

Feature

Mine of the Month

Copper World Mine



(Clark Mountain District, CA)

The mineral deposit known today as the Copper World Mine was originally located in 1868—the first of many economical lodes discovered in the Clark Mountain Range and the Ivanpah Mining District. However, as it sat idle for many years while other deposits were exploited (such as the Mescal and Bullion Mines), its full potential was not realized until the late 1890s when it became the most significant copper producer in southern California, and one of the four largest in the U.S. Discovered by a former Pony Express rider named Johnnie Moss, the deposit languished while he sought financial support for continued exploration. Successful in that endeavor, the Piute Mining Company was formed in April of 1869. A group organized and sponsored by the new company set out to more thoroughly explore the region, mainly for sources of silver. The party included Moss, mining expert James H. Crossman, and businessman William H. Clarke (after whom Clark Mountain was named—the letter *e* had been later dropped). All told, the party had located and staked more than 100 silver and copper claims throughout the Ivanpah and Yellow Pine (see Discover Minerals Volume 1 Issue 1) mining districts. During this period, the actual reserves at the Copper World had still not been assessed or appreciated; subsequently, the deposit sat idle for nearly 30 years!

Circumstances changed significantly in the late 1880s when Nikola Tesla began developing alternate current using copper coils, which led to the long-distance transmission of electricity! This historic discovery caused a dramatic increase in the value of copper, leading to a rush for the metal. Subsequently, after changing ownership several times, exploitation of the Copper World deposit began in earnest in 1899 with the completion of a smelter that produced a daily total of about 7 tons of copper matte of 95% purity, along with minor amounts of Au, Ag, Pb, and Zn.

The property lies at an elevation of 5453 feet on the southwest slope of Clark Mountain (see Discover Minerals Volume 1 Issue 4), about 4 miles (by air) northeast of Interstate 15 at Mountain Pass (location of the famous rare-earth Molycorp Mine). Hosted in the Cambrian Bonanza King Formation (known as the Muav Limestone in the Grand Canyon), and associated with sills of Cretaceous quartz monzonite, the irregularly shaped ore body reportedly had a thickness of about 3 meters and width of up to about 60 meters. The ore was composed of secondary copper minerals that formed as supergene alterations of the original primary sulfides (i.e. pyrite, chalcopyrite, etc.) present in the deposit. Primarily, these included the carbonates azurite and malachite, and the silicate, chrysocolla.

Operating sporadically in the early years of the 1900s, the most significant production at the Copper World Mine occurred during WWI due to the particularly high—though temporary—price of copper. Ore at that time was producing 4% Cu, 3-5 oz Ag, and about .1 oz of Au per ton. However, once the price of copper plunged at the conclusion of the conflict, operations were once again suspended in 1918. Very little development had occurred since, except for an adit that was driven in 1977 to extract exceptionally fine specimens of malachite-azurite-tenorite admixtures dubbed "Royal Gem Azurite" for sale to mineral collectors.

Observations and Comments

The Copper World was among the first mines I visited and explored in the late 80s to early 90s. I remember the first impression it made upon me as I approached the mine—walls encrusted with gemmy blue copper glance composed primarily of chrysocolla. It was a spectacular sight!

Now, however, the greeting is nowhere near as impressive to me, either because weathering has diminished the dazzling discoloration of the local rocks, collectors have denuded the deposit of the best material, or it was never actually all that impressive to start with, but rather exaggerated by the marvel of inexperience! Today, wearied by years of exploration and familiarity, the excavation seems no more impressive than any other copper-bearing locality. Nevertheless, it's always been an interesting mine and area to visit.

According to information provided on mindat.org, workings include numerous surface and underground diggings:

The main tunnel is driven N40W for 753 feet, and drifts SW for 100 feet where a winze was sunk on the contact to a depth of 75 feet. A crosscut was driven N40E for 40 feet at the bottom of the winze. There are over 2,000 feet of crosscuts and drifts at this level. 45 feet above the main tunnel is another tunnel 600 feet in length.

Apparently, the writer has not been to the Copper World in quite some time! While there *was* an accessible main inclined shaft accessed by a short portal thirty-plus years ago, the entrance has long since been buried by talus dislodged from the mountainside above by gravity. The shaft sloped at an easy 45-degree angle for several hundred feet, with few short drifts, one of which opened to a large stope. This, no doubt, was the glory hole.

