MINING HISTORY AND ECONOMIC GEOLOGY OF THE WHITE MOUNTAINS, INYO AND MONO COUNTIES, CALIFORNIA

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With contributions from D. D. Trent, Allen Hencher, Jack Peskin and David Wright.

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Introduction

For the purposes of this report, the White Mountains are defined as the area east of Owens, Hammil, and Benton Valleys, north of Soldier Canyon and Deep Springs Valley, west of Fish Lake Valley, and south of Truman Springs, Saratoga Springs and the town of Basalt in Mineral County, Nevada.

Within this area, the U.S. Geological survey has inventoried 433 mines and prospects (Table 1). The distribution of principal commodity types is:

- Unknown = 16
- Antimony = 1
- Barium-Barite = 7
- Bismuth = 1
- Clay = 2
- Copper = 20
- Diatomite = 5
- Fluorine-Fluorite = 14
- Graphite = 1
- Gold = 143
- Gypsum-Anhydrite
- Iron = 1
- Kaolin = 1
- Kyanite = 4
- Lead = 25
- Mercury = 50 (49 in Nevada)
- Mica = 1
- Platinum Group Metals = 1
- Potassium = 1
- Pumice = 12
- Sand and Gravel = 7
- Silver = 82
- Talc = 7
- Thorium = 1
- Titanium = 1
- Tungsten = 19
- Uranium = 6

There are 271 mines and prospects for precious (Au, Ag) and base (Pb, Cu) metals. The present gross values of these minerals from the principal mines in the White Mountains are:

<table>
<thead>
<tr>
<th>MINE NAME</th>
<th>COMMODITES</th>
<th>RESERVES</th>
<th>Ave. Grade</th>
<th>Commodity price/ton</th>
<th>Gross value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Industrial Mineral Mines</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Champion</td>
<td>Andalusite</td>
<td>250,000 tons</td>
<td>53%</td>
<td>$150</td>
<td>$19,875,000</td>
</tr>
<tr>
<td>Colton</td>
<td>Soapstone</td>
<td>1.2 million tons</td>
<td>100%</td>
<td>$50</td>
<td>$60,000,000</td>
</tr>
<tr>
<td>Gunter Canyon</td>
<td>Pumice</td>
<td>9.6 million tons</td>
<td>100%</td>
<td>$15</td>
<td>$144,000,000</td>
</tr>
<tr>
<td>Pacific Mine</td>
<td>Sericite</td>
<td>630,000 tons</td>
<td>100%</td>
<td>$60</td>
<td>$37,800,000</td>
</tr>
<tr>
<td><strong>Metallic Mines</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sacramento</td>
<td>Au, Ag, Cu</td>
<td>5,500 tons</td>
<td>0.47</td>
<td>$1,000</td>
<td>$2,585,000</td>
</tr>
<tr>
<td>Moulas</td>
<td>Au, Ag</td>
<td>22,000 tons</td>
<td>0.23</td>
<td>$1,000</td>
<td>$5,060,000</td>
</tr>
<tr>
<td>Indian Queen-Poorman</td>
<td>Ag</td>
<td>170,000 tons</td>
<td>2.00</td>
<td>$50</td>
<td>$17,000,000</td>
</tr>
<tr>
<td>Green Monster</td>
<td>Ag, Zn, Pb</td>
<td>2,600 tons</td>
<td>17.00</td>
<td>$50</td>
<td>$2,210,000</td>
</tr>
<tr>
<td>Saratoga-Lexington-Ranger</td>
<td>Au, Ag</td>
<td>1,600 tons</td>
<td>0.41</td>
<td>$1,000</td>
<td>$656,000.00</td>
</tr>
<tr>
<td>Eva Belle</td>
<td>Au, Ag</td>
<td>7,000 tons</td>
<td>0.13</td>
<td>1000</td>
<td>$910,000</td>
</tr>
</tbody>
</table>
See Table 02 at the end of this report for additional details. Many of these mines are now in Wilderness or other restricted-status lands.

**EARLY MINING CAMPS OF OWEN’S VALLEY-WHITE MOUNTAIN REGION**

The early mining camps of Owensville, San Carlos and Bend City were described by Allen Hencher and Jack Peskin (1980) as follows:

Only weeks after Dr. French’s expedition found riches in the Cosos, prospecting parties from San Francisco found pockets of gold along the Inyo range. Indian attacks retarded development but failed to dampen hope. In fact, a New York company, headed by the superintendent of the Eclipse— the best mine—and backed in part by the Kern, even proposed a canal large enough to carry ships and power 500 stamps (Hencher and Peskin, 1980).

Still, the boom did give rise to four well-equipped mills, one with a 2,700-foot ditch for water, and three important towns: Owensville, San Carlos, and Bend City (Hencher and Peskin, 1980).

**Owensville**  
37°24′03″N 118°20′44″W T.06S. R.33E. Sec. 27, NW1/4

Owensville, being the only town near a sawmill, boasted of wood-frame buildings set on stone foundations. It supported a saloon, restaurant-store, and lodge of the Sons of Temperance. Owensville probably peaked in 1864, when a July 4 celebration drew 150 men and women (Hencher and Peskin, 1980).

A post office operated at Owensville from 1866 to 1870, when it was transferred to Bishop (then called Bishop Creek). The town was abandoned by 1871 (Durham, 1998a).

From 1868 to 1869, the town was called Glen Mary. Owensville is west of the modern-day town of Laws. The site is now registered as California Historical Landmark #230 as the "First Permanent White Habitation in Owens Valley" (Office of Historical Preservation, 2012).

San Carlos, Bend City and Chrysopolis are described in the companion article “Mining History and Economic Geology of the Inyo Mountains, California.”

**Montgomery City**  
37° 49′ 39″ N - 118° 25′ 48″ West T.01S, R.32E, Sec. 27, SE1/4

David A. Wright has this to say about the early mining camp of Montgomery City (Wright, 2014):

California’s Mono County contains a generous number of ghost towns, including the premiere ghost town of Bodie. But only 41 air miles southeast of Bodie lies a ghostly site that is for the most part forgotten, a town that was a contemporary of Bodie’s earliest days. That site is Montgomery City. When Mono County was still in its infancy, the town of Benton became a destination of miners seeking new strikes, and by 1865 was the county’s largest town. The area became a beehive of activity and as usual, miners began roaming when nearby prospects became scar (Wright, 2014).

A few miners were already finding ore where the perpendicular cliffs of Montgomery Canyon opened onto alluvium at the foot of the spectacular White Mountains, a few miles to the east. In 1863, the
Montgomery District was formed, but the identity of the man who levee his name on the land remains a mystery (Wright, 2014).

The town site of Montgomery City was soon christened, but it never got very big. Attorney Pat Reddy, well known throughout the entire Eastern Sierra region, moved to Montgomery City in 1864. He had recently lost his right arm in a Virginia City saloon shoot-out, and began dabbling in a law practice. He also ran for Recorder of the Montgomery Mining District and won 61 out of 99 total votes (Wright, 2014).

Montgomery City didn’t live very long. There was never even a post office established in the town. The Montgomery Pioneer newspaper was apparently published in November and December 1864, though no issues are known to exist today. The paper was mentioned in Bodie newspapers, and one copy of it was reported to be in existence in 1881 (Wright, 2014).

