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The old mines were worked through tunnels. The Poorman tunnel is reported to have a length of 227 feet. The old workings were inaccessible at the time of writer's visit because they had caved.

The following extracts regarding the Indian Queen mine from early reports of the State Mineralogist are of interest.

> The vein matter is covered with a few feet only of loose earth and has a slate formation underneath. It has been opened up sufficiently to show a body of ore 400 feet in length, by 200 feet in width. It varies in thickness from a streak of colored ore to 4 feet. The ore contains a large proportion of galena, copper, and iron, with a compound of sulphide of silver and antimony. 25 tons of selected ore from this mine yielded $530 per ton.13/
>
> The loose body of ore found here upon the surface, has been traced up to and into a well-defined vein, which has been opened to a depth of 60 feet, showing a vein 2 feet in thickness, which works, without sorting, from $200 to $400 per ton. The ore is very base, containing silver in almost every combination known to science, and can only be worked profitably by persons skilled and experienced in working base ores. The vein is found between granite and slate formations, and pitches to the east at an angle of 40°. The course of the vein is north and south.
>
> Three tons of ore are worked daily, which yield a profit of $1,000. For a small mine, this is undoubtedly the most productive in the State.14/

Several mine dumps reported to contain a total of 150,000 tons were sampled by the Ora Tahoma Mining Co. and are said to average $3.26 per ton in gold and silver at current metal prices. A picked 10-pound sample of dump material taken by the writer assayed 29.2 ounces of silver and 0.07 ounce of gold. The sample showed quartz, galena, pyrite, and sphalerite. The tailings from the old mill at the mouth of the canyon have been scattered by cloudbursts.

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PILOT MOUNTAINS DISTRICT

The Pilot Mountains or Sodaville district includes the southern part of the Pilot Mountains in southeast Mineral County. Mina, a town on the Southern Pacific R.R., is the supply center and nearest shipping point.

In 1913 cinnabar was discovered in the vicinity of Cinnabar Mountain by Thomas Pepper and Charles Keough while they were searching for stray steers. This discovery caused considerable excitement, and shortly afterward many

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13/ Whitehill, H. R., Biennial Report of the State Mineralogist: State of Nevada, 1871-72, p. 38.

14/ Whitehill, H. R., Biennial Report of the State Mineralogist: State of Nevada, 1873-74, p. 19.

claims were staked by men from Mina and Tonopah. The quicksilver deposits are in an area about 7 miles square on the northwest and southwest slopes of Cinnabar Mountain.

Quicksilver produced from various properties has amounted to more than $200,000, mostly from high-grade ore produced during the period from 1915 to 1917. Most of the production has been derived from properties of the Mina Mercury Co. and the Drew mine.

Cinnabar occurs in limestone, conglomerate, and silicified tuff. The geology of the deposits has been described by Foshag.15/

In 1916 tungsten deposits were discovered on the east slope of Pilot Mountains 23 miles by automobile road from Mina, Nev. For several years after the discovery the mine was developed in a desultory manner, but a very small amount of tungsten concentrates were produced. The tungsten-bearing mineral is scheelite.

In addition to tungsten and quicksilver deposits, there are several deposits of gold and silver that have been intermittently productive for a number of years. In recent years metal mining in the area has been confined to small-scale operations.

A brief description of the geology of the tungsten deposits is given by Hess and Larsen.16/

Mina Mercury Co.

The Mina Mercury Co., W. W. Booth, president, controls seven claims and three fractions of unpatented ground in Cinnabar Canyon. This property includes a part of the Lost Steers group, the original discovery claims located by Pepper and Keough. Property was last worked in 1929-30 under lease and option by the Nevada Almaden Quicksilver Co.

In 1929, this company replaced the four D-retorts with a Cottrell oil-fired rotary furnace 30 feet long and 3 feet in diameter. Accessory reduction equipment includes a crusher, cyclone dust collector, metal-pipe condensing system, and redwood settling tanks. Power is furnished by 25-horsepower Fairbanks-Morse semi-Diesel engine.

Development includes a shallow inclined shaft and, to judge from the dump, a considerable amount of underground workings.

According to Foshag17/, the country rock is limestone, with which are interbedded thin layers of conglomerate, sandstone, and shale. The ore

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15/ Foshag, W. F., Quicksilver Deposits of the Pilot Mountains, Mineral County, Nev.: U. S. Geol. Survey Bull. 795, Oct. 27, 1929, pp. 113-123 (map).

16/ Hess, Frank L., and Larsen, Esper S., Contact-Metamorphic Tungsten Deposits of the United States: U. S. Geol. Survey Bull. 725-D, 1921, pp. 278-280.