Outside, another stope (adjacent to the adit just mentioned) had been carved into the mountain, but extended down for only a short depth. The exposed rock contained small masses of malachite with azurite concretions ("blueberries") embedded in it, along with coatings of black tenorite. This was given the lofty name of Royal Gem Azurite; it was too soft for lapidary work, but nice for display. Also found here are occasional small vugs in the country rock containing minute crystals of hemimorphite. Otherwise, the only other underground workings still accessible are a few prospect holes that pockmark the walls of the main open-cut. These contain mostly "yellow ochre" *limonite* with some corroded chalcopryite and copper staining.

More interesting, and reminiscent of the Copper World's heyday, is the saddle on the ridge above the main workings. Here, the aforementioned "gemmy blue walls" still exist to some extent. Mineralizing solutions deposited vibrant blue chrysocolla as botryoidal coatings associated with bright white calcite in the fractures of the country rock.

Crossing through the open cut in the saddle leads to the north side of the ridge where more dumps can be found and examined. In this valley are numerous other workings worth exploring, particularly the Copper Commander. The trail leading to it passes through a contact-metamorphic zone dominated by large crystalline masses of grossular garnet.

Back on the south side of the ridge is the nearby Dewey Mine, about 1000 feet west of the Copper World. The walls of the main portal are often coated with chalcantite. While here, keep an eye out for the rare nesosilicate mineral, thaumasite, a white hydrous calcium sulfo-carbosilicate; though finely fibrous, it looks very much like calcite at first glance, so don't overlook candidates as worthless!



This is an example of the brown grossularite found in a contact zone near the Copper Commander Mine. Extensive crystalline masses of this mineral outcrop along the path to the mine.

Thaumasite can be easily mistaken for common calcite. As this photo shows, the rare mineral occurs in cracks and seams in brecciated Bonanza King limestone host rock. It is soft and fibrous.



Specifications

LOCATION

DISTRICT: Clark Mountain Mountain Pass; California

TOPO MAP: Clark Mountain Quadrangle 7.5 minute series
Sec 5 T 16 N R 13 E

GPS: 35° 30' 18." N, 115° 36' 9" W

DIRECTIONS: From Las Vegas south on I-15, about 65 mi to Cima Road Exit 272; exit right (NW) .4 mi to powerline rd; right (NE) 3.6 mi to fork; go left (right leads to Mohawk Mine workings on south flank of Mohawk Hill) about .4 mi to next fork; go left about 2.5 mi to mine

GEOLOGY

SETTING:

Irregular hydrothermal deposit hosted in the Goodsprings Dolomite; ore body primarily in the late-Cambrian (~540-505 Ma) Bonanza King Formation member intruded by quartz monzonite; strike NW and dip SW. Regional structures include normal and thrust faulting.

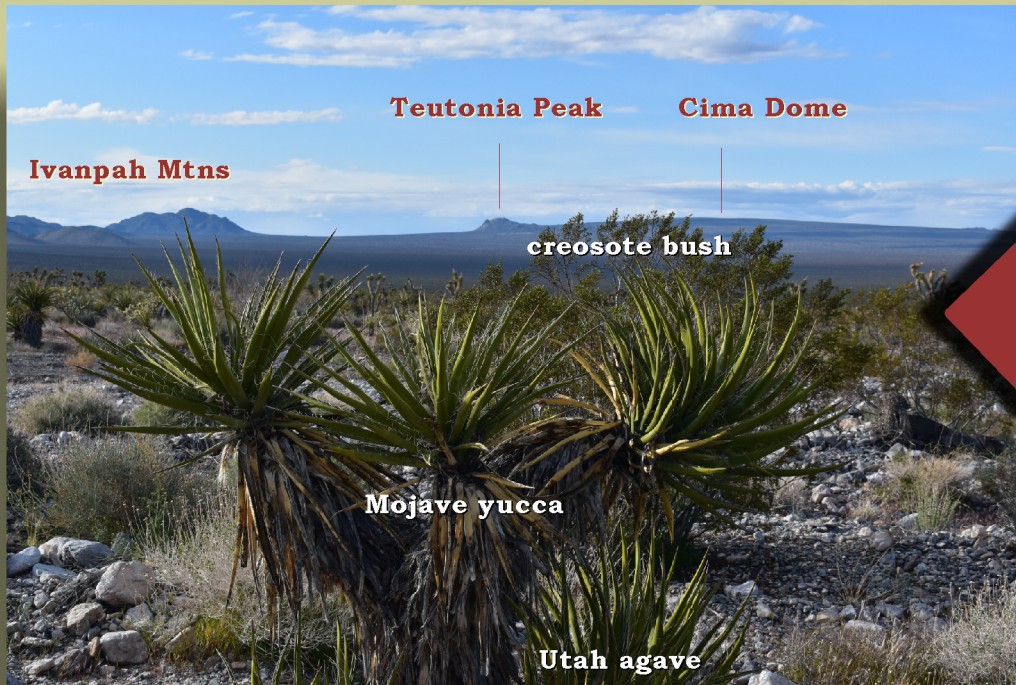
REFERENCES:

Hewett, D.F., 1956, Geology and Mineral Resources of the Ivanpah Quadrangle, CA and NV, USGS Professional paper 275, 172 pp70-72, 118, 136-138

Koenig, H., 2007, *Mining History of Mojave National Preserve*, Anthropological Studies Center, Sonoma State University, pp 41-43

<http://www.mindat.org/loc-88358.html>

Photo of Mines and Minerals



Scenic Vista

View to the SSE from an area near Clark Mountain and the Copper World Mine looking into the heart of the Mojave National Preserve. Typical flora of the Mojave Desert can be found in this area, including Utah agave, (*Agave utahensis*), Mojave yucca (*Yucca schidigera*), and creosote (*Larrea tridentata*) as pictured here.

Easy Access

There are many routes to the mines near and at Clark Mountain. The easiest for newcomers is from the south off Cima Rd utilizing a well-graded powerline service road. Of course, 4WD is still necessary as the road becomes much more challenging closer to the mountain itself.



Photo of Mines and Minerals



Inevitable Forks

The powerline road continues to the right, which parallels the north side of Mohawk Hill, site of many worthy mines to explore. The Copper World Mine and its coterie of prospects, however, requires taking the fork to the left that leads to the southwest flank of Clark Mountain.

Mind Your Poles

Assigned numbers to help guide the way, most of the wilderness roads throughout the region are marked with route poles that look like this. However, this one lacks a number, because it delineates the preserve's boundary line.



U.S. Park Lands

While not a national park, the Mojave National Preserve is nonetheless a part of the U.S. park system, and as such, all pertaining rules must be observed in order to help preserve the integrity of the lands for the enjoyment of future generations. From here the road starts to get considerably rougher as it nears the mine.

Photo of Mines and Minerals

Riding High

The Copper World Mine resides in a saddle between the main mass of the Clark Mountain Range to the right, and a spur ridge that trails off to the southwest (left middle). The dumps are easily discernable from a distance (arrow) as approach is made, a sure sign that you're on the right path.



SE dump



Hidden Gems

Though sparse, some unusual minerals, such as ilmenite and tetrahedrite, can be obtained from these dumps with considerable effort, determination, persistence, a keen eye, and luck!

Rabbit Holes

The walls of the excavation are pockmarked with short adits and shallow prospects. Numerous mineral specimens can be obtained in these workings, including azurite, malachite, chalcopryite, tenorite, *limonite*, hemimorphite, and chrysocolla.



Photo of Mines and Minerals

Typical Mineralization

An extensive volume of knowledge was obtained by prospectors and miners through years of experience exploring the western US for its mineral wealth following the great gold discoveries of the mid-19th century. They learned to look for telltale signs of mineralization that often revealed the presence of desirable commodities, such as lead, zinc, silver, and copper, thus alleviating the necessity of blindly scouring every foot of every mountain range hoping to stumble upon something useful. One such sure sign was a green stain of malachite (called copper bloom or glance) that denoted the presence of copper-bearing deposits nearby. Though not always a reliable indication of the size and profitability of such a deposit, it was certainly a promising clue worth a closer inspection.

trench



Mineralizing solutions permeate through readily available conduits such as faults and bedding planes, and upon cooling, deposit their mineral wealth. Here, a vein containing chrysocolla stains a fault separating the barren hanging wall on the left from the more permeable foot wall on the right.

The original sulfides in the vein were oxidized to form the valuable minerals sought after by the miners at the Copper World Mine. When carbonate rocks are intruded, they contribute the carbon dioxide needed to form malachite and azurite. Silicate rocks yield chrysocolla.

