0240 0068

# Report of Investigation

Number 1

ANTELOPE MINING DISTRICT

Pershing County, Nevada

by

James M. Whitaker
Geologist

GREAT WESTERN SILVER & LEAD MINES, INC.

JULY 1971

September 1, 1971

Mr. Robert L. Davis
Vice President
Great Western Silver & Lead Mines, Inc.
Reno, Nevada

Sir:

Forwarded is a copy of Report of Investigation Number 1, Antelope Mining District, for your evaluation and approval. The report is a supplement to the mapping project that was conducted during the first week of July 1971. Focus is on the overall geological aspects of the Great Western property (Superior and Iron Mast Mines) in the Antelope District.

It will be noted that the conclusions and recommendations follow the introduction. This is standard format in geologic report writing (Lahee, 1961). This not only saves the reader time, but aids in clarity.

Timing and subjects of future reports should be based upon continuing developments at the property and management directed interests.

Respectfully submitted,

James M. Whitaker

James M. Whitaker,
Geologist

Table of Contents

## Introduction

Located in the Antelope Mountain Range approximately 36 miles north of the town of Lovelock and 22 miles west of the village of Imlay, in Pershing County, Nevada is the Antelope Springs (Cedar) Mining District. This report is specifically concerned with sections 25 and 36 of T33N, R30E and the western 1/3 of sections 30 and 31 of T33N, R31E; the total area being approximately 2.7 sq. miles.

The purpose of the investigation was:

1. To construct a basic geologic map of the area.
2. To map the workings of the Iron Mast and Superior Mines.
3. To show any relationships between the Iron Mast and Superior Mines as well as accurately locate many of the smaller workings and prospects.
4. To plot assay and geochemical data and project potential ore zones.

The investigation was initiated at the request of Robert Davis, Vice President, Great Western Silver & Lead Mines, Inc., of Reno, Nevada, to provide the corporation with an overall picture to present to its shareholders, prior to the start of an intensive development program.

The surface geology was compiled using a K & E high-standard telescopic alidade and plane table, mapping on a scale of 1:6000, while the underground workings were mapped with a tape and pocket transit (Brunton) on a scale of 1:240. A total of 4 days was spent in the field during the first week of July compiling the data. Preliminary drafting was completed in the field and final plates were ready for duplication within one week.

In carrying out this investigation the author is grateful to R. Davis and J. Menendez who provided a wealth of background information about the area, access to previous reports and maps, as well as doubling as rodmen.

Summary and Conclusions

The major geologic structures are two shear or fault zones which strike approximately N50°W. The western shear is traceable on the surface from the Noble Mine in the northwest corner of section 25 through the Superior Mine and on to the Antelope Mine in section 31 (not plotted on the map) for a distance of approximately 2.5 miles. The Iron Mast and Tonkin Tunnel define the eastern shear, for a distance of approximately 1/2 mile, including many small prospects and adits.

The shear zones are clearly visible in the underground workings of the Superior, Iron Mast, Noble and Tonkin workings, the slate or country rock exhibiting gouge, brecciation, slickensides and siliceous alteration. Shearing is also noticeable in the open pit a few hundred feet southeast of the Superior Shaft. The two shear zones could very well extend far beyond the vicinity of the Antelope Mine and into the Smith Canyon area (section 32).

The ore mineralization is in the form of argentiferous galena, chalcopyrite, sphalerite and pyrite occurring as irregular pods as part of a fissure vein system which utilized the shear zones as channelways for deposition. Near the surface ground water has oxidized much of the sulfides resulting in much gossan and limonite, as well as the characteristic malachite stain of copper on rock joint surfaces.

Any additional ore bodies within the area of investigation will occur at any point and depth along the strike of the shears, within each of the shears at a depth below that reached by existing shafts, or conceivably, in some yet undefined shear zones. It is probable that in the structural development of this region additional shears were formed, however they are not manifest on the present topographic surface or are obscured by talus, soil and vegetation.

## Recommendations

The following steps should be taken in order to develop the property to its maximum potential. Some of the recommendations may be carried out concurrently.

1. De-water the Superior Mine and muck-out the Iron Mast mine, retimbering where necessary.
2. Sample the ore in the cleaned out areas and at the working faces, estimating ore reserves.
3. Begin limited production from either or both of the mines to sustain a development program.
4. Accurately map all of the mining claims of Great Western Silver & lead Mines, Inc. with a transit and chain.
5. Construct an accurate, detailed geologic map of the surface

geology with plane table and alidade.

6. Obtain aerial photos of the region to study any variations in soil, vegetation, topography and drainage that may be indicative of shear zones on the surface.

