Antelope Group

The Antelope group of two patented and six unpatented claims is owned by Judge Edgar Eather, Stanley Fine, and Robert C. Kelley of Eureka. Development consists of an adit 350 feet long, a raise 240 feet in length, and a number of shallow shafts, inclines, and other workings totaling about 1,000 feet. Equipment includes a blacksmith shop, a 14-kilowatt generator belt-driven by a model A Ford engine, and a small electric centrifugal pump. The pumping equipment was installed to handle a small flow of water encountered in the lower workings on the North Antelope claim. In the fall of 1937 the property was idle.

The formation is chiefly steeply dipping shaley limestone trending north and south, locally disturbed by minor folds. To the north, the limestone is intruded by granite porphyry. Two fissure veins, known as the North and the South Antelope, ranging from 1 to 5 feet in width, have been prospected. The ore is largely oxidized and contains silver, lead, and zinc. In the lower workings of both veins, bunches of massive sulphides composed of pyrite, galena, and sphalerite are beginning to appear.

Black Rock Group

The Black Rock group of five unpatented claims, owned by Stanley Fine and associates of Eureka, is on the western slope of the Fish Creek Range, 26 miles by road southwest of Eureka. Development consists of four shallow shafts ranging in depth from 10 to 60 feet, an adit 100 feet long, and other workings totaling about 400 feet. There is no equipment on the property and in recent years it has been inactive.

The prevailing formation in this area is dolomitic limestone. The vein varies in width from a few inches to a maximum of 2 feet, and it is traceable on the surface for nearly a mile. At the north end, the vein has a strike nearly east and west with a northerly dip, while at the south end the strike is N. 65° E. with a vertical dip. Scheelite occurs as scattered crystals up to 2 inches in diameter in a gangue composed chiefly of quartz and calcite stained with iron oxides and copper minerals. A little silver and lead are also present.

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LYNN DISTRICT

The Lynn district is in the Tuscarora Range, 22 miles by automobile road northwest of Carlin, Nev. Placer gold was discovered here by Joe Lynn in April 1907, and in the same year the Lynn Big Six Mine, the principal lode property, was located by W. E. Barney. The following year a small, short-lived boom ensued. The Lynn Big Six Mining Co. erected a small amalgamating mill at their mine in 1917, in which a small tonnage of ore was treated. There has been a small but consistent annual production of gold from a number of small properties, and up to 1936 the total production, based on incomplete data, has been about $225,000, most of which was derived from the placer deposits. In 1937, lessees worked the Lynn Big Six mine, owned by the Beaver Crown Consolidated Mining Co. (successor to the Lynn Big Six Mining Co.).

Beaver Crown Consolidated Mining Co.

The Beaver Crown Consolidated Mining Co. owns the property formerly known as the Lynn Big Six Mine, consisting of 6 patented and 3 unpatented claims. R. M. Holt, 435 K St., Salt Lake City, is president of the company. In 1937, the property was under lease to George H. Ryan and W. D. Cronin of Salt Lake City and four men were employed. Production of shipping ore in 1935-1936 amounted to $17,000.

Development consists of the Talbot adit, 1,400 feet long; Mill adit, 800 feet long; Bull Moose adit, 700 feet long; a shaft 300 feet deep and inclined 40°, and other workings totaling about 5,000 feet. Equipment on the property consists of tools for hand mining, blacksmith shop, and several camp buildings.

The country rock in the vicinity is bedded rhyolite intruded by andesite, the latter considerably altered. The bedding planes of the rhyolite strike south 30° west and dip about 30° westerly. Values are chiefly in gold, which occurs in a free state along a shear zone in the rhyolite. Principal zone strikes N. 35° E. and dips 40° northwest. The gangue consists chiefly of silicified material and iron oxides. The richest ore is associated with bismuth. A shipment of 25 tons of ore made by Cronin on June 3, 1937, had the following analysis:

	Ounces per ton
Gold	1.16
Silver	0.15
Lead	None
Zinc	Trace
	Percent
Copper	0.1
Insoluble	59.8
Iron	20.0
Sulphur	0.1
Lime	1.7

