Molycorp Mine Site
Physical Features (Mine Site)

- Approximately 5.5 km from the Village of Questa.
- Area of Mine Site is approximately 16km$^2$.
- Encompasses 3 main tributary valley to the Red River: Capulin Canyon, Goat Hill Gulch and Sulphur Gulch.
- Elevation at the mine site ranges from 2300m to 3200m.
- Mining activities produced extensive underground workings and an open pit of approximately 0.65 km$^2$. Also produced approximately 320 million tons of waste rock that are around the open pit.
Geology (Mine Site)

• Precambrian metamorphic assemblages and granitic intrusive rocks overlain by Tertiary volcanic.
• Molybdenite mineralization caused by Late Oligocene and Early Miocene quartz monzonite and granites intrusions.
• Hydrothermally altered volcanics contain pyrite mineralization (1-3%).
• Mineral deposit considered Climax-type deposit.
  – Associated with silicic and fluorine rich rhyolite prophyry and grantitic intrusives.
• 3 principal alternation zones.
  – Highly altered quartz-sericite-pyrite zone,
  – Less-altered argillic (koalinite) zones, and
  – Mildly altered propylitic zone.
• Ore deposit contains quartz, molybdenite, pyrite, fluorite, calcite, dolomite, and rhodochrosite with lesser amounts of galena, sphalerite, chalcopyrite, magnetite and hematite.
Climate and Vegetation

• Annual average temperature is $4^0C$.
• Annual average precipitation is 52cm.
• Annual average snowfall is 370 cm.
• Prevalent vegetation zones are:
  – Willows, cottonwoods, shrubs, perennial grasses and flowerly vegetation along the Red River,
  – Pinon-juniper woodland (1800-2300m),
  – Mixed conifer woodland (2300-2740m),
  – Spruce-fir woodland (2740-3660m).
Hydrology

• Surface water:
  – Red River originates near Wheeler Peak at an altitude of 3658m and flows roughly 55km to the confluence with the Rio Grande.
  – Peak stream flow occurs from late May to mid June.
  – Summer thunderstorms are prevalent in July and August.
  – Mean annual discharge ranges from 12.8 to 103 ft$^3$/s, average daily discharge ranges from 2.5 to 750 ft$^3$/s.
  – Springs and shallow alluvial ground water discharge to the Red River make it a gaining stream over much of its length.
Hydrology

- Ground Water:
- 4 types of water bearing units:
  - Fractured bedrock
    - Largest volume of aquifer but contains small amounts of water due to its low porosity. Chemically clean (no to little exceedences of State Standards).
  - Waste rock piles, debris fans
    - Geochemically reactive, high porosities and fast infiltration rates. (many exceedences of State Standards)
  - Red river alluvium
    - Restricted in areal extent and have variable composition and chemically clean (no to little exceedences of State Standards)
## Constituents of Concerns (Mine Site)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Standard (mg/l)</th>
<th>Median concentration for Sugar Shack Middle (mg/l)</th>
<th>Median concentration for Capulin Spring (mg/l)</th>
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<tbody>
<tr>
<td>Aluminum</td>
<td>5.0</td>
<td>378</td>
<td>1150</td>
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<tr>
<td>Beryllium</td>
<td>0.004</td>
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<td>0.36</td>
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<tr>
<td>Cadmium</td>
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<td>0.12</td>
<td>0.57</td>
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<td>Chromium</td>
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<td>0.04</td>
<td>0.939</td>
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<tr>
<td>Cobalt</td>
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<td>3.6</td>
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<tr>
<td>Copper</td>
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<td>9.6</td>
</tr>
<tr>
<td>Fluoride</td>
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<tr>
<td>Iron</td>
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<tr>
<td>Manganese</td>
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<td>Nickel</td>
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<td>4.2</td>
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<td>Sulfate</td>
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<td>7100</td>
<td>15000</td>
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<tr>
<td>Total Dissolved Solids</td>
<td>1000</td>
<td>10750</td>
<td>20000</td>
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<tr>
<td>Zinc</td>
<td>10</td>
<td>29</td>
<td>127</td>
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<tr>
<td>pH</td>
<td>Between 6-9 s.u.</td>
<td>2.95</td>
<td>2.76</td>
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</table>
Major On going Studies (Mine Site)

- Remedial Investigation/ Feasibility Study (EPA)
- Baseline Study (26 reports)
- Revegetation Study
- Cover Infiltration Study
- Stability Study
Closure Plan (Mine Site)

- Regrade slopes to 3:1
- Cover with 3 ft of material and vegetate. (infiltration barrier)
- Water treatment
Molycorp Tailing Facility
Physical Features

- Approximately 3.5km from the Village of Questa.
- Area of Tailings Facility is approximately 4km².
- Facility sits in 2 southwest draining arroyos (dramiages).
- Contains approximately 100 million tons of tailings.
Geology

• Alluvial Sediments of the Santa Fe Group
  – Consists of sand, gravel and clays.
Climate and Vegetation

- Average annual precipitation is 40 cm.
- Vegetation consists of sagebrush/grassland with Pinon-juniper
Hydrology

• Surface water is diverted around the Facility.

• Ground Water:

• 2 main units
  – Upper and Lower Aquifer Units made up of interfingering of sands, gravels and clays. (Dams 1 and 2)
  – Basalts (Dams 3, 4, and 5)
Constituents of concern

- Molybdenum
- Fluoride
- Manganese
Closure Plan (Tailings)

• Cover with 1 meter of material and vegetate. (infiltration barrier)
• Create positive drainage off facility.
• Capture and treat seepage.