Photo of Mines and Minerals

XXI 87 D



Chrysocolla

botryoidal aggregate

on sericitized matrix

1.5 x 1.75 x 1.5 inches

IV 25 D



Tenorite

with malachite, azurite,

chrysocolla on matrix

4.5 x 2.5 inches

VII 22 D



Azurite

"blueberry" aggregate

with malachite

3.25 x 3 inches

III 03 D



Tetrahedrite

massive aggregates

with malachite, etc

1 x 1 inches

X 08 C



Chalcanthite

efflorescent aggregates

altering to boothite

6.5 x 4.5 inches

IV 64 D



Cuprite

massive aggregate

with malachite, etc

1.5 x 1.5 inches

IV 65 D



Ilmenite

massive aggregate with

crystalline faces

2.88 x 2.5 x 2 inches

V 01 D



Goethite

"yellow ochre" limonite

on gossan matrix

3.25 x 3 inches

V 02 D



Goethite

limonite gossan matrix

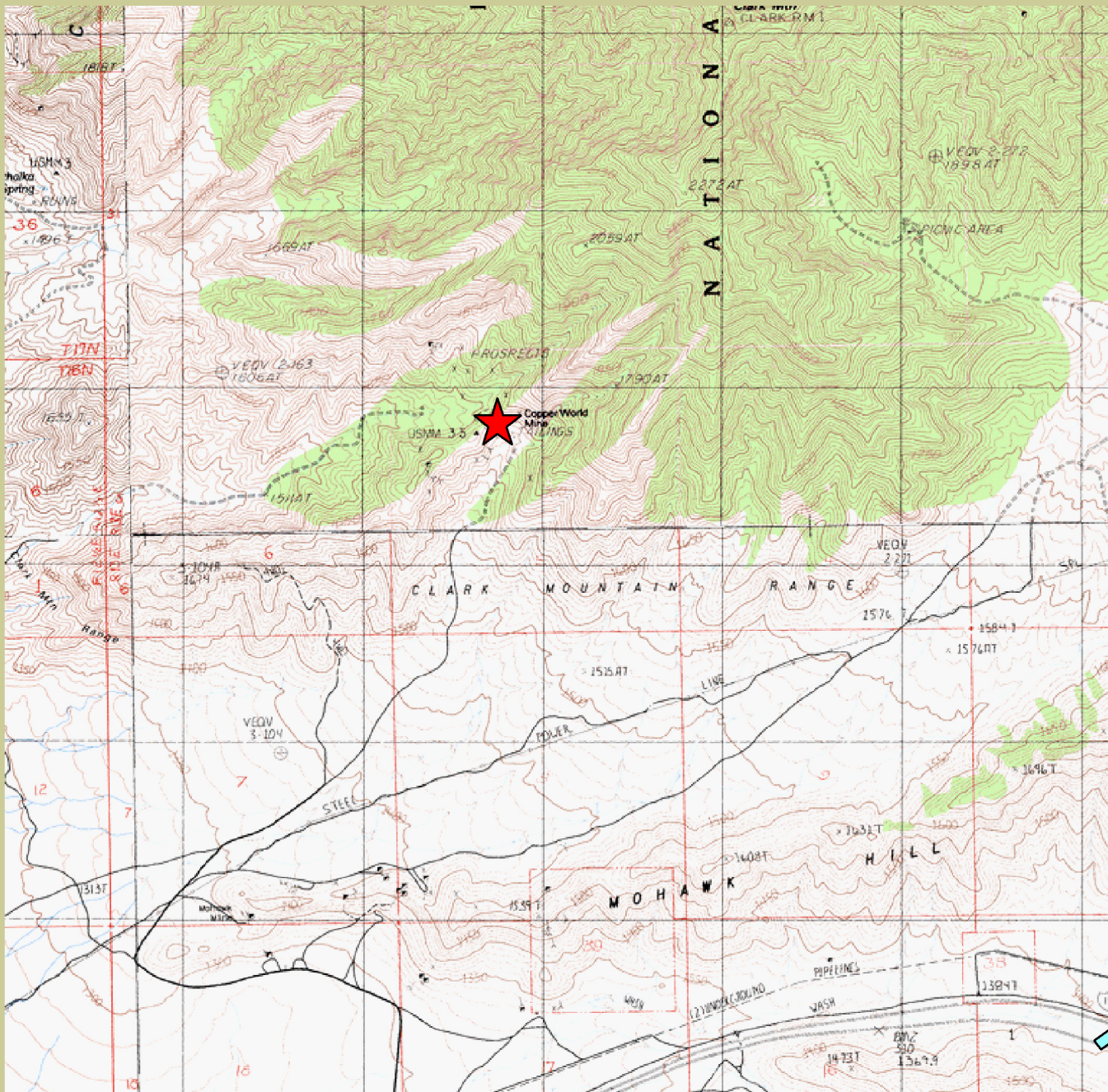
with malachite

4 x 3 inches

All specimens from the G. Miles Lehman Collection

A visitor to the Copperworld Mine can expect to find some of these minerals.

Topographic Map



I-15 to
Las Vegas
about 60 mi

This is a scan of the Mescal Range Quadrangle showing the Copper World Mine with surrounding prospects, and the nearby Mohawk mines on both sides of Mohawk Hill to the southwest (the Clark Mountain Quadrangle does not show this relationship).

View of Workings



**Aerial view of the Copper World Mine on the SW flank
of the Clark Mountain Range near Mountain Pass, CA**