The Montgomery Pioneer’s editor and publisher didn’t stick around very long and later became Judge of the Superior Court of San Francisco. Mining in Montgomery City at the time can be well summed up in a letter to the editor he sent to the Inyo County Register (forerunner of the still-published Inyo Register of Bishop, CA)(Wright, 2014).
"Benton, Mono Co., Cal., July 1, 1885, EDS. REGISTER -- In early days -- about '63 and '64, I believe -- some very rich rock was found in Montgomery Canyon, and a tremendous rush and excitement was the consequence. A lively little town of three or four thousand inhabitants at once sprung up, locations were made and mines opened out, and large shipments of rich ore made to San Francisco and other places. I have been told that some of the ore was worth from $2 to $3 a pound; but the ledges were broken on the surface, and apparently gave out, and the excitement soon subsided. In the meantime, parties prospecting around found rich ore on Blind Springs Hill." (Wright, 2014).

The original Benton is now a sleepy village with a small population. The main attraction is the bed and breakfast at the old Benton Hot Springs Inn. What maps show as Benton on U.S. 6 is a late comer in the area, established as Benton Station in 1880 when the narrow gauge Carson & Colorado Railroad came to the area. But Montgomery City is a true ghost town and rewards anyone who makes the rough but short trip up to it, an extremely enjoyable experience (Wright, 2014).

Nearly a dozen stone walls can easily be seen scattered throughout the site. They are all located within the confines of Montgomery Creek and the base of the White Mountains. One stone cabin nestled along the base of the mountains has a fairly intact roof with both square and round head nails, indicating later occupancy. Another stone cabin exhibits a nicely preserved hearth and fireplace (Wright, 2014).

Montgomery City is situated at an elevation of just over 6,500 feet and affords pleasant summertime browsing, though it can be warm in the direct sunshine.

The road leading up to the main haul portal to the mine is deteriorated, and the portal has been caved. Below it is a smaller open working that drifts in several hundred feet.

The mineral surveys and patents at Montgomery are accessible through the Bureau of Land Management (2014). The surveys and patents in T.01S, R.332E, Sec. 27 are:
The mining history of the White Mountains region is summarized by Diggles, and others, 1983:

The earliest known mining activity around 1861 was in the southern end of the White Mountains. The most important mines included the Sacramento, Twenty Grand, Southern Belle, and Poleta mines, which produced ore containing gold, silver, copper, and lead. Ores from these mines were first processed at the Ida mill in Owensville, near the present town of Laws, California (Clark and Clark, 1978).

The earliest discovery in the northern end of the White Mountains was in 1870 at the Indian Queen-Poorman mine north of the White Mountains Roadless Area. By 1888 it had a 4-stamp mill; operations were continuous until around 1917, then intermittent until 1983. Other silver-, lead-, and zinc-rich areas were found in this area and south to Montgomery Canyon. Whiting (1888) reported that mines in Montgomery Canyon had produced $60,000 worth of metals, but by 1890, most of the rich, easily accessible silver ores had been removed. Completion of the Carson and Colorado Railroad through the Owens Valley in 1883 made Benton at the north end of the valley a mining center. Goods and machinery were delivered, and the ores and concentrates were shipped to smelters in the Reno and San Francisco areas (Clark and Clark, 1978).

Interest in the nonmetallic deposits, which are located on the west range front between Sacramento and Silver Canyons, began around 1920. A deposit of andalusite in Jeffrey Mine Canyon (later Champion...
Mine) was mined from 1921 to 1945. Deposits of sericite (referred to in some previous reports as pyrophyllite) flank the andalusite deposits and have been mined since the mid-1940’s. Ore from open pits is transported by truck to a grinding mill at Laws, California, for processing. Barite was mined in the Gunter Canyon area from the late 1920’s to the late 1950’s. Some barite came from the Hobo property, but most of it came from the Gunter Canyon Barite mine adjacent to the roadless area. Production from several pumice deposits from the mid-1920’s to 1983 has supplied local and southern California markets related building products (Stewart, 1949). Limestone from Silver Canyon was shipped to soda plants on Owens Lake for production of carbon dioxide gas used in carbonation (Logan, 1947). A small, unspecified amount of limestone from a quarry outside the roadless area, between Coldwater and Piute Canyons, was used for roofing granules (Bateman, 1956).

**GEOLOGIC HISTORY OF THE WHITE MOUNTAIN REGION**

Diggles and others, (1983:1) summarize the geologic history of the White Mountains:

The White Mountains include rocks as old as Proterozoic and deposits as young as Holocene. The rocks can be divided into four groups. (1) An upper Proterozoic through Cambrian sequence of carbonate, quartz sandstone, and shale that was deposited in a shallow-marine continental shelf environment and Ordovician strata that consists of dark argillite, chert, and shale deposited in a deep-water marine environment. The Ordovician rocks were thrust into their present location from sites of deposition 40 mi or more to the northwest. (2) Metavolcanic and metasedimentary rocks similar to Paleozoic and Mesozoic rocks found tens of miles to the northeast in western Nevada occur near White Mountain Peak. They are of a higher metamorphic grade than older rocks nearby, suggesting that they are allochthonous. (3) Mesozoic plutonic rocks of the Inyo batholith, an eastern extension of the Sierra Nevada batholith, are predominantly granodioritic to granitic in composition, but also include monzonite. About half of the roadless area is underlain by granitic rock and 16 discrete plutons have been mapped. Most of these are Jurassic or Late Cretaceous in age but small Triassic plutons are present also (Crowder and others, 1973). (4) Late Tertiary volcanic and sedimentary rocks, especially abundant in the northern part of the White Mountains, include rhyolitic lava flows, ash flows, ash-fall tuffs, and hypabyssal bodies. Most of the Tertiary sedimentary rocks contain a large amount of rhyolitic ash. Andesitic lava flows and lahar deposits are common, and olivine basalt flows are found locally at many places throughout the White Mountains (Diggles and others, 1983:1).

**MINERAL POTENTIAL OF THE WHITE MOUNTAIN ROADLESS AREA**

The USGS and U.S. Bureau of Mines assessed the mines and mineral deposits of the White Mountains between 1964 and 1983. In their summary report, Diggles and others (1983:4) concluded that:

The most important metallic mines in the area are: (1) the Sacramento mine, with 5,500 tons of measured and inferred marginal reserves containing gold, silver, and copper; (2) the Moulas mine, with 22,000 tons of indicated and inferred marginal reserves containing gold and silver; (3) the Green Monster mine, with 2,600 tons of indicated and inferred marginal reserves containing silver, zinc, and lead, and a smaller amount of higher grade resources; and (4) the Saratoga, Lexington, and Ranger mines, with 1,600 tons of indicated and inferred marginal reserves containing gold and silver. The most important nonmetallic mine inside the White Mountains Roadless Area, the Colton mine, has 1.2 million tons of indicated and inferred sub-economic sericite resources. The Pacific mine, partly
within the roadless area, has 630,000 tons of indicated and inferred reserves and 430,000 tons of indicated and inferred sub-economic resources of sericite. The Champion mine has 250,000 tons of inferred sub-economic resources of andalusite and rutile. The Gunter Canyon area pumice deposits adjacent to the White Mountains Roadless Area have 9.6 million tons of indicated and inferred sub-economic resources (Diggles, and others, 1983:4).