17/ Foshag, W. F., Work cited (footnote 15).

deposits are lenticular bodies in limestone. The richest ore is confined to a brecciated zone from 4 to 6 feet wide, which has a definite hanging wall but sometimes obscure footwall. Cinnabar is almost the only sulphide present, although some small patches of stibnite and a few grains of pyrite are found. The cinnabar forms seams and bunches in the soft gangue or is finely disseminated through it. Beyond the sheared zone the cinnabar occurs as small scattered grains or bunches in seams of white calcite that cut the dark limestone.

Drew Mine

The Drew mine is at the head of Cinnabar Canyon about 14 miles easterly from Mina. Six unpatented claims and a millsite are owned by Mrs. Al Drew of Reno.

Development includes an incline shaft, said to be 300 feet deep, and considerable lateral workings. Most of the workings are caved and inaccessible. Most of the equipment has been removed.

According to Foshag[18], the cinnabar is present as irregular bodies in sandstone. The stopes mined are said to have been small, but the ore was rich; some of it carried as high as 18 percent quicksilver, 28 percent lead, 44 ounces silver, and more than 1 ounce gold to the ton. The ore is more complex here than in any other part of the district; the cinnabar is intimately associated with calamine with bintheimite. Fine-grained sphalerite is also abundant. The gangue is chiefly quartz.

Other Cinnabar Claims

Bert Hitt, of Mina, and partner own two cinnabar claims in Dunlap Canyon 11 miles from Mina. Very little development work has been done on this property and no quicksilver has ever been produced.

Adjoining the Hitt claims are two claims owned by Ed Allen of Mina. Property is developed by a 50-foot shaft and 350 feet of drifts and other workings. Production from the Allen property has been $7,000 in quicksilver.

The Mammoth Quicksilver Co. property in Dunlap Canyon comprises seven unpatented claims. Nobel C. Smith, of Fresno, Calif., is the president and principal owner of the company. Production is said to have been about 300 flasks.

Development consists of several tunnels and subsidiary workings totaling several thousand feet.

Equipment includes one D-retort and a three-pipe furnace, a small air compressor, an incline gravity tram 600 feet in length, and several camp buildings.

The Cardinal group of four claims, owned by Henry Ott of Reno, is near the Drew property in Cinnabar Canyon. This property was discovered in 1931

18/ Foshag, W. F., work cited (footnote 15).

by J. R. Towner of Sodaville. Production is said to have been 70 flasks. The mine is equipped with two D-retorts.

The Red Wing group of 8 claims, owned by George A. Betty and Edward Messinger of Mina, is in the vicinity of Summit Springs, 23 miles from Mina.

Development work consists of several tunnels, which, with other workings, total 1,000 feet. Equipment includes two D-retorts. A small production of quicksilver has been made.

The Reward group of 10 claims, owned by George Thompson of Mina and associates, is in Dunlap Canyon. Production of quicksilver by lessees is said to have been about 1,000 flasks.

Development work comprises 300 feet of drifts, raises, and crosscuts. With the exception of about 40 feet of tunnel, all the work has been in ore. In October 1936, this property was under lease to Dave Hutchinson and Edward Messinger on a royalty basis of 15 percent of the production.

In October the lessees had constructed a two-pipe furnace with a capacity of about 3 tons of ore per day. This furnace consisted of two 12-inch pipes, 12 feet long, placed vertically in a brick-firing chamber. The furnace was fired with fuel oil.

The cinnabar is present in seams and disseminated in conglomerate, limestone, and sandstone.

The Chong Wong property is 1 1/2 miles northeast of the Drew mine. It comprises three claims owned by Chong Wong of San Francisco, Calif. Here the cinnabar is associated with barite in a chert formation.

In addition to the foregoing properties, other cinnabar claims are held in this area. The possibilities for further production of quicksilver from this area are promising.

Gunmetal Group

The Gunmetal group of claims, also known as the Summerfield property, is on the east slope of the Pilot Mountains 23 miles southeast of Mina. The principal owner is E. W. Esson of Los Angeles. About 1924, this property was worked under bond and lease by the Lezeart Coal Mine Syndicate. This company erected a 25-ton mill that employed pnuematic concentration. In 1927, operations were discontinued. The attempt to recover the scheelite by dry concentration was unsuccessful. The Lezeart mill was equipped with a small crusher, an Abbe ball mill, and two Stebbins dry concentrating tables. Development consists of a tunnel about 600 feet long and some scattered surface workings.

