



MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY

McLaren Tailings  
Project Update  
September 3, 2014

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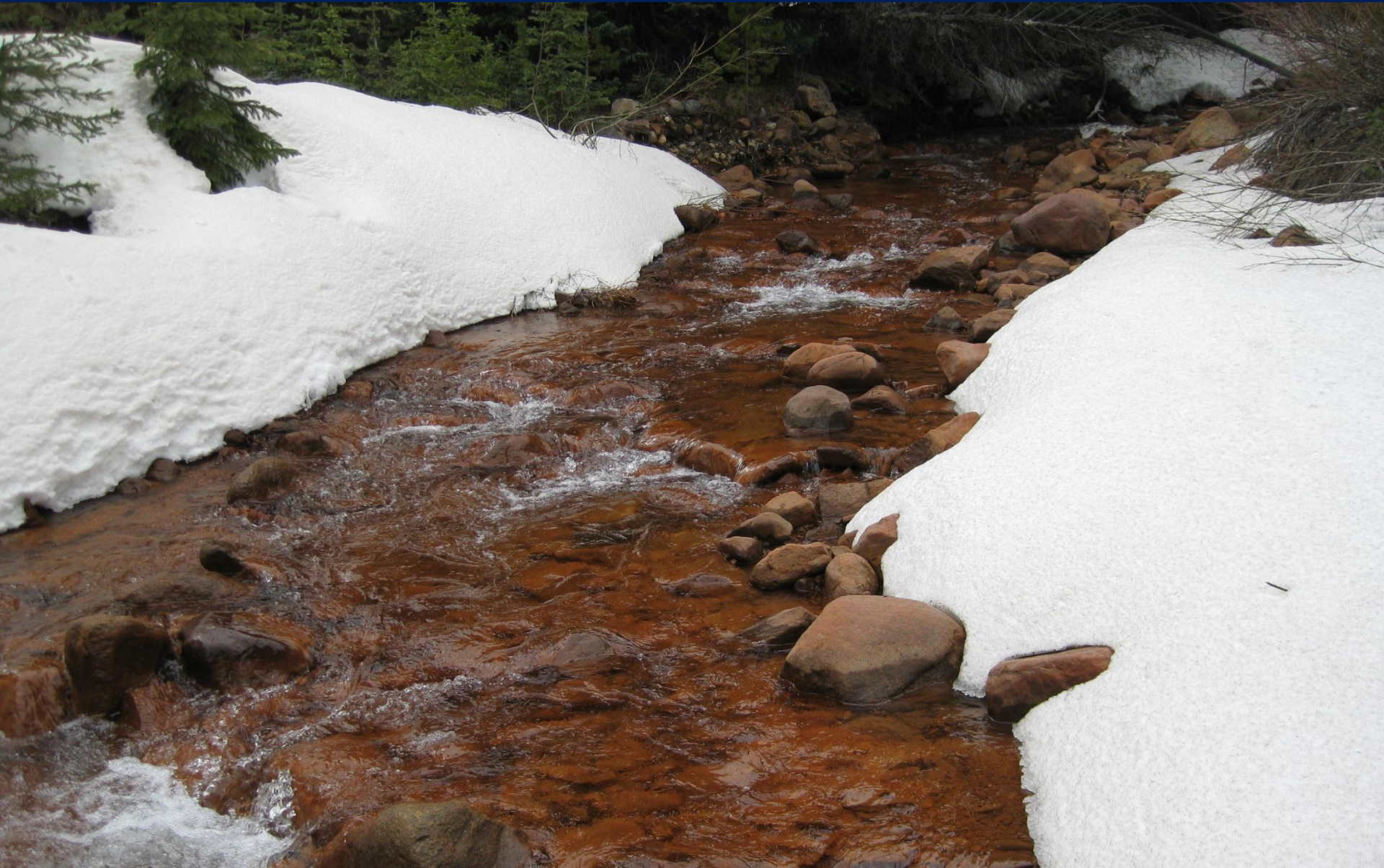
# Tailings Impoundment - 2008



