

2013 NAAML Small Project Award

Harding Pegmatite Mine Safeguard Project
Dixon, New Mexico
New Mexico Abandoned Mine Land Program
Mining and Minerals Division
Energy, Minerals and Natural Resources Department

The project construction began June 28, 2011 and ended August 18, 2011. Total reclamation construction cost was \$206,697. The New Mexico Abandoned Mine Land Program, Mines and Minerals Division, Energy, Minerals and Natural Resources Department are responsible for its reclamation.

The Harding Pegmatite Mine, five miles east of Dixon in north central New Mexico, is a historic and geological treasure. It has contributed to the scientific understanding of the origin of pegmatites.

A Pegmatite is an exceptionally coarse-grained igneous rock, with interlocking crystals, usually found as irregular dikes, lenses or veins.

Starting in the early 1900s, and during World War II, the unique pegmatites were economically and strategically important materials for the US. The Harding Pegmatite Mine was the world's largest producer of the mineral microlite. This material was needed to manufacture walkie-talkies and radios for the armed services. Beryl, used to make non-sparking tools for the development of atomic weapons, Spodumene, for thermonuclear bombs, and calcite, were also mined. Since mining ended in the 1950s, the well preserved and exposed pegmatite has been used as an outdoor laboratory for geology and mineralogy students around the world.

The mine was donated by its owner to the University of New Mexico, Department of Earth and Planetary Sciences in 1978. 3 to 4,000 people visit the site *each year*, including scientists, students, mineral enthusiasts and school children. There were many hazards on the site and access was easy into unpermitted areas. Parking also was a problem for the number of visitors the site was receiving.

With the high visitation rate and presence of 10 hazardous abandoned mine openings, University of New Mexico became interested in reclamation. The university, the site caretaker, and the New Mexico AML program developed a list of goals for reclamation. They planned for...

- An improvement of site access by installing a post and chair barrier around the parking lot, a heavy-duty locking hinged swing gate by the entrance road, and a chain gate across the secondary access road.
- Backfilling one mine shaft using mine waste rock
- Construction of bat grates, some with and without hinged locked doors
- Construction of a corrugated steel pipe (culvert) airflow closure at an adit
- Installation of a six strand barbed wire fence along the highway, two informative and educational signs, and 7 numbered marker posts for visitors to take self-guided tours

The University of New Mexico noted that due to their budget constraints, reclamation would not have occurred in a reasonable time frame without partnering with the New Mexico Abandoned Mine Land program and OSM.

The University of New Mexico required some special requests due to the research potential of the site. One design challenge was to keep the underground entrances accessible to authorized personnel for scientific research. The program's engineers designed lockable hinged doors at all adit portals where access would be necessary.

The doors are also bat and small mammal accessible openings, and have the most minimal restriction to natural ventilation. This access design has been used in other similar projects.

In case of a cave-in while personnel were performing research, the other portals without entrances had to be alternative escape routes. Engineers used an innovative locking mechanism where the door can be opened from the inside without a key.

Another on-site difficulty was due to the bedrock's fragility. Percussive drilling was dangerous, so the project engineer custom designed the grating of the doors to closely follow the existing rock, minimalizing drilling.

Design kept the visual impact of the historic site as true as possible. Exposed steel was corrosion resistant, but it was a type of *weathering* steel which forms a reddish-brown patina that blends in with the environment. Close attention was given to not cover up any significant geological features.

The University of New Mexico and the Abandoned Mine Land program were both concerned about safety for the many visitors but also took into consideration vandalism and trespassing. The gates designed to be strong and reasonably vandal and bullet resistant. Hinge and doorframe designs were devised to hide the hinges and make them almost impossible to tamper with from the outside. Gates were installed on the roads that lead to the rear of the property, preventing unauthorized access to the mine, which the site caretaker noted was a problem in the past.

At this highly visited abandoned mine site, design and on-site challenges were met while respecting the Harding Pegmatite Mine's unique historic, geologic and mineralogic significance. The community benefits from the safer site, with enhanced ability to control access. The Harding Pegmatite Mine can now be preserved as a historic and geological treasure for years to come.