

MINING HISTORY

The Harding Pegmatite Mine property has been donated to the University of New Mexico by Dr. Arthur Montgomery.

Quartz outcrops first attracted prospectors in search of gold.

Lepidolite, a lithium mica, was found instead and used in the glass industry. Joseph Peyer mined lepidolite from 1919 until 1930. The quarry was excavated and the main adit was driven. The next episode of mining, 1942-1947, produced the world's largest production of **microlite**, an unusual ore of niobium and tantalum. 10,000 kilograms of microlite concentrate containing an average of 68% Ta_2O_5 and 7% Nb_2O_5 were produced. During this period the quarry was enlarged and three adits on the east side of the main adit were driven. The last episode of mining, 1950-1958, produced great quantities of **beryl**, a beryllium cyclosilicate.

Lepidolite Mining

- 1900 First mining claims
- 1918 Joseph J. Peyer from Taos prospects for lepidolite
- 1919 Peyer begins mining lepidolite, which is shipped to Wheeling, West Virginia
- 1920 Mineral Mining and Milling Company takes ownership and continues mining lepidolite and spodumene for the glass industry
- 1927 Embudo Milling Company builds a grinding plant at Embudo on the Rio Grande
- 1930 Mining ceases, mill is dismantled, to date 13,500 tons of ore produced

Microlite Mining

- 1939 Optical grade calcite (850 pounds) mined from the Iceberg Pit
- 1941 Marrow gauge railroad line from Santa Fe to Colorado removed for scrap
- 1942 Art Montgomery enters a lease-purchase agreement of the property; mining begins for Ta minerals (Microlite), Flautio Griego as Mine engineer; R. H. Jahns (U.S.G.S.) recognizes beryl at the mine
- 1943 U.S. Bureau of Mines exploratory core drilling program by Soule, 39 holes drilled to delineate microlite ore distribution; 5 feet of massive beryl was penetrated in one hole; high-grade microlite mining continues, all mining done

GEOLOGY

Deep in the earth, the temperature can be high enough to melt rock. The melted or liquid rock is called magma. When magma cools, sometimes only part of it will harden. The leftover liquid magma will be richer in "volatiles" such as beryllium, fluorine and boron because these elements prefer to stay in the liquid magma rather than go into the crystals that are forming at high temperature. This new magma may intrude a different part of the surrounding rock than the original magma. When this special magma hardens at somewhat lower temperatures than the original magma, the crystals may grow very large. This hardened body of rock is then called a pegmatite. Pegmatites cool and harden from the walls inward. As the pegmatite cools, different minerals will form in layers like an onion skin.

Eight layers or zones can be distinguished in the Harding pegmatite:

1. quartz (grey or white)
2. beryl (white with pink hue)
3. clevelandite (white)
4. quartz (white) - spodumene (tan)
5. spotted rock (microcline with lepidolite make the lavender background, and spodumene makes the white spots in the rock)
6. rose muscovite (pink) - clevelandite (white)
7. perthite (pink) - microlite (gold or black)
8. aplite rock (white)

Sometimes a pegmatite will "stew in its own juices." In other words, some of the liquid given off while minerals crystallize or harden, intrude the already formed rock and change the minerals in it to new minerals. This process makes "replacement zones." In the spotted rock zone, lepidolite replaces microcline, and in the rose muscovite-clevelandite zone, rose muscovite replaces spodumene.

The Harding pegmatite intrudes Precambrian metamorphic rock. The pegmatite was emplaced approximately 1330 million years ago between amphibolite to the south and quartz-muscovite schist to the north. It has the composition of granite. The Harding pegmatite strikes along the east ridge in the form of a flat disc. The thickness varies from 1 meter in the areas to the east to as much as 2.5 meters in the quarry. The dike dips gently to the south. There are many smaller pegmatites in the area.

BOTANY

The Harding Mine occurs at the transition at 7500' elevation in the piñon-juniper woodland biome or life zone. Annual precipitation is about 16 inches.

In addition to piñon (*Pinus edulis*) and juniper (*Juniperus monosperma*), one can find ponderosa pine (*Pinus ponderosa*) on north slopes and in moist drainages. Common shrubs include Gambel's oak (*Quercus gambeli*), chamisa (*Chrysothamnus nauseosus*), mountain mahogany (*Cercopus montanus*), and snakeweed (*Gutierrezia sarothrae*). The common grasses are blue grama (*Bouteloua gracilis*) and Indian ricegrass (*Oryzopsis hymenoides*). Many herbaceous plants can be found flowering in spring---locoweed (*Oxytropis lambertii*), Townsend's aster (*Townsendia excapa*), Mountain parsley (*Pseudocymopterus montanus*), mustard (*Lesquerella* sp.), dwarf lousewort (*Pedicularis centranthera*), and rock jasmine (*Androsace septentrionalis*). Summer flowers include tansy aster (*Machaeranthera tanacetifolia*), penstemon (*Penstemon* sp.), Indian paintbrush (*Castilleja confusa*), and western wallflower (*Erysimum capitatum*).