Approximate pre-mining locations of  
Soda Butte Creek and Miller Creek



# Soda Butte Creek – May 2009



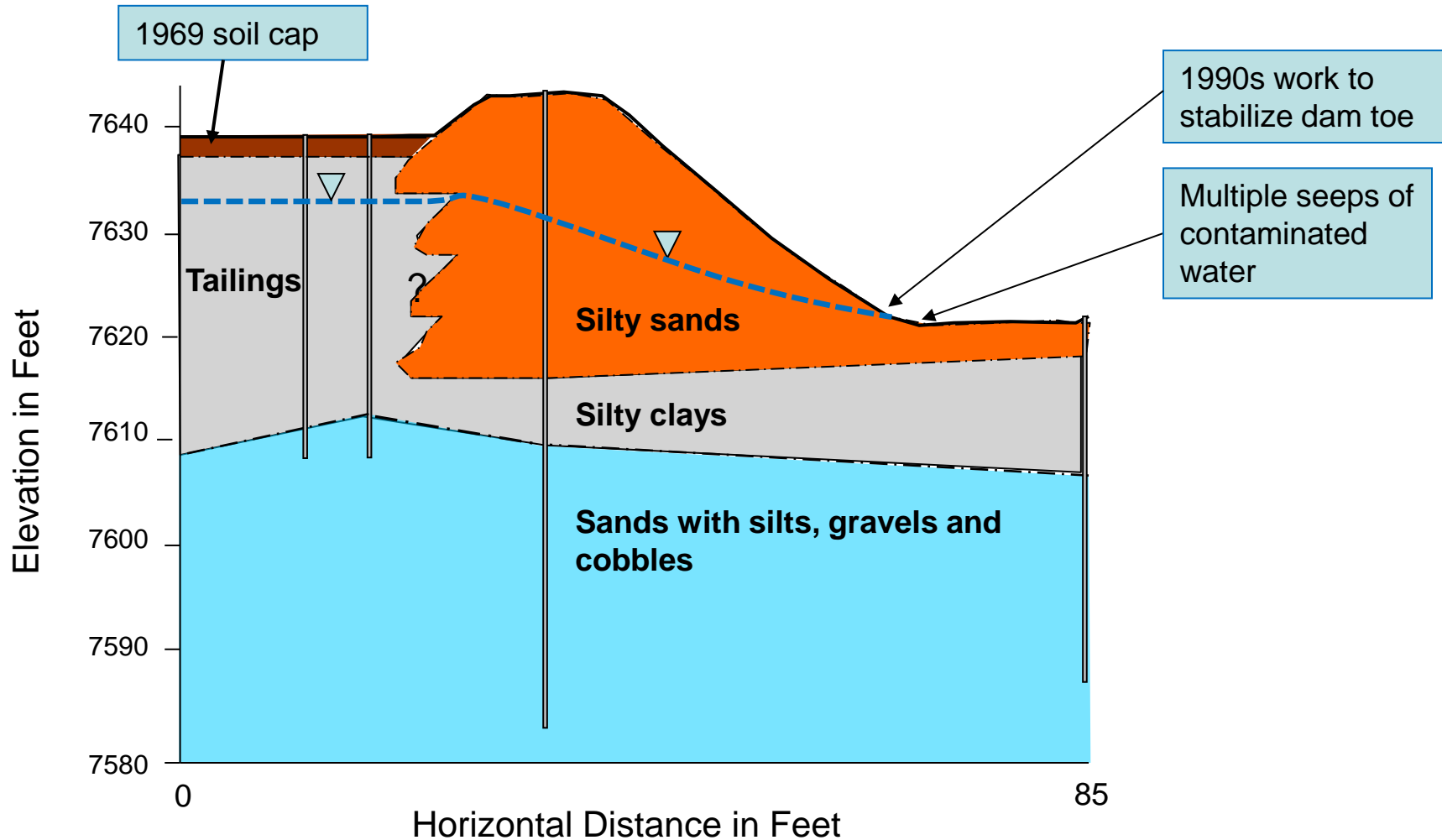


# Soda Butte Creek – August 2009





# Tailings Dam Cross-Section





# Reclamation Challenges