PRINCIPLE MINES OF THE WHITE MOUNTAIN REGION

Champion Mine

D.D. Trent describes the Champion Andalusite Mine as follows:

**Introduction:** Clearly the Champion Andalusite Mine, also known as the Jeffrey Mine, is one of the world’s most unusual mines. Not only was it unique geologically, but also was its mining method. In the 1920s, the Champion mine was the only commercial source of andalusite known in the world, a remarkable fact considering that andalusite is a mineral common in many metamorphic rocks. Andalusite is an aluminum silicate mineral, which the Champion Sillimanite Company of Detroit, Michigan, processed to manufacture high temperature refractory materials such as automobile spark plugs and chemical laboratory porcelain (remember Gooch crucibles used in quantitative chemistry laboratory classes?). Andalusite has long since been replaced by a synthetic refractory material called mullite (Schmauch, and others, 1983, p. 28).

**Location:** The mine on the western flank of the White Mountains near the head of what is now Jeffrey Mine Canyon (shown as Dry Canyon on early maps). Elevation is 8,600 to 10,000 feet. Access is by hiking up a steep and rugged 4.5-mile trail.

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1 Andalusite, Al$_2$SiO$_5$, is a polymorph of sillimanite and kyanite.
Upper workings of the Champion Andalusite Mine showing rock cribbing, tunnel portals and scaffolding on the cliff, ca. 1930 (Eastern California Museum).

**Years of Operation:** 1921 to 1945 (Dingles, and others, 1983, p. 5).

**Production:** 1921-1945, 26,457 tons of andalusite was produced, valued at $183,992. Principle production, from 1922 to 1936, amounted to about 20,000 tons of 53 percent andalusite (Schumauch and others, 1983, p. 19).

Upper mine camp of the Champion Mine, ca. 1930. All but the upper building were destroyed by fire in January 1987 (Eastern California Museum).

**Geology of the Ore Deposit:** The northern segment of the White Mountains is essentially an easterly tilted crustal block with an impressive escarpment rising from the Chalfant-Hamil valleys on the west, at an elevation of 1,310 m (4,300 feet), to the range summit at White Mountain Peak, elevation 4,342 m (14,246 feet). Cenozoic (?) uplift of the range occurred along the White Mountain fault zone. The andalusite deposit is in a quartz mass in fault-sheared steeply dipping felsic metavolcanic rocks of probable Permian to Jurassic age (JPf in Chowder and Sheridan, 1972). The rocks are metamorphosed felsic tuffs and flows containing relict pyroclastic textures, and probable flattened relict pumice fragments showing flow structure. Some of the metavolcanics in hand specimen are difficult to distinguish from aplite dikes (Crowder and Sheridan, 1982). The vivid yellow and orange of the metavolcanic rocks in the slopes of Jeffrey Canyon, and in nearby Cottonwood and Lone Tree Canyons, result from hydrothermal alteration of the felsic volcanic rocks in the shear zone of the White Mountain fault. To the west of the mine are metasedimentary rocks of Permian to Jurassic Age (JPs in Chowder and Sheridan, 1972). Intruding the metamorphic rocks is the adamellite and granite of Pellisier Flats, a gray, medium to coarse-grained biotite-hornblende quartz monzonite of probable upper Jurassic age; a K-Ar age of biotite from a sample in the adjacent Benton quadrangle yields an age of about 157 Ma (Everden and Kistler, 1970, p.33). Shearing in the White Mountains fault zone has produced black mylonite as well as
flasher and augen gneisses. Mapping of the varying rock types is difficult in the highly sheared environment. Furthermore, the steep, rugged terrain makes access to much of the shear zone extremely difficult (Crowder and Sheridan, 1982).

The zone of andalusite is about 300 feet wide and 500 feet long in sheared metamorphic rocks in the White Mountain fault zone (Jeffrey and Woodhouse, 1931, p.461; McKee, and others, 1982). The deposit is described as segregations, irregular lenses and stringers associated with the 300 foot-wide quartz mass bounded by hydrothermally altered sericite schist, and quartz monzonite (Melhase, 1925, p.92; Kerr, 1932, p.618; Sampson and Tucker, 1927, p. 400). Typically, the andalusite consists of loose, intergrown prismatic crystals, some of which reached lengths of several inches. Associated with the andalusite is quartz, and a variety of minerals including cavities of small crystals of lazulite, rutile (up to 3%), topaz, fluorite, zircon, pyrite, pyrophyllite, corundum, woodhouseite (CaAl₃(SO₄)(PO₄)(OH)₆), svanbergite (SrAl₃(PO₄)(SO₄)(OH)₆), and other somewhat rare phosphate minerals (Jeffrey and Woodhouse, 1931, p. 461; Cooper, 1962, p.23).

The source of the alumina and the sequence of geologic events explaining the origin of the andalusite deposit are unclear. It seems probable that the White Mountain fault zone provided the plumbing system for hydrothermal fluids from the Pellisier Flats intrusion to interact with the felsic volcanics and form the mineral deposit.

**Development**: The mine included eight workings, the Vulcanus No. 1 through Vulcanus No. 8. Mining was by the open stope and pillar method. The ore was then hand sorted and sacked for carrying out 4.5 miles by mule pack train to the loading camp. The workings were not extensive as most of the ore was in “high-grade segregations in massive quartz and large rooms and stopes were used to [extract] most of the ore.” Tunnels were used for exploration and haulage of the ore (Sampson and Tucker, 1927, p. 401; Cooper, 1962, p. 8). Strings of pack mules packed the ore down the steep trails to a platform at the base of the trail where the ore was loaded into sacks containing about 100 pounds each. From the platforms the ore was trucked to a loading station on the Nevada & California narrow gauge railroad (the “Slim Princess”, equipment and rolling stock of which may be seen at the Laws Railroad Museum and Historic Site near Bishop).

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2 The mineral named in honor of Charles Douglas Woodhouse (1888–1975), mineralogist, professor at the University of California, Santa Barbara.
Champion Mine. The mule corals and base of the 4.5 mile trail where trucks were loaded with sacks of ore (Eastern California Museum).

At Mina, Nevada, the ore was transferred to standard gauge Southern Pacific Railroad trains and shipped to Detroit (Jeffrey and Woodhouse, 1931, pp. 461-462).

“The lower [mine] camp at about 7,500 feet elevation included the cook house, bunk houses, a wash house, a machine shop and a blacksmith shop. The cook house boasted a commercial size cooking range as well as a walk-in refrigerator – both hauled up over 3,000 vertical feet on the 4.5-mile switchback trail (Kelsey and Kelsey, p. 38).

Electricity for the camps was supplied by a hydroelectric plant on the Jeffrey ranch at the base of the mountain and transmitted five miles to the mine camps. Wire, hardware, and power poles were packed up the steep mountain trail by mules. Two air compressors, one at each the lower and upper deposits, powered air drills (Sampson and Tucker, 1931, p. 455; Kelsey and Kelsey, 1992, p. 40).

