Agenda

• Location
• Site Overview
• History and Mining Impacts
• Cleanup History
• Preparing for the Future
Iron Mountain Mine

Shasta Lake and Dam

Whiskeytown Lake

Keswick Reservoir

Spring Creek Debris Dam

Spring Creek Power Plant

Keswick Dam

City of Redding
Site Overview

- 4,400 acre property
- Mined 1890-1963 for copper, zinc, gold, silver, and pyrite
- Spring Creek flows into the Sacramento River
  - Most critical spawning habitat for salmon in CA
  - 19% of California’s water supply
  - Major source of hydroelectric power
<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1860’s</td>
<td>Ore found</td>
</tr>
<tr>
<td>1880’s</td>
<td>Mining started at a large scale</td>
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<tr>
<td>1898-1904</td>
<td>Hillside denuding from smelters became a legal issue</td>
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<tr>
<td>1905</td>
<td>Keswick smelter shut down</td>
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<tr>
<td>1929-1942</td>
<td>Gossan open pit mining</td>
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<tr>
<td>1930’s</td>
<td>Copper cementation plant built</td>
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<tr>
<td>1945</td>
<td>Shasta Dam completed</td>
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<tr>
<td>1950</td>
<td>Keswick Dam completed</td>
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<tr>
<td>1955-1962</td>
<td>Brick Flat Pit open pit mining</td>
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<tr>
<td>1963</td>
<td>All mining stopped</td>
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<tr>
<td>1963</td>
<td>Spring Creek Debris Dam completed</td>
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<tr>
<td>1964</td>
<td>Spring Creek Power Plant starts</td>
</tr>
<tr>
<td>1976</td>
<td>Water Board issues order abate SW pollution</td>
</tr>
<tr>
<td>1983</td>
<td>IMM on Superfund List</td>
</tr>
<tr>
<td>1989</td>
<td>AMD collection, treatment started, onsite capping, adit rehab, tailings removed</td>
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<tr>
<td>1994</td>
<td>Minnesota Flats Treatment Plant started</td>
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<td></td>
<td>SCDD Sizing Study completed</td>
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<tr>
<td>2004</td>
<td>Slickrock Creek Retention Reservoir online</td>
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<tr>
<td>2009</td>
<td>IMM Surface Water Quality Model updated</td>
</tr>
<tr>
<td>2010</td>
<td>SCAKR Dredging Project completed</td>
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</tbody>
</table>
Richmond Ore Body

Impacts to Spring Creek
(pH = 3)
Impact on the Environment

- Largest source of surface water pollution in US. Historic discharges into Sacramento River:
  - 10,000 lbs/day iron
  - 650 lbs/day copper
  - 1,800 lbs/day zinc
- 30 documented large-scale fish kills
  - Habitat for steelhead and four runs of Chinook Salmon (including endangered Winter Run Chinook Salmon)
- Site listed on National Priorities List (Superfund) in 1983 to address ecological risk
Main Mine Area of Iron Mountain Mine

Adits in the mine workings

- Slickrock Creek
- Boulder Creek
- Spring Creek
Adit Rehab and AMD Collection

Then

Now

AMD

Now

AMD
AMD Treatment and Disposal

Minnesota Flats Treatment Plant

Sludge

Water

Brick Flat Pit

Sludge Drying Ponds
Spring Creek Arm of Keswick Reservoir Dredging Project

10/13-14/2009
Interim Compliance Point: Sacramento River Below Keswick Dam
Results of Cleanup Activities

• 97% reduction of metals
• Current version of remedy: no exceedances of compliance point
• Over $500M work completed, primarily through enforcement
• Site operation requires high investment/resources
• Remedial actions performed to date:
  • Acid Mine Drainage conveyance and treatment
    • Minnesota Flats Treatment Plant for lime neutralization treatment plant
  • Clean water diversions
    • Upper Spring Creek Diversion pipeline
    • Slickrock Creek Retention Reservoir
  • Waste pile and tailings consolidation, capping, and removals
  • Spring Creek Arm of Keswick Reservoir
    • Contaminated sediment dredging and storage
Preparing for the Future

• Final Cleanup Decision
  • Focuses on Boulder Creek drainage
  • Tramway and railroad areas
  • Extensive Water Quality Modeling
  • Changing conditions: drought, raising of Shasta Dam, etc.

• EPA Takeover of Site
  • Site operator will run site until 2030
  • Unique legal settlement provides for 100 years of treatment post-2030

• Collaborating with partners
  • Continued work with our Federal, State, and Local partners

• Considering innovative technologies
  • Potential to shrink footprint of site
  • Solar/hydroelectric power
Conclusion

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