28 ABA Data
Underground Rib Sampling

Visual designation:
- Class 1
- Class 2
- Class 3
- Class 4

Acid Potential Potential (tCaCO3/kt)
Neutralization Potential (tCaCO3/kt)
Site 23/D General Site Management

- Designated placement zones are marked on the active lift of the site and production rock is placed according to class.
- Outer surfaces have at least two feet of Class 1 rock.
- Class 2 and 3 rock are blended and placed in the center of the pile.

Use of interim storage area for reclamation activities:

- 1350
- B Pond berm
- Pipeline excavation
- D Pond berm
Cover Design

2 meters

Growth Medium
Capillary Break
Barrier Layer
Capillary Break
Site 23 Cover Excavation
Site 23 Cover Excavation

- Growth Medium
- Capillary Break
- Barrier Layer
- Capillary Break
Cover Performance Monitoring

- Greater than 85% water saturation in barrier layer minimizes oxygen ingress

- Water percolation through barrier layer 15-20% of annual precipitation

- Barrier layer does not freeze during the winter

- Trench flow was about 70-80% upper capillary break and 20-30% growth medium. The lag time between peak precipitation and peak trench flow is about 6 hours for dry conditions and 2 hours for wet conditions

- Modeling with Hydrus-2D/3D software compares favorably with field results

- Numerical modeling of alternative cover designs indicates that the upper capillary break is necessary to maximize lateral flow and prevent buildup of head pressures in the growth medium and barrier layer

- OSU vegetation assessment recommends allowing development of native spruce/hemlock vegetation with windthrow to promote nutrient mixing and minimize erosion
D Pond Berm Replacement 2010
Site E Removal Activities 2010
960 Site Waste Rock Removal
<table>
<thead>
<tr>
<th>Site 347</th>
<th>Before Removal</th>
<th>After Removal</th>
<th>After Removal</th>
<th>After Removal</th>
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<tr>
<td>Parameter</td>
<td>Unit</td>
<td>9/12/95</td>
<td>9/28/06</td>
<td>8/17/09</td>
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<td>pH</td>
<td>st. units</td>
<td>6.1</td>
<td>7.6</td>
<td>7.5</td>
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<tr>
<td>Sulfate</td>
<td>mg/l (tot)</td>
<td>1300</td>
<td>161</td>
<td>230</td>
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<tr>
<td>Calcium</td>
<td>mg/l (diss)</td>
<td>412</td>
<td>64</td>
<td>102</td>
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<tr>
<td>Magnesium</td>
<td>mg/l (diss)</td>
<td>164</td>
<td>21</td>
<td>28</td>
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<tr>
<td>Iron</td>
<td>mg/l (diss)</td>
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<td>0.2</td>
<td>ND</td>
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<tr>
<td>Manganese</td>
<td>mg/l (diss)</td>
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<td>0.4</td>
<td>0.272</td>
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<tr>
<td>Zinc</td>
<td>mg/l (diss)</td>
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<td>0.1</td>
<td>0.054</td>
</tr>
<tr>
<td>Lead</td>
<td>mg/l (diss)</td>
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<td>ND</td>
<td>0.00008</td>
</tr>
<tr>
<td>Nickel</td>
<td>mg/l (diss)</td>
<td>0.3</td>
<td>0.005</td>
<td>0.007</td>
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ND – Non detectable result
1350 Removal Activities
1350 Removal Activities