**History:** The deposit was discovered in 1917 by Adolf Knoph (Knopf, 1917; Knopf, 1921) but no development work was undertaken until 1921 when the site was located by Dr. J.A. Jeffrey, a dental surgeon who had some experience in mining and an interest in mineralogy. With the help of an enthusiastic prospector he located the andalusite deposit at the head of what was then known as Dry Canyon. Jeffrey bought a ranch at the base of the White Mountains that became the base of operations for the mine. In addition, the ranch provided forage to feed the mules that packed the ore down the mountain and packed the food and supplies, including 600 pound air compressors, to the mine camps up the mountain.
Loading pack mules with ore and equipment at the Champion Mine. Blinders were used on cantankerous mules during loading for their safety and for that of the packers (Mural on the Chase Bank building, Bishop, California).

Pack mules and a packer at a switchback on the steep trail packing out ore to the lower station of the Champion Mine (Eastern California Museum).

Dr. Charles Woodhouse, Jeffrey’s son-in-law, became the general manager of the corporation. He designed and supervised the building of the 4.5 mile trail from the ranch to the mine camps (Kelsey and Kelsey, p. 38).

Packing out the ore required use of an aparéjo (Spanish, harness or pack saddle), a packsaddle used by mule freighters. It consisted of a large leather “envelope” stuffed with hay until it was about six inches thick and large enough to cover the mule for the heavy loads to be carried. Two 95-pound sacks of ore were loaded on each side of the aparéjo for the trip down the trail (Kelsey and Kelsey, p. 38). The operation included 16 mules and two packers. There were two trips a day, using two strings of eight mules, winter and summer.
Obviously, developing and operating this mine was extremely difficult. Nevertheless, it continued to operate even in its later years as the reserves became depleted and a competing economic process for making mullite had been developed. One wonders why mining continued in the face of these realities. It is speculated that Dr. Jeffrey, the company president, simply enjoyed vacationing at the ranch even after mining andalusite became uneconomic. The operation closed down in 1945 and the Champion Mine reverted to public domain in 1982 (Cooper, 1962, p. 8; Diggles, and others, 1983, p. 3).

Acknowledgements

I wish to thank Roberta Harlan and Heather Todd of the Eastern California Museum, Independence, California, for their vital help in providing documents and photographs that contributed greatly to this article on the Champion Mine.

Colton Soapstone Mine  

37°37'60"N -118°19'60"W  

T.04S, R.33E, Sec. 3, NW1/4

A pyrophyllite-soapstone deposit/mine located 6.8 km (4.3 miles) W of White Mountain Peak, south of Lone Tree Creek, on National Forest land. It is northwest of the Champion Mine, between Lone Tree Creek and Jeffrey Canyon. It was owned by Huntley Industrial Minerals, Inc. It was worked intermittently (Minedat.org, 2014c).

The mine is in Permian to Jurassic age metasedimentary rocks (JPs in Chowder and Sheridan, 1972). There is a fault and sheers metavolcanic rocks northeast of the mine.

Mineralization is a replacement type pyrophyllite deposit hosted in mixed clastic/volcanic rock (pre-Cretaceous phyllylitic schist, quartzite, and pre-Cretaceous volcanic rocks. The ore body is lens-shaped at a thickness of 30-48 meters and several hundred feet long. The ore consists of pyrophyllite schist in silicified zones in pre-Cretaceous volcanics and sedimentary rocks. Alteration is local (silification). Local rocks include pre-Cenozoic metasedimentary and metavolcanic rocks undivided (Minedat.org, 2014c).

The Colton Mine, has 1.2 million tons of indicated and inferred sub-economic sericite Resources (Schmauch and others, 1983:6)

For additional information see, Wright (1957b), USGS (2005c).

Eva Belle Mine  

37°33'7"N -118°11'48"W  

T.04S, R.34E, Sec. 35, SW1/4

A former Au-Cu-Pb-Zn-Ag prospect/mine located in sec. 35, T4S, R34E, MDM, 0.8 km (2,600 feet) NE of Cottonwood summit, on National Forest land (located claim). The mine was formerly owned by the Minerals Management Co., Dyer, Nevada. It produced in 1929. Workings include underground openings at a length of 79 meters and comprised of a 125 foot adit and 135 feet of drifts. Smelter recovery was 9.40% Pb, 32.55 ounces Ag/ton, 0.50 ounces Au/ton and 2.84% Cu. No production values available (Minedat.org, 2014d).

Quartz monzonite of the Beer Creek Pluton (Jmb in Krauskopf, 1971) is in contact with Pre-Cambrian Reed dolomite (pCr in Krauskopf, 1971) for at least 3 mi along a northerly trend. A lens of quartz-limonite boxwork occurs in a 30-feet-wide shear zone in dolomite. The lens is 100 feet long, 2.5 to 12.5 feet thick, and contains quartz, limonite, hematite, malachite, lead and zinc carbonates, and minor
amounts of pyrite and galena. Similar material on dumps of workings suggest several lenses or pods may exist (Schmauch and others, 1982, Table 4, No. 72, p.44).

Mine workings are found in a zone 4,300 feet long which follows a northwest Trend. In this zone there are four adits (with 300 feet of workings) and eight pits. The mine produced a total of 607 tons of ore which yielded 303.7 oz. gold, 11,826 oz. silver, 6,629 lb copper, 55,284 lb lead, and 17,943 lb zinc in 1901, 1902, 1904, 1975, and 1976 (U.S. Bureau of Mines production records; cited in Schmauch and others, 1982, Table 4, No. 72, p.44).

The mine was reopened in 1976 and mapped that year by Gregg Wilkerson during the U.C. Santa Barbara summer field camp. Host rocks are Pre-Cambrian carbonates and quartzites of the Campito, Deep Springs, and Reed Formations (Krauskopf, 1971). The mineralization is chimney form at the intersection of two faults. Although close to the Beer Creek Pluton, this is not a contact metamorphic deposit.

There are about 7,000 tons of indicated sub-economic resources containing 0.13 oz. gold per ton, 1.2 oz. silver per ton, 1.0 percent lead, 0.17 percent zinc, and 0.11 percent copper remain in the deposit. There is a high potential for additional gold-silver-lead-zinc-copper resources (Schmauch and others, 1983, Table 4, No. 72, p.44).

Additional information can be found in Eric (1948), Schmauch and others (1983:44), USGS (2005), and U.S. Bureau of Mines (1998). In this guide is an article and geologic map of the Eva Belle Mine.

**Gunter Canyon Pumice Mine**  37°27'30"N  118°17'7"W  T.05S, R.33E, Sec. 36, SE1/4  T.06S, R.34E, Sec. 06, NW1/4  T.06S, R.33E, Sec. 12, 13

A former pumice mine located about 9.3 km north-northeast of Laws, along Gunter Creek Canyon, on National Forest wilderness land (White Mountains Roadless Area Review & Evaluation (RARE II) Area) Local rocks include Pre-Cambrian marine rocks of the Poleta (Cp) and Campito formations (Cpm) (Bateman, 1965, Plate 3). Workings include unspecified surface openings (Minedat.org, 2014b).

Additional information about the Gunter Canyon pumice deposit is found in Tucker (1926:251) and Tucker (1938b:485, pl.3.)
The primary source of information about the Indian Queen-Poorman mine is Smith and others (1983k).