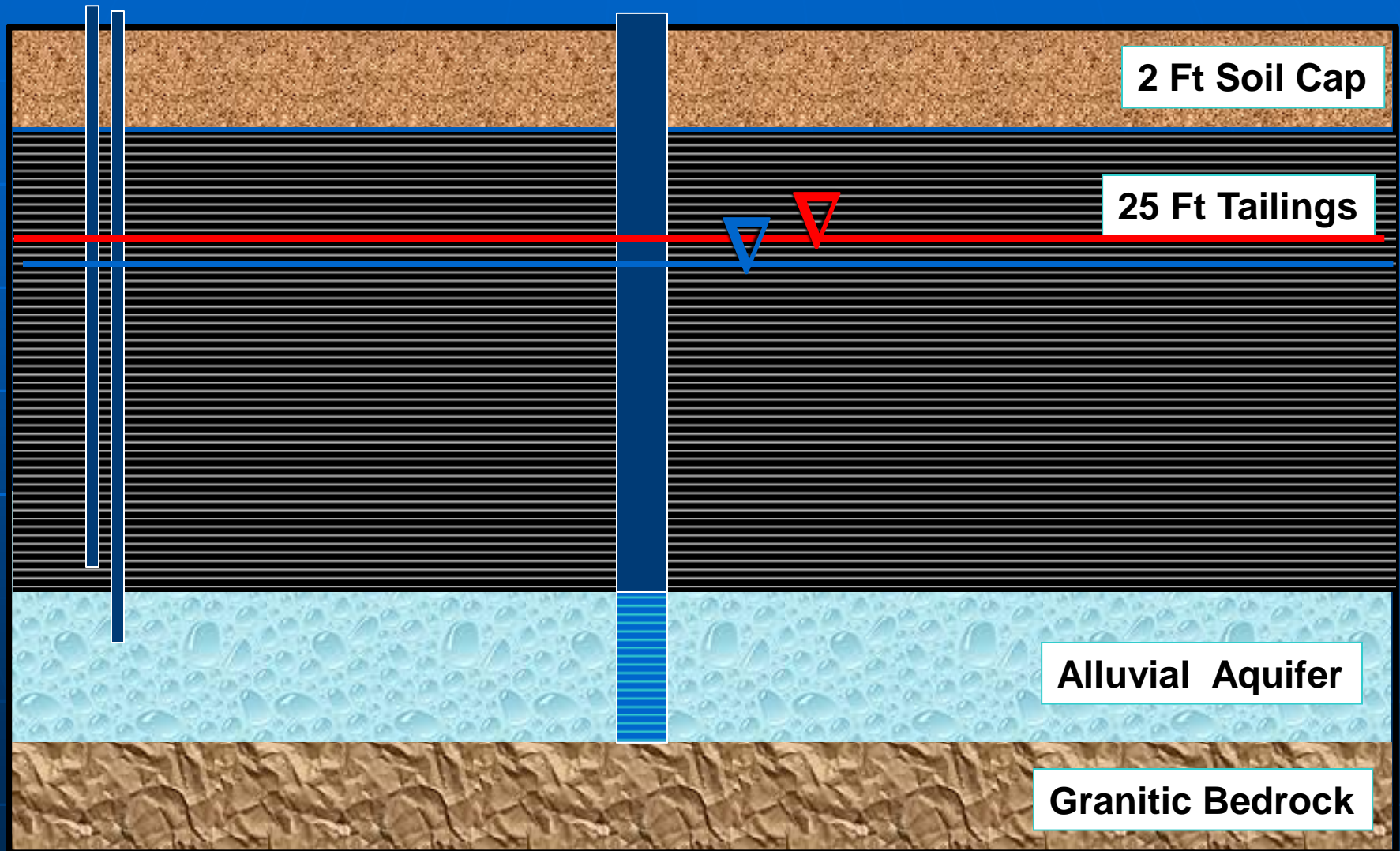


## Site Reclamation Overview

- Dewater the tailings by pumping the underlying aquifer
  - Intercept clean water
  - Treat contaminated water to DEQ water quality 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