7. Conduct a geophysical investigation of the area between the two known shears on a 200 foot interval grid using electromagnetic (EM) and induced potential (IP) methods.

8. Take rock/soil samples at each of the grid stations.

9. Strip overburden in the vicinity of geophysical and geochemical anomalies and sample.

10. Core drill to a depth of at least 1500 feet potential ore zones based on interpretation of geophysical and geochemical data.

## Geography

The Antelope District is located on the southwestern flank of the Antelope Range in northern Pershing County. The Rosebud District adjoins the Antelope District to the northwest while the Majuba Hill group lies approximately 4 miles to the southwest. Lincoln (1923) has grouped both Majuba Hill and the Superior-Antelope Spring Mines under the heading Antelope District, although the geology of the Majuba Hill area has little in common with the latter.

Relief in the area is 1600 feet with a maximum elevation of 7000 feet and a minimum elevation of 5400 feet. At the present time there is no published USGS topographic map (15 minute or 7.5 minute series) of this region. Majuba Hill

(6842 feet) a volcanic neck of Cretaceous Age is the most striking topographic feature in the vicinity. Hillsides are moderate to steep with numerous small washes. The drainage is a weakly developed radial pattern on the upland surface of the Antelope Range. The hillsides and washes are covered with moderately thick sage brush while mountain cedar and juniper (not exceeding 10 feet in height) predominate above 6000 feet. Southeast of the area of study is the prominent Smith Canyon drainage developed on the western side of Majuba Hill.

Rock exposures are considered fair. Alluvium reaches a maximum thickness of 10 feet in some of the larger washes, to little or no soil development on ridge lines with many outcrops.

## Stratigraphy & Petrology

The main rock unit of the area is a gray-black slate with interbeds of gray-brown quartzite (up to approximately 15 feet thick) and some occasional siliceous limestone members. No evidence was uncovered that would be indicative of the stratigraphic sequence. There is no apparent fossil record preserved in this area, however, Willden (1964) has assigned rocks of similar lithology in the Eugene Mountains (18 miles to the east) to the Upper Triassic Period based on fossil evidence. In other localities similar unfossiliferous gray slates overlay rock units that are definitely Upper Triassic and are themselves overlain by rocks of definite Jurassic Age. It is possible therefore, that the slates of the Antelope District could represent continuous sedimentation from the Upper Triassic through the Lower Jurassic Period.

The entire region has been subjected to low grade metamorphism as a result of one or more mountain building episodes (orogenies), and to a lesser extent igneous activity. It was noted in several localities that the slate graded into a phyllite, however, at the present time there is not sufficient data to draw any isograds or lines of equal metamorphism.

Within the known shear zones, hydrothermal fluids introduced quartz, siderite and barite gangue minerals as well as massive sulfides (galena, chalcopyrite, sphalerite and pyrite) occuring as ore shoots, veins, stringers and irregular pods.

Milk white quartz veins are abundant in the immediate vicinity of many of the quartzite interbeds. These veins are a result of hydrothermal activity acting on the permiable quartzite without accompanying sulfide mineralization. There is no apparent correlation between these quartz veins and sulfide mineralization within the shear zones.

## Geologic Structure

The Antelope Range is probably typical of the more common structures of the Basin & Range Province, bounded by normal faults that have been concealed by alluvial fans and post-orogenic volcanics. Several orogenies have influenced the slate with a resultant northeast regional strike and a dip to the southeast. Due to a lack of fossils, primary sedimentary features and no stratigraphic contacts, a more definite structural description of the slate is not available.

Of prime importance in the area of study are two shear zones which have a direct correlation with the sulfide mineralization. The general strike of the shears is N50°W with the western or Superior Shear having a vertical dip and the eastern or Iron Mast Shear dipping approximately 53°SW. A projected intersection of these two shears is shown at the bottom of the geologic map. This theoretical intersection would occur approximately 2200 feet below the surface at the Superior Mine.

The western shear is traceable in trenches and prospects along the topographic surface from the Noble Mine in the northwest corner of section 25 through the Superior Mine to the Antelope Mine in section 31 for a distance of 2.5 miles. Maximum width of the western shear is estimated at 150 feet. It should be pointed out, however, that this figure is a rough approximation, as the shear is at best poorly exposed on the surface.

The eastern shear zone with Iron Mast Mine, Tonkin Tunnel and numerous small prospects and adits is traceable for approximately 1/2 mile on the surface. Exact width is indefinite due to poor surface exposure but is estimated at approximately 300 feet. It is possible that two shear zones, approximately 100 feet in width and about 100 feet apart comprise the eastern shear.