The Indian Queen-Poorman mine is in the Buena Vista mining district, also known as the Queens, Oneata, Mount Montgomery, or Basalt district, is usually described under Mineral County, Nevada. The principal mining area in the district, however, is located at the head of Queen Canyon in Esmeralda County. Queen Canyon lies just north of Boundary Peak in the northern White Mountains east of the Nevada-California state line. All of the portion of the district in Esmeralda County is within the boundary of the Inyo National Forest, and a small part of the district at the head of Queen Canyon, including the Indian Queen Mine site, is within the Sugarloaf Roadless area (Smith and others 1983:25k).

According to Lincoln (1923) the first mining activity in the area dates to 1862. Little came of the early prospecting, and it was not until 1870 that the Indian Queen (Queen) Mine was located. Production began in 1873, and extended for a number of years. Couch and Carpenter (1943) credit the district with $367,435 through 1881. Lincoln (1923) mentions a revival in 1905-07, but no record of production for this time exists (Smith and others 1983:25k).
As shown on U.S.G.S. map GQ-1013, the rocks exposed on the southwest side of Queen Canyon are hornblende-diorite, ademellite, and granite of the Inyo batholith. On the northeast side of Queen Canyon, metasedimentary rocks of the Cambrian Harkless Formation and the Ordovician Palmetto Formation are exposed. These rocks have been intruded by the Inyo batholith complex, and hornfels, skarn, and marble have formed locally within the contact zone. Tertiary volcanic rocks form the upper reaches of the northeast side of Queen Canyon either covering or cross-cutting the older sedimentary rocks. Most of the mineral properties in Queen Canyon are located within the north west trending band of Harkless Formation exposed on the steep slope of the canyons’ north wall. The Indian Queen or Queen Mine is high on Garnet Ridge at the southeast head of the canyon, the Morgan, Spohr, and Albert mines are located along the trend of the Harkless outcrop to the northwest. Just above the old camp area in Queen Canyon, the canyon forks on each side of Garnet Ridge. The lower point of Garnet Ridge is underlain by Ordovician Palmetto Formation, mapped in thrust contact with the underlying Harkless. No mineral deposits were seen in the Ordovician rocks, and the thrust itself has no evidence of mineralization. The thrust contact is mapped (U.S.G.S. GQ-1013) as following the canyon floor to a point just west of the old camp where it climbs up and across the toe of the canyon wall west of the Albert mine. There are small prospects here, but they are in the Harkless Formation, just east of the mapped thrust contact. The small outcrop of basalt just above the Spohr mine is in flow contact with the underlying metasediments, and a red baked zone can be seen below the basalt in the metasediments. Although not shown of the geologic quadrangle map, it seems that there is a major structure between the Cambrian rocks and the Tertiary rocks high on the canyon rim to the northeast. The Cambrian rocks east of the Albert mine appear to be large, chaotic blocks, in a way similar to blocks on the margins of large caldera structures. The highest points on the east canyon rim, Mustang Point, Horseshoe Rock, and Kennedy Point, appear to be rhyolitic plugs or domes within the Tertiary section. The structural boundary between Mustang Mountain to the east and Queen Canyon to the west also forms the general boundary between the Buena Vista district and the adjacent Fish Lake Valley district (Smith and others 1983k:25, 26).
The Harkless formation in the area of the mines in Queen Canyon is composed of argillites, phyllites, and spotted schists. The rocks are tan, pale green, and maroon, and they show abundant iron staining around the old mine workings. At the Indian Queen mine, some of the workings follow a 50 foot-wide shear zone which is heavy with iron and manganese oxide staining. Other workings on the ridge above the mine expose N40°W trending shear structures. The old drifts and stopes of the Indian Queen-Poorman mine are reported to follow prominent northwest-southeast shear zones. Mining was done on what are described as breccia zones laced with quartz veins containing sulfide minerals (Brad Lyles, personal communication). An interesting observation made by Lyles is that the old workings extend for a long distance to the southeast, and that the extreme southeast end of the accessible workings pass from altered sediments into highly altered volcanic rocks. The contact is not sharp, and is complicated due to the alteration. Lyles did not think that the vein-type mineralization was present within the volcanics (Smith and others 1983k:27).

If the vein mineralization of the Indian Queen does extend into volcanics, the mineralization is therefore very young, and not related to the Inyo Batholith to the south. If, as is more logical, the vein mineralization does not cross the contact, the alteration in the volcanics may signify young mineralization related to the volcanics similar to what can be seen in the mercury-gold properties in the Fish Lake Valley district to the southeast. Whatever is the case, if volcanic rocks were actually intersected by the deep workings of the Indian Queen, the contact between Cambrian sediments and Tertiary volcanics must here be a structural contact district (Smith and others 1983k:27).

Dump rock at the Indian Queen contains visible amounts of galena, chalcopryite, pyrite, and copper oxide minerals. Some galena with quartz was seen at the upper Albert workings. Other dumps in the area were, except for minor iron staining, essentially barren (Smith and others 1983k:27).
Additional information can be found in Vandenburgh (1937), USGS (1908), Lincoln (1923), Raymond (1877) and Nevada Bureau of Mines & Geology (1983).

**Moulas Mine Group**  
37.5277062 N. -118.276774 W.  
T.05S, R.33E., Sec. 01, NE1/4  
T.05S, R.34E., Sec. 08

The Moulas Mine Group are former lode Au-Cu-Ag mines 1.8 km (6,000 feet) northeast of Chalfant Peak, on National Forest land. It was owned by Kintla Exploration and Outback Mining Co. Workings include surface and underground openings. (Minedat.org, 2014c).

Local rocks include Granodiorite of Mount Barcroft. The mine is associated with a fault in this igneous unit (Bateman, 1965, Plate 3).

Metamorphic rocks the Moulas Mine consist of slate and hornfels that are in contact with a Granodiorite of Mount Barcroft pluton. The sedimentary rocks are faulted and sheared in northeast to northwest directions and filled with various amounts of quartz or gouge. The quartz veins range from 0.1 to 7.0 feet thick and 10 to 400 feet long. The longest vein averages about 2 feet thick. It is massive, brittle, often banded with limonite and siliceous limonite. Some areas of the vein have blebs or masses of pyrite, specular hematite, chalcocite, or chalcopyrite and associated malachite stain (Schmauch and others, 1983h, Table 4, No. 85, p.47).

Mine workings at the Moulas Mine Group consist of eleven adits (six caved), three shafts (two caved), 11 trenches, and 20 pits are in a 0.5 by 2.5 mile area. The adits are 20 to 100 feet long, except for the main inclined adit which has over 800 feet of drifts and stope areas (Schmauch and others, 1983h, Table 4, No. 85, p.47).

In a trench adjacent to the main inclined adit is a quartz vein with 22,000 tons of indicated and inferred marginal reserves, averaging 0.23 oz. gold and 0.2 oz. Silver per ton. In the unmined portion of the inclined adit is 9,600 tons of indicated sub-economic resources averaging 0.08 oz. gold and 0.5 oz. silver per ton. Of the 184 samples collected from this property, 34 had 0.1 to 1.78 oz. gold per ton, 24 had 1.0 to 11.2 oz. silver per ton, and 20 had 1.0 to 3.98 percent copper. This property has a high potential for additional gold-silver-copper resources (Schmauch and others, 1983h, Table 4, No. 85, p.47).

