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BATTLE MOUNTAIN DISTRICT

The Battle Mountain mining district, which includes the subdistricts of Copper Canyon, Bannock, Copper Basin, Cottonwood Creek, and Galena, is located in the southeast corner of the Battle Mountain Range, 10 miles southwest of the town of Battle Mountain in T31 and 32N,R43 and 44W. The district is principally in Lander County, but extends into southeast Humboldt County. The district originally was bound by the Reese River on the east, Summit Springs Valley on the west, Humboldt Valley on the north, and Buffalo Valley on the south. Access to the area is south from Interstate 80 on Nevada Highway 8A, then west along heavily used dirt roads. The district is located at the northwest end of the Battle Mountain-Eureka mineral belt.

The Battle Mountain district is perhaps the best described mining area within the Shoshone-Eureka project boundaries. Mining activity has been more or less continuous within the district since its discovery, and the prospects, veins and characteristics of the mineralization are well described in numerous publications. We have, therefore, confined our work at Battle Mountain to compiling data from literature and restricted our field reconnaissance to the collection of several samples, mainly for comparison purposes.

The Battle Mountain mining district, named for the 1857 battle between the Shoshone Indians and a government surveying expedition, was formally organized in 1866. The Shoshone Indians already had knowledge of copper ore and prospectors were making copper and silver discoveries in the early 1860's. Development followed organization and by 1868, the district was in full production with over 30 mines, 2 smelters and a mill in operation. Antimony was discovered in Cottonwood Creek in 1871 and minor production resulted from the deposits. The boom lasted until 1885 when the rich surface ore was finally exhausted, and except for minor leasing operations, the district was idle until 1900. The district experienced minor booms in 1900, 1909, and 1910 with the discovery of lode and

J. Tingley + P. Smith (1982) Mineral Inventory of Eureka – Shoeshone Resource Area: NBMG OFR ~~82-10~~ 83-3 + 83-4

placer gold, and during World War I due to the demand for copper (Vanderberg, 1938). After the war, production fell until 1935 when the Copper Canyon Mining Company began a development program. Over the next 50 years, the copper producing mines frequently have changed owners and experienced various stages of exploration and production. Placer gold, antimony and arsenic ores had been produced intermittently throughout the district's history. In 1967, Duval Corporation brought the Copper Canyon and Copper Basin open pit mines and mill into operation and became one of Nevada's three major producers of copper. These mines are still in operation today. Union Pacific Railroad (Rocky Mt. Energy) has drilled to a depth of at least 4000 feet on a deep molybdenum porphyry (Climax type) deposit at the Buckingham Mine (Schilling, 1972, oral communication). In 1981, Amax continued exploratory drilling but reported no plans to develop the prospect.

The total mineral production for the district from 1868 to 1969 is estimated to be about $50 million, principally from copper, with lesser amounts coming from gold, silver, lead, zinc, antimony, arsenic, and turquoise (Stager, 1977).

The Battle Mountain range is a roughly circular, isolated group of hills that are underlain by Cambrian to Ordovician siliceous and volcanic rocks which are unconformably overlain by the Pennsylvanian-Permian Antler Sequence. Thrust over the Antler sequence from the west are the Pennsylvanian-Permian Pumpernickel and Havallah Formations along the Golconda Thrust. The sediments are intruded by an 87 m.y. old granitic pluton (Theodore, et al., 1973), and by numerous 38-41 m.y. old dikes and stocks (Silberman, McKee, 1971). Tertiary to Quaternary ash tuffs, basalts, glassy rhyolites, and augite andesite occur locally. The Paleozoic sediments are complexly folded and faulted with normal and thrust faults trending north and northeast.

According to Hill (1915), there are four principle modes of ore occurrence:

1) The silver-lead lodes - the ore bodies occur in sandstone and quartzite in narrow fissure veins that can be traced for thousands of feel along strike, and

as replacement lodes, along north trending fault zones on the fringes of the copper-gold zones. Ore minerals include argentiferous galena, sphalerite, native gold, tetrahedrite and in the oxidized zones, cerrusite, anglesite, and cerargyrite. There are also occurrences of polybasite, pyrargyrite, and argentite. Gangue minerals include quartz, calcite and pyrite.

2) The copper deposits in the vicinity of the intrusions - the auriferous primary and secondary copper ore occurs in the siliceous and carbonate sediments in the contact metamorphic zone associated with the granitic porphyry intrusive.

3) Pyritic gold quartz veins - gold occurs in narrow white quartz veins in short shoots. The ore bodies tend to be small pockets with production coming from the enriched oxidized zone.

4) Stibnite veins and replacement lodes - Veins carrying high-grade antimony with minor pyrite occur along the outer zone of the ore deposits in Galena Canyon in carbonaceous shales and sandstones. Light and dark quartz with stibnite and pyrite replace shale locally. The ore zones are lenticular, narrow and production was small.

Other mineral occurrences in the district are as follows: Arsenopyrite is widespread in the ore deposits, occurring in quartz veins along the faults in the quartzite and hornfels of the Harmony Formation. Placer gold has been worked from the alluvial fans in front of the canyons along the range front. Placer gold deposits are also found in the older terraces and gravels. Bismuth has been reported in several mines, but its occurrence is unknown since there has been insufficient quantities produced. The turquoise deposits occur along limonitic stained shear zones in argillized quartz monzonite and in hornfels and quartzite of the Harmony Formation. Nodules and veins up to four inches are localized in the fractures. Production of turquoise in the district has been greater than $1 million (Morrissey, 1968). Molybdenite has been detected at both Copper Basin and Copper Canyon in fault zones and in narrow veins. No production has been noted. Scheelite occurs in the calc-silicate skarn zone.

The main copper and gold producing properties in the district have been the Copper Canyon and Copper Basin open pit mines, both currently owned by Duval Corp. The auriferous copper deposits are located near and are probably genetically related to the granitic porphyry intrusive. The Copper Canyon deposits are located in a series of subparallel fractures in shale and sandstone of the Harmony Formation with ore occurring in the crushed zone in the quartz monzonite porphyry, and in the conglomerate member of the Battle Mountain Formation. The ore minerals include the sulfide, sulfate, and oxidized copper minerals and are associated with pyrite and pyrrhotite. The Copper Basin ore is principally secondary copper minerals and sulfides. The largest deposit fills the cracks and replaces the host rocks near a diorite mass. Turquoise occurs as a network of veinlets in shale. Gold occurs in silicified sediments in irregular deposits, as free gold in narrow seams in diorite, and as narrow quartz veins cutting shales and quartzite. In December 1981, Duval suspended operations at the Copper Basin Mine, but continued gold and silver production at the Copper Canyon Mine. A new gold-silver deposit was discovered adjacent to the Copper Canyon Mine, with estimated 16 million tons of ore at 0.15% gold and 0.59% silver (2.4 million ounces gold, 9.2 million ounces silver). The total reserve of the new and known ore bodies is 2.7 million ounces gold and 62.8 million ounces silver (Schilling, 1981).

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