McLaren Tailings
Project Update
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Introductions

- Montana DEQ Remediation Division
- Pioneer Technical Services, Inc.

Retrospective Overview

AMD Discharges From Tailings Impoundment

Soda Butte Creek - North Bypass Channel

August 2009

Soda Butte Creek - Downstream

August 2009

McLaren Tailings Contribution to Total Loads in Soda Butte Creek

Monitoring point SBC-2 near Cooke City

Metal	Low Flow	High Flow
Copper	60 - 90 %	> 5 %
Iron	70 - 95 %	20 - 40 %
Manganese	80 - 95 %	20 - 40 %

Monitoring point SBC-4 near Yellowstone National Park

Metal	Low Flow	High Flow
Copper	? - 90 %	?
Iron	25 -30 %	5 - 10 %
Manganese	80 - 95 %	< 5 %

DEQ Water Quality Restoration Plan for the Cooke City TMDL Planning Area

Site Description

- Soils
  - 2 foot soil cap
  - 15-35 feet of silty clay tailings
  - 10-50 feet of sandy creek sediments
  - Limestone and granite bedrock
- Water
  - Soda Butte Creek to the north
  - Wet hillside bordering tailings to the south
  - Artesian aquifer underlying aquifer
  - Contaminated groundwater in tailings

Reclamation Design Investigation

Contaminated Water Handling

Tailings Handling

Weather

Reclamation Overview

- Dewater the tailings by pumping the underlying aquifer
  - Intercept clean water
  - Treat to DEQ-7 standards
- Stabilize tailings using lime
  - Reduce moisture and strengthen tailings
  - Reduce metal mobility
- Implement seasonal shut down BMPs
  - Interim repository liner
  - Water and sediment control
- Complete site reclamation
  - Soil amendment and revegetation
  - Stream reconstruction

2010 Site Work – Sediment Pond Excavation

2010 Site Work – In-situ Lime Mixing

2011 Site Work – Repository Compaction

2011 Site Work – Mixing and Excavation

2011 Site Work – Sediment Pond

2012 Site Work – Water Treatment

2012 Site Work – Sediment Pond

2012 Site Work – Treated Water Discharge

2012 Site Work - Mixing and Excavation

2012 Site Work – Excavation to the Dam

2012 Dewatered Acidic Seeps

2013 Site Layout

2013 Reclamation Work

- Continue dewatering and water treatment
- Remove remaining tailings
- Construct stream channels
- Divert water into new stream channels
- Complete repository for capping
- Place amended cover soil
- Install repository cap
- Implement season shut down