Additional information is found in USGS (2005b) and U.S. Bureau of Mines (1998).

**Pacific Mine**  
37°38′55.83″N -118°20′24.01″W  
T.03S, R.33E., Sec. 33, NE1/4

At the Pacific Mine, sericite-bearing schist occurs in a band of felsic metavolcanic rocks that trend north for more than 3 miles along the White Mountains fault zone. The main deposit is more than 200 feet long and 100 feet thick. An additional deposit or extension, about 100 feet thick, lies 400 feet to the north. Three lenses of sericite schist, 160 to 220 feet long, occur at the White Swan Claims 2,000 feet south of the main deposit. Ore grade rock contains mostly sericite with less than 30 percent quartz. This deposit has been described as pyrophillite (Schmauch and others, 1983h, Table 4, No. 53, p.40).

The mine occurs in a shear zone of felsic metavolcanic rock that is Permian to Triassic in age (JPf in Crowder and Sheridan, 1972). Metasedimentary rocks are to the west of the mine (JPs in Crowder and Sheridan, 1972).
Mine development consists of two open pits are on the main deposit. The north pit is 200 by 400 feet and has been explored to a depth of 200 feet by five drill holes. The south deposit was developed by a 111-feet-long adit. Ore was crushed and classified at a mill at Laws, California, 4.5 miles northeast of Bishop. The Pacific Mine has produced more than 160,000 tons since 1945, (U.S. Bureau of Mines production records) and continued to produce about 1,000 tons per year on a custom basis in 1983. The product was sold under the trade name Chromacal which was used principally as a paint extender (Schmauch and others, 1983h, Table 4, No. 53, p.40).

The Pacific Mine has 630,000 tons of indicated and inferred reserves and 430,000 tons of indicated and inferred sub-economic resources of sericite (Schmauch and others, 1983h:6)

**Piute Mine**  
(Comstock Pumice Mine)

The Piute Mine appears prominently on BLM’s 1:100,000 topographic map. But in the USGS mine database, it is recoded as the Comstock Pumice Mine

The massive, moderately consolidated pumice deposit is exposed only in the open pit; elsewhere it is covered with fanglomerate at least 10 feet thick. Particles making up this subaqueous deposit vary from fine sand to pebble size. A screen analysis by Chesterman (1956, p. 61) shows that 76.5 percent is minus 1/4 in. to plus 30 mesh in size (Schmauch and others, 1983j, Table 4, No. 84, p.46).

An open pit, 400 feet long, 100 feet wide, and 30 feet deep. The property was mined intermittently from 1941 to 1945. A bulldozer removed overburden and pushed pumice into a storage bin. The minus 1/8 in.
undersize, removed by screens, was mostly silica sand. The oversize material was crushed by rollers to pass a 5/8 in. screen and sold at Bishop and other markets in southern California (Chesterman, 1956, p. 61; Schmauch and others, 1983j, Table 4, No. 84, p.46).

From outcrop exposures, at least 110,000 tons of indicated and inferred marginal reserves of pumice remain. Compaction, permeability, and porosity tests confirm its suitability for lightweight aggregate products. This property has a high potential for additional pumice resources (Schmauch and others, 1983j, Table 4, No. 84, p.46).

Polita Mine  
37°21'31.68"N  -118°16'32.43"W  T.07S, R.34E., Sec. 08, NW1/4

This mine had gold, some free-milling, associated with pyrite and carbonate in narrow quartz vein in limestone. It was worked by a 400-foot adit and a 600-feet, inclined winze (Norman and Stewart, 1951, Table 4, No, 73, p.160).

Ruins of ore loding structure, Poleta mine. Photo by Gregg Wilkerson, 2014

The rocks are PreCambrian Poleta Formation (Bateman, 1965, Plate 3). See geologic maps at end of this report

There is a unique paved road at the Polita mine with 60% grades.

Sacramento Mine, comprising 6 claims, on the west slope of the White Mountains, 11 miles north of Laws and 3 miles northeast of Chalfant Siding on the Southern Pacific Railroad at an elevation 6000 feet. The owner, in 1940 was Joseph Smith, of Laws, Calif. The quartz vein in granite strikes N. 30° E., and dips 30° northwest. It is from 18 in. to 4 feet wide. Development consists of a 300-feet. shaft on the vein from which workings considerable ore was stoped prior to 1890. Below this shaft four tunnels have been driven into the hill. The upper, No. 1 tunnel, was driven 300 feet on the vein. Some stoping was done above this tunnel. No. 2 tunnel was driven 550 feet on the vein, then crosscut east 900 feet. Vein is 2 feet to 4 feet wide in these workings, No. 3 tunnel north 30° east 450 feet on the vein which is 4 feet wide here. At face of tunnel is a winze 50 feet deep with 100-feet drift trends north which ends at a fault. Strike of fault is east-west. No. 4 tunnel is a crosscut east 150 feet, with a raise to No. 3 tunnel. The ore in these workings is said to carry $15 to $16 (in 1940) per ton in gold, largely free. The mine is idle (Sampson and Tucker, 1940:132).
Ore at the Sacramento Mine is contained in a 1.7- to 2.0-feet-thick quartz vein, associated with an altered diabase dike in hornblende monzonite, is exposed for 380 feet along strike and 600 feet down dip in mine workings. The vein and dike trend north and dip 25° W. The north end of the vein is thinned and fragmented by shearing; the east side is partly overlapped and terminated by a reverse fault. Pyrite and chalcopyrite in the vein are partially oxidized. Gold and silver are associated mainly with limonite and secondary copper minerals. Discrete grains of visible gold were observed in quartz and in siliceous limonite-quartz (Schmauch and others, 1983, Table 4, No. 53, p.40).
The Sacramento ore lies in a fault zone in the Granite of Mount Barcroft (Batman, 1965, Plate 3).

The Sacramento Mine has 5,500 tons of measured and inferred marginal reserves averaging 0.47 oz. gold per ton, 0.3 oz. silver per ton, and 0.56 percent copper (Schmauch and others, 1983j, p. 6)

Saratoga, Lexington, and Ranger Mines  

37°27'51.74"N  -118°18'44.33"W  
T.05S, R.33E, Sec. 36, SW1/4

At the Saratoga, Lexington and Ranger Mine, there is a mineralized shear zone, 4 to 5 feet thick, in interbedded limestone and argillite. The vein is exposed for 60 feet on the surface and to a depth of 80 feet in the workings. The zone contains from 70 to 90 percent limonite and siderite with discontinuous veins and pods of quartz up to 1.5 feet thick, and veins of chalcedony and calcite. Various amounts of hematite, pyrite, pyrolusite, malachite, chalcopyrite, gold, and silver also occur in the zone (Schmauch and others, 1983, Table 4, No. 101, p.50).

At the Saratoga, Lexington and Ranger Mine, development consists of four adits totaling 700 feet, one shaft that is 29 feet deep, and five pits. Production data was reported with the Southern Belle Mine and cannot be separated (Schmauch and others, 1983, Table 4, No. 101, p.50).

