THE EAGLE MINE SUPERFUND SITE CASE STUDY
Agenda

• Site Background
• Enforcement History
• Regulatory Framework
• Robust Remedy
• Getting to Site Completion
Eagle Mine Workings
Over 65 miles of tunnels located beneath Gilman
Site Climate
Mining History
Gilman

Shaft elevators – miners’ entrance into mine

Outbuilding full of abandoned drill cores in Gilman. This one building contained multiple rooms full of cores. (2019)
Mine Waste

- Waste Rock
- Roaster Waste
- Tailings
- Acid Mine Drainage (AMD)
Old Tailings Pile & Rex Flats

- Old Tailings Pile
- Rex Flats
- Tailings Slurry Pipeline/Trestle
- Eagle Mine up canyon

1985
New Tailings Pile

New Tailings Pile
(now Consolidated Tailings Pile)

Area of Current Water
Treatment Plant

1985
Site Management - 3 Operable Units

- **OU1: Sitewide Surface Water Quality**
  - All remedial components targeted at achieving surface water ARARs
  - Ecological risk based
- **OU2: Town of Gilman**
  - Soils in abandoned town
  - Human health risk based
- **OU3: Battle North Redevelopment**
  - Soils in Rex Flats, Maloit Park, Old Tailings Pile requiring additional remediation to achieve residential use standards for redevelopment
  - Human health risk based

Stained rocks along Eagle River from groundwater flow from Rex Flats.
Enforcement History

1986 Site listed on NPL

1986: Site MOA
1995: SSEA
2004: State MOA
2018: Site MOU

CERCLA Process
1983: State NRD & Response Cost Claim
1993: EPA OU1 ROD
1999: EPA OU1 ESD
2017: EPA OU1 RODA

Relevant Enforcement
1988: State Consent Decree/Remedial Action Plan
1996: EPA Consent Decree/Statement of Work
2018: Friendly UAO to PRP
Where are we now? The obstacles.

- Patchwork enforcement strategy for OU1
  - Confusing to everyone
Where are we now? The obstacles.

- Sunsetted provisions from 1996 CD/SOW
  - Critical remedial components including water treatment plant
  - Narrow provisions
Where are we now? The obstacles.

- Regulatory Issues
  - Two State-issued discharge permits
    - Water treatment plant
    - Liberty Well
  - When CERCLA & CWA don't agree
    - TI waiver for arsenic
  - 303(d) listing
    - Segment change
Solution.

- New Consent Decree for OU1
  - Goals:
    - Consolidate all enforcement documents for OU1
    - Adopt permit equivalent documents
    - Broader and more flexible modification and additional work provisions
Robust Remedy

- 1988 State and PRP Consent Decree/Remedial Action Plan:
  - Flood workings by bulkheads and grouting
  - Removal of roaster pile wastes and tailings throughout the Site
  - Consolidation of roaster pile wastes and tailings into CTP
  - CTP Capping
  - Setting compliance objectives and long term monitoring for site
Robust Remedy
1988 State and PRP Consent Decree/Remedial Action Plan:

- Waste rock pile diversion ditches
- CTP groundwater extraction trenches
- Up gradient diversion trench at CTP
- Diversion of lower Rock Creek around contamination
- Construction of lined surge pond at CTP
Robust Remedy

- 1990 Amendment to State and PRP Consent Decree/Remedial Action Plan:
  - Construction of WTP
  - Second lined surge pond
  - Mine seepage collection system
  - Expanded gw/sw monitoring
  - Temporary sludge disposal at CTP

Acid Mine Drainage from the Eagle Mine workings in 1991

Eagle River in 1991
### Water Treatment

#### WTP Influent/Effluent Concentrations

<table>
<thead>
<tr>
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<th>Average Influent Concentration (µg/l)</th>
<th>Average Effluent Concentration (µg/l)</th>
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<tbody>
<tr>
<td>Arsenic</td>
<td>31.63</td>
<td>1.04</td>
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<tr>
<td>Cadmium</td>
<td>76.25</td>
<td>0.65</td>
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<tr>
<td>Copper</td>
<td>167.56</td>
<td>4.0</td>
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<tr>
<td>Zinc</td>
<td>33,080</td>
<td>48.58</td>
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Note: Arsenic data reported from Ramboll-Environ, 2010 through 8/2014. All other contaminants based on 2014 data only. PQL for Arsenic is 1 µg/l and detection limit for copper is 4 µg/l.
Robust Remedy

- 1996 EPA and PRP Consent Decree:
  - Culvert system to divert clean Rock Creek surface flow
  - Mine draw down to maintain mine pool level
  - Waste rock pile leachability study
  - Completion of CTP cap within 2 construction seasons
  - Addition of sludge dewatering and disposal at WTP

Mine draw down system at Adit 5
Robust Remedy

- 1998 ESD
  - Liberty Well
  - 980-foot well
  - 150 gpm direct discharge into Willow Creek
  - State Discharge Permit

Pump replacement in Liberty Well in September 2018
Robust Remedy

• 2018 Unilateral Administrative Order
  • Expansion of existing remedy
  • Collection of groundwater at Belden, at the base of Rock Creek and from the Mill Level of the mine
  • Conveyance of collected water to WTP for treatment

Iron precipitate forming in an area where groundwater enters Eagle River in Belden
Before and After. . . . . . .
Roaster Pile Remediation

Roaster Pile #1
Prior to Removal
1988

Roaster Pile #1
After Restoration
1994
66,300 cubic yards of Roaster material were removed from 5 Roaster Piles in 1988 and 1989 and placed in the CTP.
Roaster Pile #3 Remediation
Nearly 1 million cubic yards of tailings were removed from the OTP, Rex Flats and Maloit Park and placed in the CTP between 1988 and 1996.
Before and After...
Consolidated Tailings Pile Reclamation

The Consolidated Tailings Pile
In 1989

The Consolidated Tailings Pile
After Reclamation
1999
Before and After... Consolidated Tailings Pile Reclamation

The Consolidated Tailings Pile
Prior to 1989

The Consolidated Tailings Pile
After Reclamation
1999
Before and After.

Maloit Park Wetlands

Maloit Park Wetlands
In 1993

Maloit Park Wetlands
After Remediation
1999
Getting to Site Completion

- Lodge CD
- Permits > PEDs
- GW determination
- SWRAU
- Site deletion