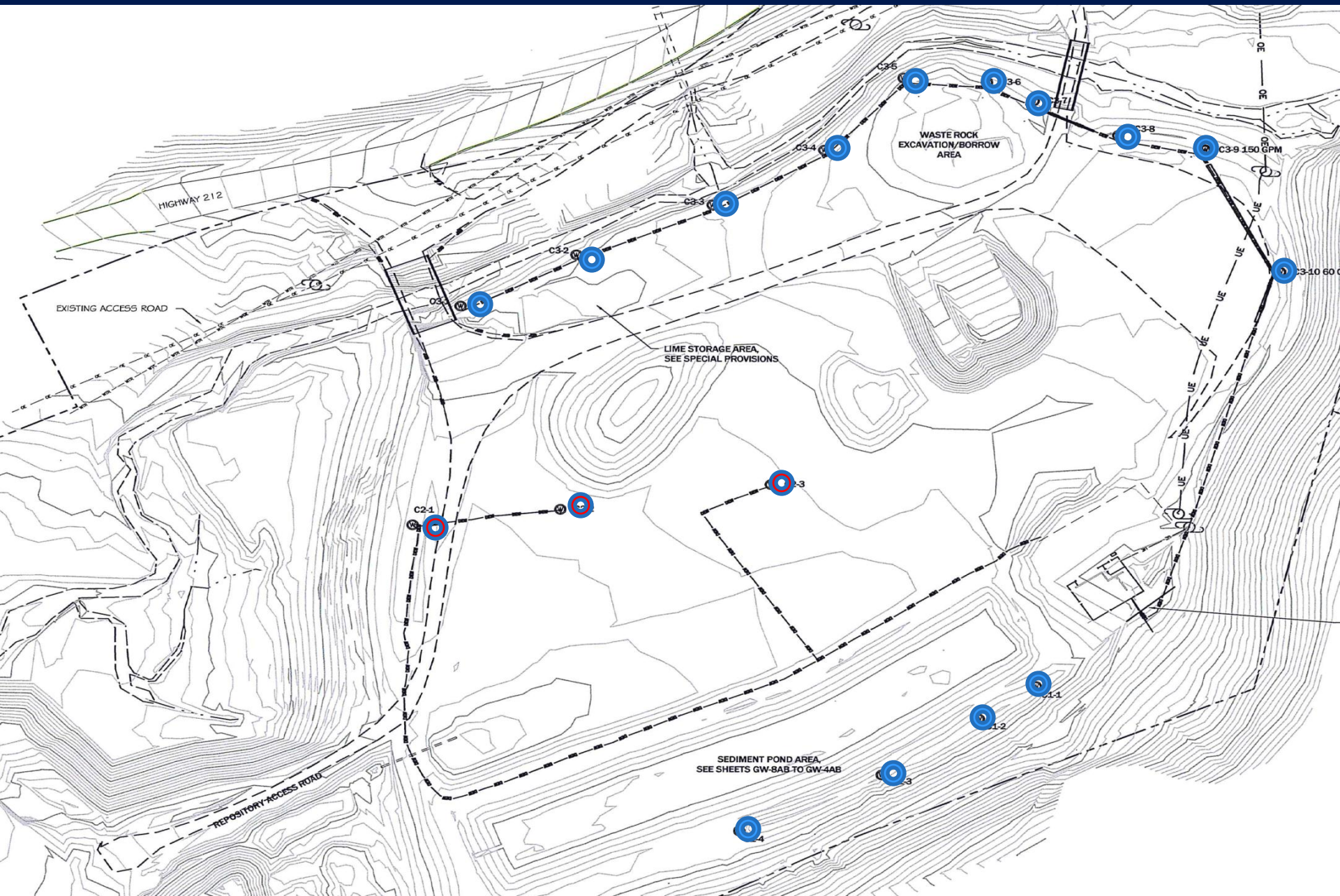


# Construction Dewatering





# Construction Dewatering System





# Construction Dewatering August 2012



Static Water Level



# Water Treatment System





A scenic landscape photograph of a calm lake reflecting the surrounding mountains and dense evergreen forests under a clear sky. The mountains in the background are partially covered in snow.

## MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY

# 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



## 2013 Project Milestones

- August 28 – 29: Soda Butte Creek diverted into its reconstructed channel
- September 7: Final section on tailings excavated and placed in the repository
- September 12: Miller Creek diverted into its reconstructed channel
- October 2: Repository HDPE liner installation complete



# Soda Butte Creek



2008



2013



## 2014 Reclamation Work

- Install repository cap – 3 feet of soil
- Improve soil productivity using compost
- Cover project with one foot of compost-amended soil
- Monitor performance of reconstructed stream channels
- Construct water collection features
- Seed in September



## Repository Construction

- Contains approximately 240,000 cubic yards of compacted lime-stabilized tailings and ore rock
- Capped with a geochusion, 60-mil 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 Compaction



July 2011



# Repository Compaction



July 2011



# Repository – Final Grading and Compaction



September 2013



# Repository – Liner Installation



2013/09/23

# Repository - Liner Installation



September 2013



# Repository – Soil Cap



July 2014



# Repository – Surface Water Control



August 2014



# Repository – Pending Seeding



August 2014

# 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
- Coconut fabric to stabilize banks
- Riparian seeding
- Planting of willow stakes



# Soda Butte Creek Reconstruction



August 2013



# Soda Butte Creek Reconstruction



August 2013



# Soda Butte Creek Reconstruction



August 2013



# Soda Butte Creek Reconstruction



September 2013



# Soda Butte Creek Reconstruction



August 2014



# Soda Butte Creek Reconstruction



August 2014



# Soda Butte Creek Reconstruction



August 2014



# Miller Creek Reconstruction



July 2014



# Water Features



August 2014



# Water Features



August 2014



## 2014 Project Status

- Sampling indicates water quality in Soda Butte Creek meets DEQ water quality standards with majority of metals below laboratory detection limits
- Expect work to approach completion in 2014 – as always weather dependent
- Received reports of significantly improved fishing in Soda Butte Creek
- Remaining work includes seeding and the planting of aspen, fir, and thimbleberry