The ores at this mine are hosted in the PreCambrian Poleta and Campito formations. The ore is localized along a fault zone that juxtapose these two formations (Bateman, 1965, Plate 3).

There are Eight hundred tons of indicated and 800 tons of inferred marginal reserves averaging 0.41 oz. gold per ton, 0.54 oz. silver per ton, and 0.06 percent copper remain in the deposit. Road access and processing facilities near the property are factors that influence the classification of this small resource. There is a moderate potential for additional gold, silver and copper resources (Schmauch and others, 1983g, Table 4, No. 101, p.50).
The Southern Belle Mine is in the Piute Mining District. D.D. Trent observes:

According to U.S. Bureau of Mines records, the Southern Belle has also been known as the Inyo Gold Mine (Schmauch and others, 1983c, p. 18).

The mine is located on the western slope of the White Mountains, about 5.5 mi north of Laws. The nine claims are partially in Mono County. The south end of the property is in Inyo County. It was in operation from 1893-1937 (Schmauch and others, 1983c, p. 18).

The Southern Belle Mine mill site and dumps. Ore shoot delivered ore from a railroad track that connected to northern parts of the mine complex. Photo by Gregg Wilkerson, 2014.

The Southern Belle Mine is reported to have produced $250,000 prior to 1904 but the records were destroyed in the 1906 San Francisco earthquake fire. The U.S. Bureau of Mines reports the combined
production from several workings: gold, 1,024.77 oz.; silver 182 oz.; (Sampson and Tucker, 1940b, p. 135; Schmauch and others, 1983c, p. 18).

The ore deposit is intensely faulted and folded. Host rocks are hornfels, argillite, phyllite, shale, and marble of the PreCambrian Campito Formation (Bateman, 1965, Plate 3). These metamorphic rocks are broken by steeply-dipping tensional faults. The 0.1 to 2.9-feet-thick quartz veins filling these faults contain iron oxides, copper oxides and gold. (Schmauch and others, 1983, p. 50). Granitic rocks intrude the metamorphic rock sequence, but no igneous rocks are present in the mineralized area of the mine workings and the property is divided into three segments, the Southern Belle, Bullion and New York mines (Sampson and Tucker, 1940, p. 135). Six veins are reported at the Southern Belle, three of which have been the main producers. The Southern Belle vein, which strikes east-west and dips about 45 degrees N, averages 7 feet in width. It has been worked by horizontal drifts, winzes and raises. The Randolf and Pierce veins, also striking east-west experienced limited development (Sampson and Tucker, 1940b, p. 135-136).

Several portals at the Southern Belle main workings connected to more than 3,900 feet of stopes, drifts and winzes. At the southern end of the property are four shafts, six trenches, three pits and 11 adits. The New Year shaft, which is in Inyo County, is reported to be 260 feet deep with three underground working levels, and the Bullion Mine, east of the New Year, was developed by a 375-feet inclined shaft with six levels. A small mill was on the property in 1940 consisting of a jaw crusher, three 1250-lb stamps, amalgam plates, a concentrating table and powered by a 20 horse power gas engine (Sampson and Tucker, 1940b, p. 136; Schmauch and others, 1983c, p. 50).

The Southern Belle mine was worked from 1893 until about 1907. From 1931 to 1937, it was leased by operators (Sampson and Tucker, 1940b, p. 136).

A railroad connected the northern and southern workings of the Southern Belle. The mill foundations are still there, as are remnants of many ore delivery shoots.

**Twenty Grand Mine**

37°30'45.82"N -118°19'13.37"W   T.05S, R.33E, Sec. 14, SE1/4

The Twenty Grand Mine is former lode Au-Ag-Cu-Pb producer located, 2.3 km (2,500 feet) south of Chalfant Peak, along Piute Creek, on National Forest land. The property was comprised of 10 claims. Mineralization is a vein deposit with veins at 2 to 20 feet thick, hosted in quartzite, dolomite, quartz monzonite and limestone of the PreCambrian Poleta Formation (Bateman, 1965, Plate 3).

The ore body strikes NE and dips 30-40SE at a thickness of 6.1 meters (maximum). Vein quartz is brecciated and recemented. Alteration is local (oxidation). Local rocks include Cambrian marine rocks and/or Quaternary alluvium and marine deposits. Workings include underground openings comprised of a 600 foot adit, 120 foot adit and a 40 foot adit, plus a 60 foot incline and a 40 foot incline with a 200 foot, 15 degree winze. There are also a 200 foot adit, and two 300 foot adits with 150 feet of crosscuts and drifts. Total underground development is about 2,000 feet (Minedate.org, 2014g).

The geology of the Twenty Grand mine consists of northwest-trending, gently dipping faults and shear zones in metasedimentary rocks and quartz monzonite are partially filled by quartz veins 1 to 2 feet thick and 100 to 200 feet long. Quartz is massive to vuggy and brecciated, and contains gold, galena, chalcopyrite, hematite, pyrite, brochantite, antlerite, malachite, and azurite (Schmauch and others, 1983e, Table 4, No. 96, p.49).
Mine development consists of twelve adits, three caved, one caved shaft, 41 pits and trenches. Forty-eight tons produced in 1936 yielded 11.8 oz. gold, 909 oz. Silver, 1,213 lb copper, 9,100 lb lead (U.S. Bureau of Mines production records). Sampson and Tucker (1940, p.139-140) reported that five carloads shipped from this property had ore valued at $60 per ton (Schmauch and others, 1983e, Table 4, No. 96, p.49).

A small amount of ore was produced in 1936. Smelter recovery ran 9.45% Pb, 1.26% Cu, 1.89 ounces/ton Ag, and 0.25 ounces/ton Au. There is no record of early Au production. Production data are found in Goodwin (1957c).

Additional information may be found in Tucker and Sampson (1940:139-140), Schmauch and others (1983e), USGS (2005g), and U.S. Bureau of Mines (1989f).

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Principal Mines of the White Mountains
Mono and Inyo County, California