System Discharge vs. DEQ Standards

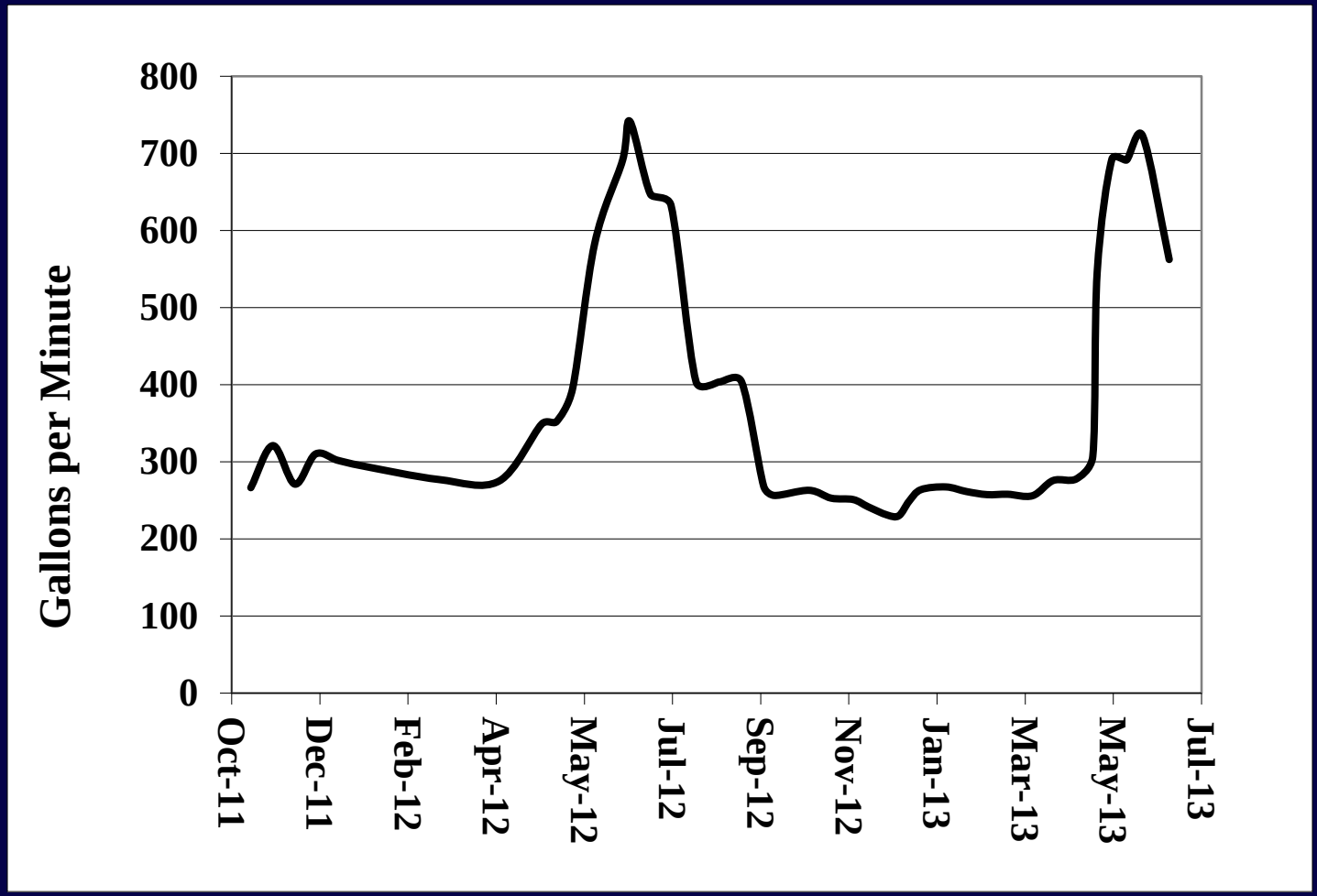
Chemical	Target	2012 Maximum	2012 Average	2013 Maximum	2013 Average
Iron	1.0	1.2	0.50	0.60	0.34
Manganese	(0.050)	0.096	0.028	0.14	0.059
Aluminum	0.087	<0.03	<0.03	0.050	<0.03
Copper	0.012	<0.005	<0.005	0.018	0.0053
Cadmium	0.00033	0.002	<0.00008	0.00008	<0.00008
Zinc	0.15	<0.01	<0.01	0.01	<0.01

Concentrations in mg/L

26 weekly sampling events between June 13, 2012 and October 10, 2012 and from June 5, 2013 to July 24, 2013

Antimony, arsenic, barium, chromium, lead, mercury, nickel, and silver have not been not detected in discharge

