Tererro Mine Project

New Mexico Environment Department
Vicinity Map

Legend

- Campground
- Town
- Mine
- Gaging Station

EMOU
LSFH
PMOU

Pecos (Tererro) Mine
Operable Unit

Highway 63

Figure 1-1
Mining History

1882 First discovery of mineralization

Operated from 1903-1907 and 1926-1939 from 1800’ bgs

Employed an average of 600 (largest payroll in NM)

Population of 3000 in Town of Tererro

Ore rich in Pb and Zn, small amounts of Au, Ag and Cu

~2.3 tons of ore processed, ~$40M of minerals

11,137 lbs. of gold
352,664 lbs. of silver
19,297,000 lbs. of copper
138,412,000 lbs. lead
440,683,000 lbs. zinc

Ore trans via a 12 mile long aerial tramway (longest in NA)
Contamination History

1940-1979  Mine and mill waste used as construction and maintenance material.

1950  NM State Game Commission purchased all properties related to the mine and mill and transferred these assets to the NM State Game Commission

1982  LSFH was expanded. Following fish kill NMED conducted a preliminary water quality study in the area and found metals in seeps and surface water discharges around the Pecos Mine

1991  Spring runoff resulted in fish kill (90,000)

1985  Comprehensive investigation of the area was conducted

1992  Administrative Order on Consent (AOC)

Amax Resource Conservation Company was required to follow CERCLA
Site Description
Pecos Mine OU

This OU consists of:
• The mine
• 12.3 acres of waste rock (217,000 yds$^3$)
• Contaminated soils
• 5-10 acres of wetlands
• Willow Creek
• Pecos River
• Affected GW/SW
Cleanup Actions
Pecos Mine OU

The remedy for the mine included:
• Excavation and consolidation of all associated wastes
• Installing a cap overlaying an impermeable geosynthetic clay liner
• Restoring Willow Creek and associated wetlands and riparian habitats
• Revegetating disturbed areas
• Diverting both subsurface and surface water flows around the capped waste pile.
• Restore GW/SW
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Initial environmental impact investigations indicated that Pecos Mine waste materials had impacted ground water, surface water, soil and sediments in downgradient areas, primarily through waste rock piles and impacted soils present throughout the site.

As a result of these impacts, reclamation operations were performed at the Pecos Mine from 1999 through 2003 encompassing several major components, including waste materials consolidation and capping, construction of a shallow, subsurface flow Underdrain interception system; restoration of Willow Creek and its surrounding floodplain; closure of the mine’s main shaft; restoration of the Willow Creek Campground; and site wide revegetation.
Willow Creek, a local tributary to the Pecos River, borders the Pecos Mine's northern boundary. Waste rock, generated from mining operations, was deposited into the creek and surrounding floodplain, completely diverting the creek from its original pre-mining pathway until it was flowing entirely on waste rock deposits along the floodplain's southern edge.

Approximately 900 linear feet of Willow Creek was completely reconstructed after removal of nearly 65,000 cubic yards of waste rock from the Willow Creek floodplain. Reconstruction design incorporated non-impacted, upstream reach morphology considerations. (Continued on next page)

Willow Creek reconstruction work included placement of a two-foot thick layer of heterogeneous cobbles, small boulders, and gravel across the channel bottom and along the toe of each bank; placement of rock and soil backfill to increase the bank slope adjacent to the stream channel; installation of continuous panels of woven and nonwoven geotextile fabrics; backfilling with imported general silt, revegetation of the creek banks and riparian corridor with native, subirrigated grass, forbs and shrub; and transplant woody species; and construction of a step structure that captures and channels water to pools and grade control structures to ensure grade control within steeply descending floodplain, channel stability and enhance aquatic habitat establishment.

Willow Creek restoration work was initiated in 1999 and completed in 2000.
Main Shaft Cap Cover Construction

The Pecos Mine main shaft is located on the north end and at the top of the mine's waste rock pile and is 20.5-feet long. It is 6.8-feet wide and estimated to be over 700-feet deep. Reclamation construction operations in 2001 exposed workings from the side of the shaft, prompting further investigation as to its condition, resulting in the need for an enhanced cover as an additional public safeguard and added protection against potential shaft collapse.