Legend
- Mines or Settlements
- Access Routes

Map showing mines and settlements in the White Mountains area of California.
Geology of the area near the Eva Belle Mine. Adapted from Krauskopf, 1971,
Geologic map of the area of the Queen Canyon and Indian Queen-Poorman mines. Adapted from Crowder and others (1972).
Geologic map of the area near the Pacific, Colton, and Champion Mines. Adapted from Chowder and Sheridan, 1972.
Geologic map of the area near the Poleta Mine. Adapted from Bateman, 1965,
Geologic map of the area near the Sacramento, Moula, Piute and Twenty Grand Mines. Adapted from Bateman, 1965, Plate 3.
<table>
<thead>
<tr>
<th>Table 1: Mines and Prospects of the White Mountains, Mono and Inyo Counties, California and Mineral County, Nevada</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Table 4:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
</tr>
<tr>
<td><strong>Table 5:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
</tr>
<tr>
<td><strong>Table 6:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
</tr>
<tr>
<td><strong>Table 7:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
</tr>
<tr>
<td><strong>Table 8:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
</tr>
<tr>
<td><strong>Table 9:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
</tr>
<tr>
<td><strong>Table 10:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
</tr>
<tr>
<td><strong>Table 11:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
</tr>
<tr>
<td><strong>Table 12:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
</tr>
<tr>
<td><strong>Table 13:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
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<tr>
<td><strong>Table 14:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
</tr>
<tr>
<td><strong>Table 15:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
</tr>
<tr>
<td><strong>Table 16:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
</tr>
<tr>
<td><strong>Table 17:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
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<td><strong>Table 18:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
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<td><strong>Table 19:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
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<td><strong>Table 21:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
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<td><strong>Table 23:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
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<td><strong>Table 25:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
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<td><strong>Table 26:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
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<td><strong>Table 27:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
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<td><strong>Table 28:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
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<td><strong>Table 29:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
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<td><strong>Table 30:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
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<td><strong>Table 31:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
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<tr>
<td><strong>Table 32:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
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<td><strong>Table 33:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
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<td><strong>Table 35:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
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<td><strong>Table 36:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
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<td><strong>Table 37:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
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<td><strong>Table 38:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
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<td><strong>Table 40:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
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<td><strong>Table 41:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
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<td><strong>Table 42:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
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<td><strong>Table 43:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
</tr>
<tr>
<td><strong>Table 44:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
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<td><strong>Table 45:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
</tr>
<tr>
<td><strong>Table 46:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
</tr>
<tr>
<td><strong>Table 47:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
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<td><strong>Table 48:</strong> North American Geologic Map, ENSO-Related Scientific Process and Materials, Table of Contents</td>
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Inyo County, California

**Mercury Prospect**
- Location: 6S 34E Sec. 5 MDM
- Commodity: Mercury

**Kesef Prospect**
- Location: 7S 35E Sec. 27 MDM
- Commodity: Silver, Gold

**Esmeralda County, Nevada**

**McNutt Mercury Prospect**
- Location: 7S 35E Sec. 16 MDM
- Commodity: Mercury

**Iron Bell**
- Location: 7S 35E Sec. 20 MDM
- Commodity: Copper

**Mistake**
- Location: 7S 35E Sec. 19 MDM
- Commodity: Silver

**Katy Nos. 1 & 2; Black Canyon Rare II Area**
- Location: 7S 35E Sec. 18 MDM
- Commodity: Gold, Silver, Copper

**Jody-Dee-Tom; Black Canyon Rare II Area**
- Location: 7S 35E Sec. 17 MDM
- Commodity: Gold, Silver, Copper

**Birch Creek Rare II Area**
- Location: 7S 35E Sec. 16 MDM
- Commodity: Gold, Silver, Copper

**White Mountains**
- Location: 7S 35E Sec. 15 MDM
- Commodity: Gold, Silver, Copper

**Red Cloud/World**
- Location: 7S 35E Sec. 14 MDM
- Commodity: Gold, Silver, Copper

**Black Canyon Rare II Area; Golden Mirage Mine; Golden Mirage & 1 & 2**
- Location: 7S 35E Sec. 13 MDM
- Commodity: Gold, Silver, Copper

**White Mountains**
- Location: 7S 35E Sec. 12 MDM
- Commodity: Gold, Silver, Copper

**Birch Creek Rare II Area**
- Location: 7S 35E Sec. 11 MDM
- Commodity: Gold, Silver, Copper

**Red Cloud; Red World Exploration 1 & 2; Black Canyon Rare II Area**
- Location: 7S 35E Sec. 10 MDM
- Commodity: Gold, Silver, Copper

**Red Cloud**
- Location: 7S 35E Sec. 9 MDM
- Commodity: Gold, Silver, Copper

**Hope Co.; Red Cloud; Red World Exploration**
- Location: 7S 35E Sec. 8 MDM
- Commodity: Gold, Silver, Copper

**Hope**
- Location: 7S 35E Sec. 7 MDM
- Commodity: Gold, Silver, Copper

**Katy Nos. 1 & 2; Black Canyon Rare II Area**
- Location: 7S 35E Sec. 6 MDM
- Commodity: Gold, Silver, Copper

**Black Canyon Rare II Area**
- Location: 7S 35E Sec. 5 MDM
- Commodity: Gold, Silver, Copper

**Birch Creek Rare II Area**
- Location: 7S 35E Sec. 4 MDM
- Commodity: Gold, Silver, Copper

**Birch Creek Rare II Area**
- Location: 7S 35E Sec. 3 MDM
- Commodity: Gold, Silver, Copper

**Birch Creek Rare II Area**
- Location: 7S 35E Sec. 2 MDM
- Commodity: Gold, Silver, Copper

**Birch Creek Rare II Area**
- Location: 7S 35E Sec. 1 MDM
- Commodity: Gold, Silver, Copper
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<th>Secondary ORE</th>
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<th>CSOS</th>
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INDEX OF DMEA REPORTS (CALIFORNIA-NEVADA), DMA NO. 4468, P. 2

Mercury
Gold

5S 34E Sec. 33 MDM
37.93302999970
-118.34174000000

6S 36E Sec. 10 MDM

TINGLEY, J.V., 1982, FIELD EXAMINATION OF 13 AUGUST 198

-118.30622000000
37.51274000010
-118.24787000000

OTHER NAMES
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-118.11010000000
37.96660000030
Esmeralda

Inyo

Lead, Silver
Lead

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-118.13703000000

Inyo

Copper
Gold


TINGLEY, J.V., 1982, FIELD EXAMINATION OF 13 AUGUST 198

-118.30622000000
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-118.24787000000

Other Names

37.29355000010
KNOPF, ADOLPH, 1918, INYO RANGE AND THE EASTERN SLOPE OF THE SOUTHERN SIERRA NEVADA, CALIF:  US GEOLOGICAL SURVEY PROFESSIONAL PAPER NO. 110, P. 11
<table>
<thead>
<tr>
<th>MINE NAME</th>
<th>COMMODITES</th>
<th>GRADES</th>
<th>RESERVES</th>
<th>Ave. Grade</th>
<th>Commodity price/ton</th>
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<td>Champion</td>
<td>Andalusite</td>
<td>53% 250,000 tons</td>
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<td>Colton</td>
<td>Soapstone</td>
<td>100% 1.2 million tons</td>
<td>100% $50</td>
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<td>Gunter Canyon</td>
<td>Pumice</td>
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<td>100% $15</td>
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<td>100% $60</td>
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<td>Sacramento</td>
<td>Au, Ag, Cu</td>
<td>0.47 oz gold per ton, 0.3 oz silver per ton, and 0.56 percent copper</td>
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<td>Moulas</td>
<td>Au, Ag</td>
<td>0.23 oz gold and 0.2 oz silver per ton</td>
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<td>Indian Queen-Poorman</td>
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<td>2.0 oz/ton</td>
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<td>Green Monster</td>
<td>Ag, Zn, Pb</td>
<td>17 oz silver per ton, 4.0 percent zinc, and 0.73 percent lead</td>
<td>2,600 tons 17.00</td>
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<td>Saratoga-Lexington-Ranger</td>
<td>Au, Ag</td>
<td>0.41 oz gold per ton, and 0.54 oz silver per ton</td>
<td>1,600 tons 0.41</td>
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<tr>
<td>Eva Belle</td>
<td>Au, Ag</td>
<td>0.13 oz. gold per ton, 1.2 oz. silver per ton, 1.0 percent lead, 0.17 percent zinc, and 0.11 percent copper</td>
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