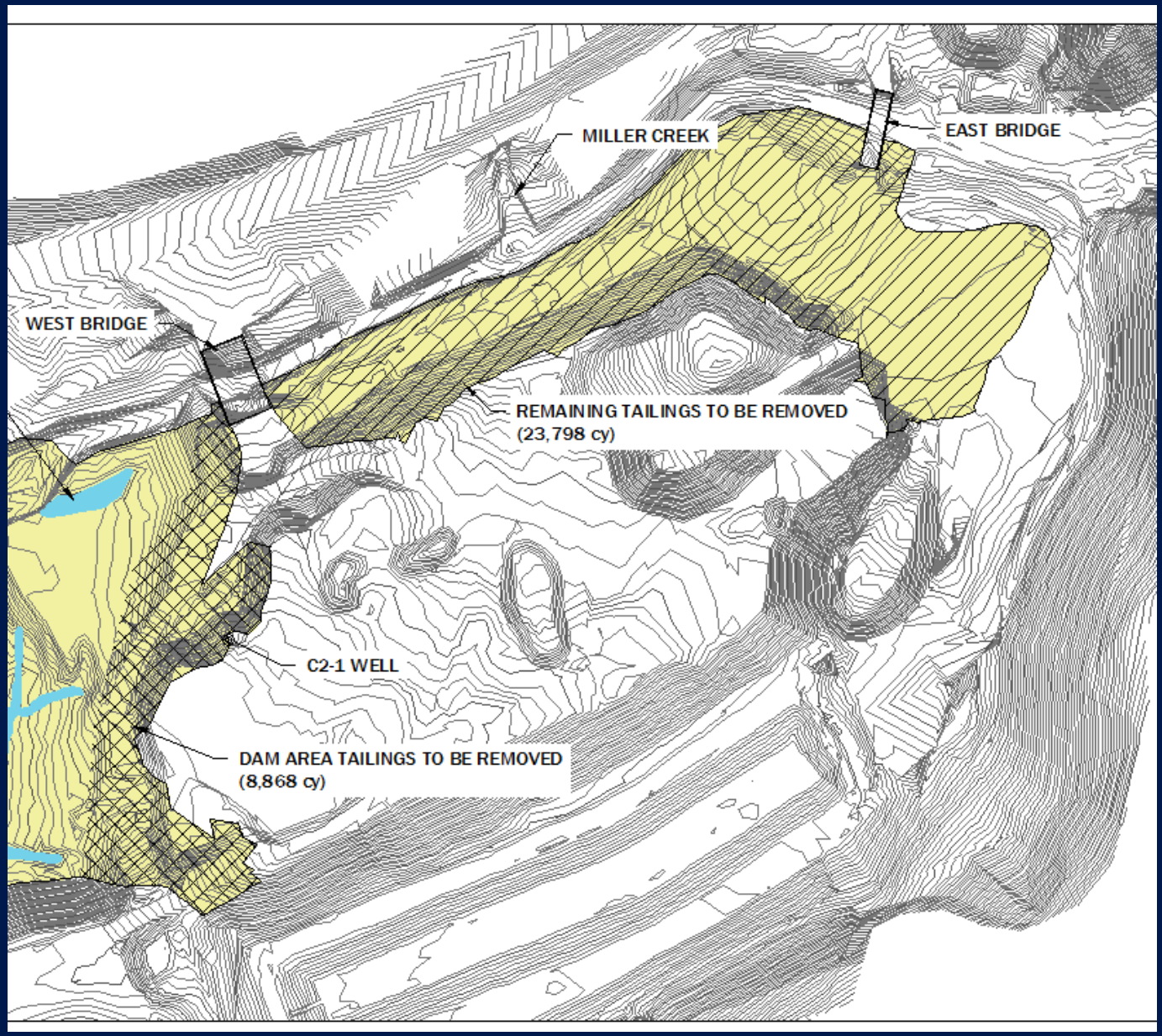
Site Pumping Rates 2011 - 2013



Tailings Excavation and Stabilization

- Approximately 245,000 cubic yards of waste rock and tailings have been stabilized with lime and compacted in the repository.
- Compacted volume is approximately 230,000 cubic yards
- Approximately 4,000 cubic yards remain to be excavated along existing Soda Butte Creek.
- Soda Butte Creek will be relocated to new channel before remaining tailings are excavated.

2013 Tailings Excavation



2013 Remaining Tailings

Repository Construction

- Design capacity is 236,000 cubic yards
- Currently contains 230,000 cubic yards
- Will be capped with a geochusion, 60-ml HDPE liner, drainage geocomposite, and 3 feet of cover soil.
- Side slopes are 5:1 horizontal to vertical based on seismic stability analysis for the area

Repository July 2013

Stream Reconstruction

- Initiated in July 2013
- Approximately 1,500 linear feet of Soda Butte Creek
- Approximately 525 linear feet of Miller Creek
- Willow brush, root wads and boulder clusters
- Riparian seeding
- Planting of willow stakes and shrub tubelings

Soda Butte Creek Reconstruction

DEQ-AML Snowshoe Creek Reconstruction

Revegetation

- Stockpiled design volume of cover soils
- Amend with compost to increase organic matter content
- Place 12 inches of amended cover soils over approximately 26 acres
- Seeding, fertilizing, and mulching
- Planting of shrub and tree tubelings

2013 Project Status

- Excavation of mine wastes is nearly complete.
- Repository currently contains 230,000 cubic yards and will have capacity for remaining tailings
- Soda Butte Creek and Miller Creek are being constructed and will be diverted by the end of the year

2013 Project Status

- Water treatment system will be shut down at the end of this construction season and dismantled
- If time permits the repository will be capped with multi layer system. If not, an interim liner will be placed over it for winter.
- Project currently ahead of schedule and is expected to be completed in 2014

Soda Butte Creek September 2008

Soda Butte Creek July 2013

Questions

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