The cover was constructed including construction of a reinforced concrete collar, two reinforced concrete anchor walls connected to the collar by a steel rebar network, a reinforced concrete cover placed over the concrete collar, and rock fill fabric netting emplaced from each anchor wall. In addition, a rock-filled geotextile retaining wall was designed and constructed to provide the necessary stability for the anchor walls and the cover system, blending into the finished waste rock pile cap.

Main shaft cover construction work was initiated and completed in 2002.

Willow Creek Campground Restoration

The Willow Creek Campground was used as a offices and materials and equipment staging location during all Pecos Mine reclamation work from 1999 through 2001. Upon completion of reclamation activities, the Willow Creek Campground was reestablished, restored and enhanced as a New Mexico Department of Game and Fish day-use area with the construction of new features including picnic and fishing sites, improved parking and roadway areas, and installation of a hand-pump well.

Post-Construction Willow Creek Campground - 2003
Materials Consolidation

An estimated 123,000 cubic yards of waste rock, tailings, un辖区 soil, wadland sediments and mining debris were consolidated and regraded within the Peek's Mine's main waste rock pile area. Consolidation was designed to incorporate all waste materials into one continuous pile in preparation for capsite. Materials consolidation work was initiated in 1999 and was completed in 2002.
The Underdrain was constructed as a 1,500 linear foot deep trench collection system to a minimum depth of 30 feet, along the entire upslope/lower part of the Pecos Mine's waste rock pile. The Underdrain was designed to divert shallow, colhoidal ground water flow from the waste rock pile for eventual discharge to Willow Creek. In addition, connection spurs were constructed within the natural drainage supplying into the Underdrain, effectively tying the Underdrain system into the subsurface bedrock. (Continued on next page).
Capping

A 13 acre cap system was constructed across the entire consolidated Pecos Mine tailings rock pile. The cap system was designed as a semi-permeable hydrologic barrier, including a 6-inch protapped clay bedding layer, a geosynthetic clay liner and a 24-inch loessial compacted topsoil layer. Approximately 53,000 cubic yards of soil materials were imported from near and off-site borrow areas for construction of the cap subgrade and topsoil layers.

In addition, two grass-based mid-slope and three rock filled gabion mattress lined perimeter drainage channels were constructed as part of the cap system, diverting surface water run-on from the cap for eventual discharge to the Pecos River.

Cap construction work was initiated in 2002 and was completed in 2003.
Revegetation

Pecos Mine revegetation work implemented three types of seed and woody species mixes, including native upland, sub-irrigated and wetland species. Plantings included 28 different species of grasses, forbs and sedges and 17 different species of conifer and woody plants.

Various revegetation methods were utilized due to the Pecos Mine's confined areas and steep slopes. Drill seeding methods were used on relatively flat areas. Hydroseeding and hydroseeding methods were utilized in areas steep slopes that could not be drill seeded. Broadcast seeding methods were used for small areas inaccessible to drill seeding equipment. All woody species were planted by hand.

Erosion control measures were installed to minimize soil loss on the cap during vegetation establishment, especially in those areas with steep slopes. The addition of Zephyrus (a sterile wheat hybrid) to the upland and sub-irrigated seed mixes was employed to provide rapid soil stabilization and erosion control. Erosion control blankets were installed across the entire waste rock pile cap and other surrounding areas, and turf reinforcement matting was installed along the bottom of the tailings spill channels immediately following application of seed, fertilizer and mulch.
Fe: 14/1.0
Mn: 2.03/0.2
Ba: 3.45/1.0
Fe: 3.72/1.0
Mn: 0.935/0.2
Cd: 0.37/1
F: 1.8/1.6
Fe: 4.45/1.0
Mn: 3.9/0.2

4th Quarter 2010
Exceedance/standard (mg/l)

PECOS MINE OPERABLE UNIT
Groundwater and Surface Water Monitoring Locations

Note: * Well used for water levels only
Daniel B. Stephens & Associates, Inc.
9-10-08
JN E506.0038
Site Description
El Molino OU

This OU consists of:
• The Mill site
• 50 acres of tailings

The mill was connected to Pecos Mine by a 12 mile aerial tramway.

Mill tailings were deposited in 2 impoundments in Alamitos Canyon. A third impoundment was located approximately 1 mile from the confluence of Alamitos Creek and Pecos River and was constructed to collect eroded material from the original tailings impoundments.