McLaren Tailings Reclamation
Project Status
July 21, 2011

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Tailings, Ore Rock, Alluvial Sediments
Estimated 237,000 Cubic Yards
McLaren Tailings Contribution to Total Loads in Soda Butte Creek

### Monitoring point SBC-2 near Cooke City

<table>
<thead>
<tr>
<th>Metal</th>
<th>Low Flow</th>
<th>High Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td>60 - 90 %</td>
<td>&gt; 5 %</td>
</tr>
<tr>
<td>Iron</td>
<td>70 - 95 %</td>
<td>20 - 40 %</td>
</tr>
<tr>
<td>Manganese</td>
<td>80 - 95 %</td>
<td>20 - 40 %</td>
</tr>
</tbody>
</table>

### Monitoring point SBC-4 near Yellowstone National Park

<table>
<thead>
<tr>
<th>Metal</th>
<th>Low Flow</th>
<th>High Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td>? - 90 %</td>
<td>?</td>
</tr>
<tr>
<td>Iron</td>
<td>25 - 30 %</td>
<td>5 - 10 %</td>
</tr>
<tr>
<td>Manganese</td>
<td>80 - 95 %</td>
<td>&lt; 5 %</td>
</tr>
</tbody>
</table>

MDEQ Water Quality Restoration Plan for the Cooke City TMDL Planning Area
http://www.deq.state.mt.us/wqinfo/TMDL/Cooke_City_files/FinalCCTMDL.pdf
Tailings Dam Stability
Cross-section View

Previous Assessment
Marginal static stability; material under dam highly susceptible to liquefaction.

Total flow from seeps approx. 40 gpm from 5 seeps in September 2008

# Tailings Water Quality vs. DEQ Standards

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Target</th>
<th>Measured</th>
<th>Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron</td>
<td>0.3</td>
<td>1490</td>
<td>5000</td>
</tr>
<tr>
<td>Manganese</td>
<td>0.05</td>
<td>19.6</td>
<td>400</td>
</tr>
<tr>
<td>Aluminum</td>
<td>0.087</td>
<td>13.9</td>
<td>160</td>
</tr>
<tr>
<td>Copper</td>
<td>0.012</td>
<td>1.86</td>
<td>159</td>
</tr>
<tr>
<td>Cadmium</td>
<td>0.00033</td>
<td>0.0060</td>
<td>18</td>
</tr>
<tr>
<td>Zinc</td>
<td>0.15</td>
<td>1.73</td>
<td>12</td>
</tr>
</tbody>
</table>

Target and Measured total recoverable metals in mg/L
Target = DEQ-7 aquatic life / human health standards
Factor = Measured / Target
Project Timeline

- May 2002: Expanded Engineering Evaluation/Cost Analysis completed
- 2002-2008: Negotiations with EPA for property purchase
- October 2007: Finding of No Significant Impacts issued by Office of Surface Mining
- 2008-2009: Site Assessment/Reclamation Design
- October 2009: Invitation for Bid issued
- April 2010: Project award to Knife River
- June 2010: First construction season
- October 2015: Project completion
Project Bid Alternatives

(1) Place all wastes in onsite repository

(2) Reprocess tailings at Golden Sunlight Mine in 2011 with remaining mine wastes placed in repository

(3) Reprocess tailings at Golden Sunlight Mine in 2011 and 2012 with remaining mine wastes placed in repository
Project Scope of Work

• Excavate mine wastes and contaminated media
• Mix quicklime with tailings to stabilize
• Operate a construction dewatering and treatment system
• Place mine wastes and contaminated media in a repository constructed onsite
• Reconstruct 2,000 feet of creek channel
• Amend cover soils with compost
• Grade and revegetate affected areas
Tailings Stabilization

• Mix quicklime with tailings in place below ground surface to minimize lime dust
• Dry wet tailings to promote compaction and structural stability in repository
• Reduce metal mobility
## Metals Leaching From Tailings
Pre and Post Lime Addition

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Target</th>
<th>Pre-lime</th>
<th>3 percent lime</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron</td>
<td>0.3</td>
<td>24.5</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Manganese</td>
<td>0.05</td>
<td>4.29</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Aluminum</td>
<td>0.087</td>
<td>0.182</td>
<td>0.038</td>
</tr>
<tr>
<td>Copper</td>
<td>0.012</td>
<td>0.065</td>
<td>0.086</td>
</tr>
<tr>
<td>Cadmium</td>
<td>0.00033</td>
<td>0.091</td>
<td>&lt;0.010</td>
</tr>
<tr>
<td>Zinc</td>
<td>0.15</td>
<td>0.23</td>
<td>&lt;0.02</td>
</tr>
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</table>

Target and Measured SPLP metals in mg/L
Target = DEQ-7 aquatic life / human health standards
Water Treatment

• Pump groundwater from site margins and beneath tailings
• Apply lime slurry as needed to increase water pH and alkalinity
• Precipitate metals in a constructed sediment basin equipped with filter curtains
Fluid Levels Under Tailings Impoundment 2009 - 2010

Elevation (ft AMSL)

- Tailings
- Aquifer
- Ground Elevation
Artesian Conditions Below Tailings
Groundwater Pumping Wells

- Sheet Piling
- Cut Off Wall
- Sediment Detention Pond #2
- Sediment Detention Pond #1
- De Watering Building
- Storm Water Run on Control Channel
Water Treatment System
Stream Reconstruction

- Historical Soda Butte Creek and Miller Creek channels are covered by the tailings impoundment
- Create runs, pools and transitions, and flood-prone areas to enhance streambed and floodplain habitat
- Divert flows between existing Soda Butte Creek and newly constructed Soda Butte Creek in winter 2014
2010 Reclamation Work

- Constructed two bridges over Soda Butte Creek
- Installed surface water and sediment control measures
- Salvaged and seeded cover soil
- Began repository excavation
- Began stabilizing tailings using ALLU system
- Placed mine wastes in repository and covered with temporary liner
2011 Reclamation Work

- Abandoned plan for offsite hauling
- Constructed 2 new piezometers in repository
- Deepen western portion of repository approximately 6 feet
- Complete water treatment building
- Complete sediment pond
- Stabilize tailings using ALLU system
- Compact mine wastes in repository and cover with temporary liner
New Piezometer PZ-8
New Piezometer PZ-9
## 2011 Fluid Level Measurements in Feet Below Ground Surface

<table>
<thead>
<tr>
<th>Date</th>
<th>PZ-8</th>
<th>PZ-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 21, 2011</td>
<td>15.6</td>
<td>ND</td>
</tr>
<tr>
<td>June 22, 2011</td>
<td>15.7</td>
<td>ND</td>
</tr>
<tr>
<td>June 23, 2011</td>
<td>15.8</td>
<td>ND</td>
</tr>
<tr>
<td>June 28, 2011</td>
<td>17.7</td>
<td>ND</td>
</tr>
<tr>
<td>June 29, 2011</td>
<td>17.9</td>
<td>ND</td>
</tr>
<tr>
<td>July 6, 2011</td>
<td>19.4</td>
<td>ND</td>
</tr>
<tr>
<td>July 7, 2011</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>July 12, 2011</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>July 21, 2011</td>
<td>ND</td>
<td>ND</td>
</tr>
</tbody>
</table>
New ALLU Mixing Head
Repository Floor: June 30, 2011
2011 Project Status

• New piezometers indicate adequate separation to groundwater under expanded repository
• Significant improvements in mixing lime into tailings have occurred in 2011
• Stabilization and compaction of tailings in repository have been successful
• Project currently on schedule / ahead of schedule
Questions

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