The author noted clear evidence of shearing in the Iron Mast and Superior Mines, in the pit to the southeast of the Superior Shaft, in the Tonkin Tunnel and at the enterance to the Noble Mine. Brecciation, gouge material, slickensides and silliceous alteration were prominent.

There is a good possibility that additional shears may have developed immediately adjacent to, and at some distance from both of the known shears, but there may be little or no evidence on the surface.

The approximate length of the known shear zones may go well beyond the limits defined on the geologic map. The possibility of both shears extending into the Smith Canyon area should not be overlooked, as there may be a definite correlation with the many small adits and workings there. A much more intensive study is necessary.

## Geologic History

Throughout the Paleozoic and most of the Mesozoic eras Nevada was a deep sea trough or eugeosyncline, volcanically and seismically active, and receiving vast quantities of clastic sediments from adjacent island arcs. Several orogenies were felt during the middle to late Paleozoic. The slates and quartzites were deposited in the eugeosyncline as shales and sandstones during the earlier part of the Mesozoic Era (Triassic-Jurassic). Sedimentation probably ended with the Nevadan Orogeny during the mid-Jurassic to mid-Cretaceous Periods (Clark 1960). This orogeny deformed the shales and along with accompanying volcanism, regionally metamorphosed the area. Further deformation occurred late in the Cretaceous with the Laramide Orogeny. Clark (1960) has suggested that the two orogenies may have been continuous in Nevada. During the latter stages of this extended orogeny the shear zones developed and sulfide mineralization was introduced. Block faulting in the Cenozoic Era and continuing up until the Recent, with accompanying erosion has given rise to the present Basin & Range landscape.

## Economic Considerations

The Superior, Iron Mast, Noble, Antelope and Sunset Mines are the major workings in the area. All appear to have been high grade lead-silver-copper-zinc producers. A thorough study of the mining history was prepared by E.P. Jucevic, E.M., in a report to Sterling Mines Corporation in 1967.

Hydrothermal fluids rising from a deep seated magma chamber utilized the shear zones as channelways, and sulfides of the above metals (argentiferous galena, chalcopyrite, and sphalerite) were deposited in an environment of favorable temperature, pressure and chemistry.

In the Iron Mast Mine (accessable to the 52 foot level) and the Superior Mine (accessable to the 200 foot level) all of the high grade ore has been removed, however, many small stringer veins varying from an inch to a foot or more have been sampled, and all of these have returned favorable assays for silver, lead, zinc and copper (R. Davis, personal communication). The removed high grade ore occurred in irregular shaped lenses, pods, and ore shoots (several feet in width) within the shear zones, as evidenced by the degree of stoping observed. Hanselman (1941), who contacted personel who actually worked in the mines of the Antelope District, indicates the occurence of massive sulfide ore in numerous veins between the 200 & 300 foot levels of the Superior Mine, with developed reserves estimated at 50,000 tons of fairly high grade ore. High grade ore is also reputed to occur in a large vein(s) at the 200 foot level of the Iron Mast Mine. These massive sulfide bearing veins may continue to a depth well below that of previous development work. High grade ore should be encountered in deeper zones that have not been subjected to oxidation by percolating ground water.

In the open pit, several hundred feet southeast of the Superior Shaft (excavated in 1970), at least two veins exceeding three feet in width have been uncovered. Assays from these veins indicate good potential for an open pit mining operation based on current metal prices and an encouraging economic forecast. It is interesting to note that none of the southeast drifts of the Superior Mine penetrate the area directly below the open pit. Further drifting as well as additional surface excavating seem warranted.

Detailed geologic mapping, by itself, can provide little positive information with regard to the location of new and promising ore producing zones. Detection and location of additional shear zones and accompanying ore mineralization must rely upon geophysical and geochemical data supported by an extensive drilling program.

## Bibliography


Clark, T.H. and Stearn, C.W., 1960, The Geological Evolution of North America: N.Y., The Ronald Press Company, p. 17, 201-203, 215.

Hasselman, C.M., 1941, Report on the Antelope Springs Mine: Private Report (unpublished) 24 p.

Jusevic, E.P., 1967, Report on the Antelope Mining District, Pershing County, Nevada: Sterling Mines Corporation (unpublished), 25 p.

Lahee, F.H., 1961, Field Geology: N.Y. McGraw-Hill, p. 758-767.

Lincoln, F.C., 1923, Mining Districts and Mineral Resources of Nevada: Nevada Newsletter Publishing Co., (Reprinted Douglas MacDonald Publishers 1970).

Willden, R., 1964, Geology and Mineral Deposits of Humboldt County, Nevada: Nevada Bureau of Mines Bulletin no. 59, p. 49-50.