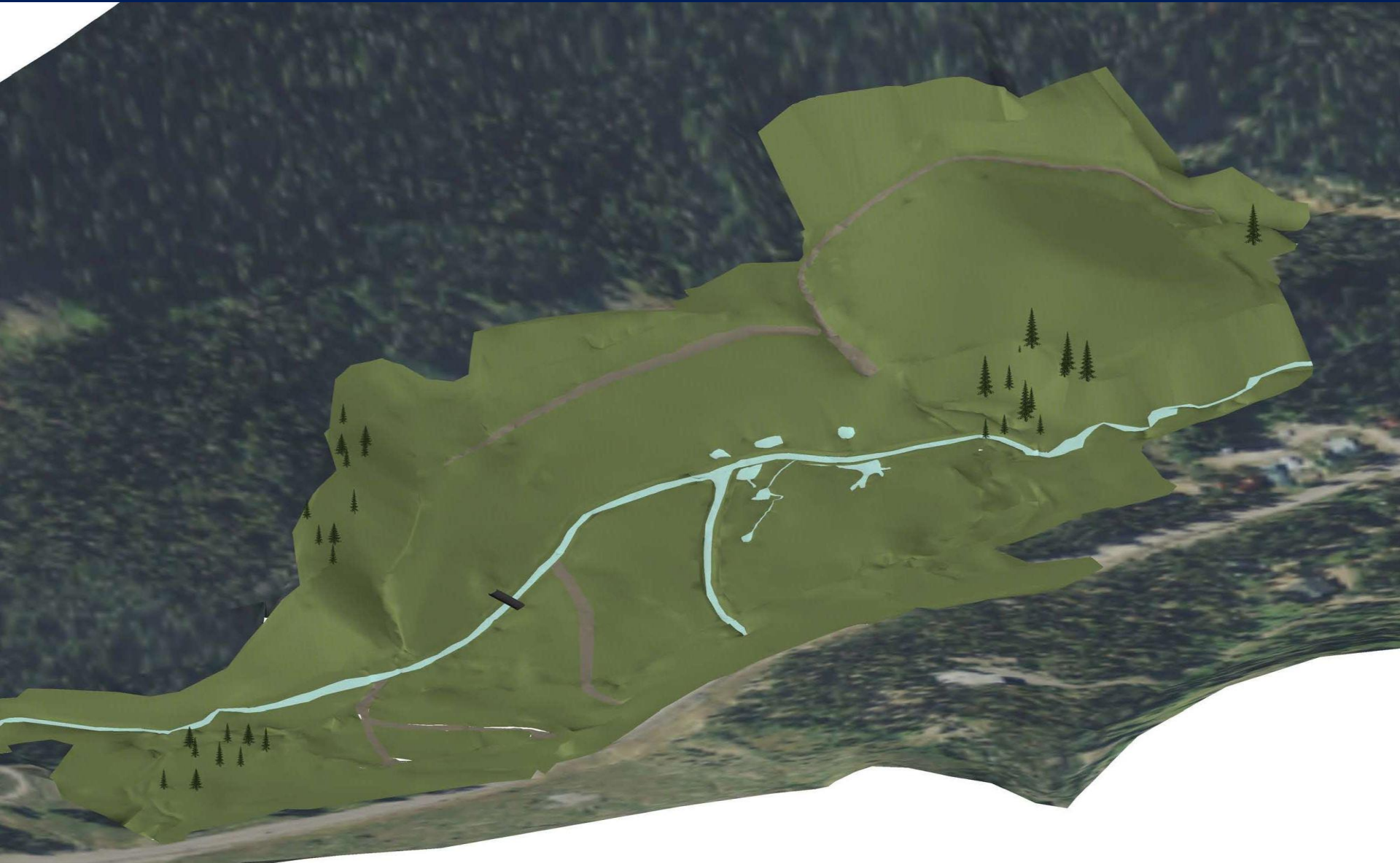


## Remaining work

- Seeding grass species and mulching
- Planting of aspen, fir, and thimbleberry
- Construction of final surface water control features
- Continued monitoring of water quality
- Monitoring of vegetation and general reclamation work



# Conceptual Project Completion







MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY

# Questions



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# McLaren Tailings Contribution to Total Loads in Soda Butte Creek

## Monitoring point SBC-2 near Cooke City

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

## Monitoring point SBC-4 near Yellowstone National Park

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

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