The scheelite occurs in a series of metamorphosed limestone (tactite) beds that have been uplifted and tilted by granodiorite porphyry. The beds dip from 15° to 30° and range in width from 3 feet to a maximum of 75 feet. The tungsten mineral is scheelite which occurs as crystals that range in size

from a head of a pin to 1/2 inch in diameter. The gangue minerals are garnet, epidote, and other silicates common to this type of contact metamorphic deposit. Sampling done has been insufficient to determine how much of the tactite beds can be classed as ore; by panning it is said most of the tactite is found to carry scheelite, and some of it will average 1 percent scheelite.

Other Tungsten Claims

The Desert Scheelite group of five unpatented claims, owned by George Thompson and M. Whitaker of Mina, adjoins the Summerfield property. In 1936 this group of claims was reported to have been taken over by a San Francisco syndicate on a royalty basis. Development work consists of short tunnels and surface cuts totaling about 500 feet.

The Garnet group of six unpatented claims in the same area is owned by George Thompson and the S. M. Summerfield estate. Virtually no development work has been done on this group.

The Silver Tungsten King group, comprising four claims, is owned by George Zark, of Mina, and associates. Very little work has been done on this group.

Stormland Group

The Stormland group of claims is at Camp Eddyville, in the Pilot Mountains, about 15 miles east of Sodaville. In 1932, John Eddy and Delbert Spainhour, of Mina, discovered high-grade gold ore on this ground. The property was sold to a group that is reported to have taken out $30,000 in high-grade gold ore by chloriding. In 1936 the property was inactive.

The formation is said to be limestone cut by dikes. Free gold is associated with manganese in irregular pockets in the limestone. All the ore produced has been taken from within 50 feet of the surface.

Belleville Mine

The Belleville mine comprises four unpatented claims at the head of Telephone Canyon on the west side of the Pilot Mountains 8 miles east of Sodaville. The owner is A. J. Belleville of Mina. The property was discovered in 1928 by Charles Woodruff. In 1932 and 1933 a small company called the Russell Gold Mining Co. operated the property and produced $27,000 in gold. In 1936, the property was under bond and lease to F. C. Marquiss and associates, and preparations were being made to erect a 25-ton mill.

Development consists of five tunnels, the longest of which is 900 feet. Total development is approximately 3,000 feet. Equipment includes a two-drill portable compressor and a 5-ton Straub mill for amalgamation. Two veins have been discovered on the Belleville property. Values are chiefly in free gold occurring in a gangue of manganese and calcite.

Sodaville Tailings

About 1/2 mile east of Sodaville is a tailings dump owned by Arthur Nelson of Candelaria, which was derived from ore taken from the mines of the Candelaria district in the early days. The ore was treated by chloridized roasting and amalgamation. A number of unsuccessful attempts have been made to recover the values. The dump is reported to contain at least 20,000 tons and to average better than $3.50 per ton at current metal prices. Values are in silver, gold, and quicksilver. The quicksilver in the tailings was derived from losses incurred in amalgamating the ores.

Bentonite

Two miles east of Mina on the west slope of the Pilot Mountains is a bentonite type of clay. The deposit is covered by two unpatented claims owned by the John McMillan estate. It has been prospected by several shallow shafts and open-cuts. No large tonnage is indicated.

Montezuma Mine

The Montezuma mine is in the east foothills of the Pilot Mountains, 20 miles by road east of Sodaville. Some years ago this property was worked by the German American Turquoise Co. In recent years the property has been inactive. Development consists of a number of irregular pits and short tunnels.

The turquoise is in decomposed trachyte as veinlets and nodules up to 1 inch thick. Most of the material is said to be of too poor quality for gem stones.

RAND DISTRICT

The Rand or Bovard district is on the northeast slope of the Gabbs Valley Range in northeast Mineral County, 27 miles by road northeast of Hawthorne via Ryan Canyon and Nugget Wash. It was discovered by Al Bovard and other prospectors from Rawhide in the spring of 1908. The nearest shipping point is Nolan on the Mina Hazen branch of the Southern Pacific R. R. 17 miles southwest of the district.

In 1919, a company called the Gold Pen Mines Co. acquired the Gold Pen property and erected a 20-ton amalgamation mill in 1920. This company ran into financial difficulties in 1921 and the property was sold to other interests.

Practically all the production has been ore shipped by lessees, except for small amounts treated at Rawhide or locally. Metal production from the district from 1910 to 1934 is shown in table 5.

Randall Property

R. J. Randall owns eight unpatented claims formerly owned by the Nevada-Rand Mining Co. Randall acquired the property in 1927 at a sheriff's sale to satisfy a judgment for $2,500 and costs obtained by the company's creditors. Property has been worked intermittently by Randall since 1927. Production is reported to have been about $50,000.