

GOODSPRINGS MINING DISTRICT

Location. The Goodsprings (Yellow Pine, Potosi) mining district is in the southern third of the Spring Mountains in Ts. 23, 24, and 25 S., Rs. ⁵⁷~~13~~ and ⁵⁸~~14~~ E. (see U. S. Geological Survey, Goodsprings topographic map), southwestern Clark County.

History and Production. The deposits in the district were first worked in 1856, when some lead ore was mined and smelted. Little work was done until 1891. From 1891 to 1944, production was almost continuous. Since 1944, there has been only minor production. Over a half million tons of ore worth more than 25 million dollars have been mined.

Many types of ore have been mined including: (1) zinc ore; (2) zinc-lead ore; (3) lead ore; (4) copper ore; (5) siliceous gold-silver ore; (6) molybdenum ore; (7) vanadium ore; (8) nickel-cobalt ore; and (9) gold-platinum-palladium ore. The lead, zinc-lead, and zinc ores contained important silver values. The nickel-cobalt ore actually is a variant of the copper-ore type; the vanadium ore is a variant of the lead-zinc ore. Large amounts of zinc, lead, silver, copper, and gold (in order of descending value) were produced; only small amounts of the other metals were produced.

Developments. There are numerous mines, many with extensive workings, in the district.

Previous Work. Gainella (1945) lists numerous publications describing the mines and geology. Hewitt (1931) and Albritton (1954) are of special interest.

The Rocks. A 13,000-foot sequence of sedimentary rocks crops out in the district. The lower half of the sequence is Paleozoic limestone and dolomite; the upper half is largely shale, sandstone, and conglomerate of Permian, Triassic, and Jurassic (?) ages. Tertiary volcanic rocks and Quaternary sediments locally cover the older rocks. Dikes and sills of "granite porphyry" are common in the

central part of the district. Quartz is absent in many of these dikes and sills, and these should be classed as ^syenite porphyry.

Structures. The district has a complex structural pattern which includes folds, thrusts, tears, and rifts. The rocks were first folded to varying degrees depending on their massiveness. Thrusting began toward the end of the period of folding. Four major and many minor thrust faults occur in the district, and generally dip west. The "granite porphyry" was intruded near the end of the epoch of thrusting. After the thrusting, a few normal faults were formed and later mineralized. Later other normal faults were formed which are younger than the ore deposits but older than the middle Tertiary volcanics. Conspicuous breccia zones mark the traces of the major faults.

It is interesting to note that the offset of one high-angle fault by another is extremely rare in the district, and that curvatures along many of these faults are unusually great, both in dip and along the strike.

Lead-Zinc Deposits. The lead-zinc ore bodies are dolomite and limestone replacements which, except for rare exceptions, are in the Mississippian Monte Cristo limestone. ~~Most occur~~ ^{where} the bedding is flat, the bodies commonly are tabular and parallel the bedding. Where the bedding is inclined, the bodies are irregular pipes that in a few cases follow fractures, but more commonly parallel or cut the bedding at slight angles yet are not parallel to one another.

The lead-zinc mines not only are confined to a narrow stratigraphic zone, but are mostly located where faults (breccia zones) and fractures cut the favorable zone. However, there are many more conspicuous high-angle faults in the district that are barren than there are faults that are associated with ore. Furthermore, within a fault zone the "master" faults which have the greatest displacement and extent, commonly are barren, whereas subsidiary shears along the same fault zone are mineralized.

The primary minerals were mainly quartz, galena, and sphalerite. Nearly all the sphalerite has been oxidized to hydrozincite, calamine, and some smithsonite. Pods of galena remain in the ^{ore} but commonly has been altered to cerussite and

lesser anglesite. Chalcopyrite originally was present in a few deposits, but has been largely altered to azurite, chrysocolla, and malachite. Oxidation extends below the deepest workings.

Molybdenum Minerals. Wulfenite has been observed in the Shenandoah, Milford, Hoosier, Mobile, Hermosa, Pilgram, Ruth, Smithsonite, Whale, and other mines in the district. However, only at one mine, the Shenandoah, has efforts ^{been made} to mine wulfenite. In 1935 and 1936, the California Molybdenum Corp., a subsidiary of Climax Molybdenum Corp., took an option on the mine and mill. Some development work was done, and the crude ore that resulted was screened, and the wulfenite in the fines concentrated by flotation at the Shenandoah mill which had been rebuilt to handle the molybdenum ore. Hewitt (1936, p. 89) states that, reportedly, the fines represent about 40 percent of the crude ore, and that 1 ton of concentrates containing 20 percent molybdenum was produced from each 20 tons of fines. Vanderburg (1937, p. 48) states that: "Judging from the tailings pile at the mill, about 5,000 tons of wulfenite ore were treated . . ." The option was dropped in November 1936.

The wulfenite generally occurs in small irregular deposits associated with zinc-lead ore, as square tabular, orange to wax-brown crystals lining drusy cavities. On the 200-level of the Milford mine needle-shaped pyramidal crystals of wulfenite were found. Like the vanadates, the wulfenite is one of the latest minerals to be formed.

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The Shenandoah mine is developed by several adits and lateral workings totaling 2,500 feet. The wulfenite is in lenses in brecciated zones in limestone. The ore mining^{ed} by the California Molybdenum Corp. was in an area 130 feet long, 160 feet high, and 10 to 30 feet wide. The zinc-lead ore minerals are cerussite, galena, smithsonite, and hydrozincite.

The Shenandoah mill had a capacity of 50 tons of wulfenite ore per day. Concentration was effected by tabling followed by flotation.

from John Schilling's
notes (1968)