McLaren Tailings Reclamation
Project Status
August 9, 2012

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Project Team

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2012 Major Project Elements

- Construction Dewatering
- Water Treatment
- Tailings Excavation
- Lime Stabilization of Tailings
- Placement and Compaction in Repository
Water Management

Photo taken July 6, 2011

30 feet of tailings
Artesian Conditions Below Tailings

Photo taken May 21, 2009
Construction Dewatering Overview

- Construct pumping wells screened in the alluvial aquifer beneath the bottom of the tailings
- 14 pumping wells along the perimeter of the tailings impoundment
- 3 pumping wells within the tailings impoundment footprint
- Active water treatment and lined sediment pond
- Winter and summer O&M and water sampling schedules
Construction Dewatering System
Winter Dewatering

- Selected perimeter wells pumped to maintain water flow through sediment pond: protect liner, avoid freeze up
- No chemical treatment
- Began pumping mid October 2011
- 10 sampling events: October 14, 2011 to May 25, 2012
- All sample results below DEQ-7 standards
- Maximums: iron 0.12 mg/L, manganese 0.004 mg/L, barium 0.07 mg/L
- No other metals detected (arsenic, aluminum, cadmium, chromium, copper, lead, mercury, nickel, silver, zinc)
Summer Dewatering

- Three pumping wells under the tailings activated
- Comparison of 2010 and 2012 fluid levels indicates 25 – 30 feet of drawdown achieved in the three pumping wells
- Approximately 300 gallons per minute water piped to water treatment plant and treated
- Approximately 3 million gallons treated per week
- Perimeter water mixed with treated water prior to discharge to Soda Butte Creek
Construction Dewatering - Tailings Excavation

Photo taken July 11, 2012
Construction Dewatering - Tailings Excavation

Photo taken July 11, 2012
Construction Dewatering - Tailings Excavation

Photo taken July 19, 2012
Construction Dewatering - Tailings Excavation

Photo taken July 25, 2012
Construction Dewatering - Tailings Excavation

Photo taken August 9, 2012
Tailings Stabilization

- Mix quicklime (CaO) with tailings
- 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>
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</thead>
<tbody>
<tr>
<td>Iron</td>
<td>0.3</td>
<td>24.5</td>
<td>&lt;0.01</td>
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<tr>
<td>Manganese</td>
<td>0.05</td>
<td>4.29</td>
<td>&lt;0.001</td>
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<tr>
<td>Aluminum</td>
<td>0.087</td>
<td>0.182</td>
<td>0.038</td>
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<tr>
<td>Copper</td>
<td>0.012</td>
<td>0.065</td>
<td>0.086</td>
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<tr>
<td>Cadmium</td>
<td>0.00033</td>
<td>0.091</td>
<td>&lt;0.010</td>
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<tr>
<td>Zinc</td>
<td>0.15</td>
<td>0.23</td>
<td>&lt;0.02</td>
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</tbody>
</table>

Target and Measured SPLP metals in mg/L  
Target = DEQ-7 aquatic life or human health standards
Repository Construction

Photo taken July 25, 2012
Water Treatment Design

• Pump groundwater from site margins and beneath tailings
• Apply hydrated lime and oxygen to precipitate metals
• Collect precipitated metals in a lined sediment basin equipped with filter curtains
Rotating Cylinder Treatment System

Photo taken June 13, 2012
# Water Quality vs. DEQ Standards

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Target</th>
<th>Tailings</th>
<th>Influent</th>
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<tbody>
<tr>
<td>Iron</td>
<td>0.3</td>
<td>1490</td>
<td>21.7</td>
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<tr>
<td>Manganese</td>
<td>0.05</td>
<td>19.6</td>
<td>0.47</td>
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<tr>
<td>Aluminum</td>
<td>0.087</td>
<td>13.9</td>
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<tr>
<td>Copper</td>
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<td>1.86</td>
<td>0.1</td>
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<tr>
<td>Cadmium</td>
<td>0.00033</td>
<td>0.006</td>
<td>0.00011</td>
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<tr>
<td>Zinc</td>
<td>0.15</td>
<td>1.73</td>
<td>0.04</td>
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</tbody>
</table>

All concentrations in mg/L
Target = MT DEQ-7 aquatic life or human health standards
**System Discharge vs. DEQ Standards**

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Target</th>
<th>Maximum</th>
<th>Average</th>
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</thead>
<tbody>
<tr>
<td>Iron</td>
<td>0.3</td>
<td>1.2</td>
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<tr>
<td>Manganese</td>
<td>0.05</td>
<td>0.096</td>
<td>0.042</td>
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<tr>
<td>Aluminum</td>
<td>0.087</td>
<td>&lt;0.03</td>
<td>&lt;0.03</td>
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<tr>
<td>Copper</td>
<td>0.012</td>
<td>&lt;0.005</td>
<td>&lt;0.005</td>
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<tr>
<td>Cadmium</td>
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<tr>
<td>Zinc</td>
<td>0.15</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

All concentrations in mg/L
Eight weekly sampling events between June 13 and August 6
Aluminum, antimony, arsenic, chromium, copper, lead, mercury, nickel, silver, and zinc have not been not detected in Channel 5
Channel 5 outlet to Soda Butte Creek

Photo taken July 25, 2012
Soda Butte Creek below AMD seeps
2008

Photo taken September 8, 2008
2012 Project Status

• Approximately 120,000 bank cubic yards of tailings excavated and stabilized (71 percent)
• Stabilization and compaction of tailings in repository have been successful
• Project currently ahead of schedule
Questions

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