Placer Deposits

Placer gold deposits have been worked on Lynn, Simon, Rodeo, and Sheep Creeks, which traverse this part of the Tuscarora Range. The Bulldog placer, site of the original placer discovery in this region, has been the largest and most consistent producer. The placers are generally rich but narrow, and the values are confined largely to thin layers of gravel directly above bedrock. A large proportion of the alluvium consists of medium-size subangular boulders. The gold is coarse and rough at the upper ends of the ravines, while lower down it is finer and associated with appreciable amounts of black sand. It is exceptionally pure, ranging in fineness from 920 to 960. Small amounts of bismuth oxide are associated with the placer gold, and its association with the gold in the veins indicates that the placer gold has been derived from a number of small quartz veins and stringers in the vicinity. In general, the coarseness

and roughness of the gold and the frequency with which it is found adhering to gangue material is evidence that it has not traveled far.

The placers have been worked annually since their discovery with small-scale equipment, including power rockers, sluices, and similar equipment, during the spring months when water from melting snow is available. During the summer, dry washers have been employed to some extent. A description of the various types of placer equipment used in the district is contained in a report by Vanderburg[22].

The customary royalty paid by lessees in the district is 10 percent of gross bullion returns.

Turquoise

In recent years, several turquoise claims have been located in the Lynn district on Rodeo Creek; the Black Matrix claim is owned by the American Gem Co., 2113 Delmar Ave., Wilmar, Calif., and two other claims are owned jointly by the American Gem Co. and L. A. Springer.

The turquoise of gem quality occurs in narrow seams in a sedimentary formation. Development work has been superficial in character and there is no record of any production.

MINERAL HILL DISTRICT

The Mineral Hill district is 5 miles southeast of Mineral, a station on the Eureka-Nevada Railroad. It is accessible by automobile over fair desert roads either from Palisade, a station on the Southern and Western Pacific Railroads, 35 miles north, or from Eureka, 55 miles a few degrees east of south. The district derives its name from a detached rounded hill rising to a height of about 700 feet above the subjacent Pine Valley. In 1868, rich silver float was found along the base of this hill by John Spencer, Amos Plummer, and two other men from Austin while searching the hills for a strayed horse. The float was traced to the outcrop along the crest of the hill, and a number of claims were located. The discoverers mined 80 tons of ore from the croppings, which was hauled to the Manhattan Mill at Austin and treated by the Reese River process[23]. The results were

22/ Vanderburg, W. O., Placer Mining in Nevada: University of Nevada Bull., vol. 30, no. 4, 1936, pp. 83-91.

23/ In the early-day milling of silver ores in Nevada, the process most widely used was the Washoe process, named after the Washoe (Comstock) district where it was developed. It consisted of amalgamation in pans heated by steam, using mercury, salt, and copper sulphate for reagents. Essentially it was an adaptation of the Patio process used in Mexico. Ore containing sulphur and other deleterious elements was not amenable to direct amalgamation, and such ores were given a preliminary roast to drive off the volatile elements. Salt was added during the roasting to convert the silver into chlorides, which amalgamate readily. This roasting and subsequent amalgamation constituted the Reese River process. It may be considered a modification of the Freiberg process (roasting followed by amalgamation in barrels) developed in Germany.

so encouraging that a 15-stamp mill and Stetefeldt furnace were erected. After operating several years, it was discovered that a recovery equally as good could be obtained without roasting, and in consequence the ore was subsequently treated by the Washoe process.

In 1870, the property was sold to George D. Roberts and William Lent of San Francisco for $400,000, and in 1871 Isaac C. Bateman, acting as agent, sold it for $1,200,000 to an English syndicate, which organized the Mineral Hill Silver Mining Co., Ltd. This company erected an additional 20-stamp mill, but, failing to develop a sufficient ore supply, the company failed in 1872, following which the mines were worked by the debenture holders of the property. The following extracts from a report[24/] prepared by Captain Hoskins in 1872 for the Mineral Hill Silver Mining Co., Ltd. show the condition of the company's affairs at that time:

> In handing you my report on these mines, I am sorry that it does not fall to my lot to notice any decided improvement in them, although we have maintained our weekly results, and increased them to 40 tons per week, still, in the main tunnels and other points where a discovery would be of immense value, our efforts, so far, have been unavailing to meet with a continuation of the rich surface-deposits.***
>
> Queen Tunnel: This tunnel is extended south a distance of 480 feet parallel with the ridge of the hill, and right under the main ore-deposits, and is not communicated to the shaft sunk from the center of the Giant ore-chamber; in all this distance (after the first 120 feet) no trace of ore has been seen, the rock being hard, compact limestone, crossed in many points by fissures which show plainly the action of the water by the carbonate of lime crystalized on the walls, without a trace of mineral.***.
>
> Taylor Tunnel: This tunnel is being extended east by six men and is now in over 229 feet; the ground has been generally hard, but in the last 20 feet we have struck several "vughs" or small cavities, and the rock is mixed with spar, and altogether any change is hopeful, and further extension in the hill may prove something good.***.
>
> We have 60 men employed in the mines, at $4 per day, and have raised during the five months to the end of August, 589 tons of ore of an estimated grade of $71 per ton at a mine's cost, including stores and prospecting, of $35,129. The cost of prospecting in dead ground during the same period was $13,084, a large amount to come out of our very much reduced ore returns. On the question of what is best to be done in the future, my only recommendation is to keep on the Taylor tunnel as fast as possible, with the hope of meeting in depth with a channel of ground more favorable for mineral than that nearer the surface. Nothing having been done in the district deep, we have no guide to give us an idea as to what the probabilities may be of striking ore,

24/ Cited by Raymond, Rossiter W., Report on the Mineral Resources of the States and Territories West of the Rocky Mountains: (1872) Government Printing Office, 1873, pp. 152-153.

but I am sorry to say that, after a careful examination of the hill for many months, I cannot see that there is much chance of meeting ore in depth. The deposit on surface was evidently formed by water from the top, and has no connection whatever with the interior of the hill.

In 1880, the property was acquired by the Barker-Spencer Co., who were operating at the time on the south end of the hill. This company operated intermittently until 1887.

Sporadic mining operations were carried on by lessees and several small companies until 1910, when the Mineral Hill Consolidated Mining Co. was organized. In 1911, this company erected a small cyanide plant and operated until 1913, when operations were suspended. Since 1913, occasional small-scale operations have been carried on by lessees; the last activity was in 1936, when a Los Angeles group made an unsuccessful attempt to treat the tailings dump, estimated to contain about 10,000 tons.

Complete statistics on the production of the Mineral Hill district are not available. It is said to be more than $6,000,000, but this figure appears excessive when one considers the extent of the workings, value of the ore, scattered references on early-day operations, and other factors.

According to Whitehill,25/ the production from 1870 to 1876 was as follows:

Year	Production
1870	$120,000
1871	701,000
1872	590,000
1873	226,000
1874	183,000
1875	140,000
1876	125,000 (estimated)
	2,085,000

Since 1913, the production from the district, according to S. F. Stollenwerck, has been about $25,000. The writer estimates that the total production from the district has been about $2,500,000.

Early Metallurgy

The early metallurgy at Mineral Hill is of interest because better than 90 percent recoveries were obtained by the Reese River and Washoe processes then in vogue. Such recoveries were unusual and they constituted an engineering achievement at that time. The following brief descriptions of milling methods employed is taken from the rare book by Eissler,26/ who at one time was manager of the property.

25/ Whitehill, Henry R., Biennial Report of State Mineralogist, State of Nevada, 1875-1876, p. 27.

26/ Eissler, M. Metallurgy of Silver: New York, 1898, pp. 154-167.

The first mill erected in the district employed the Reese River process, a Stetefeldt furnace being used for roasting. With this process, the ore was first crushed in a Blake-type crusher, after which it was spread out to dry on a floor covered with cast-iron plates 1/2 inch thick. Under the floor was a system of flues connected with a firebox at one end and a stack at the other. The ore was raked constantly, until quite dry, after which it was fed by hand to the stamps, equipped with 40-mesh screens. Since dry-crushing was employed, drying was necessary to prevent clogging of the screens. The screen undersize was delivered by a screw conveyor to a bucket elevator, which transported it to the furnace room.

After being roasted in the Stetefeldt furnace, it was sent to the cooling floor. From the cooling floor it was trammed to the pan room, equipped with four pans and two settlers. Each pan was charged with 1,500 pounds of ore, water was added along with a dipperful of sulphuric acid and, after being stirred for several hours, 300 to 400 pounds of mercury was added to each pan along with 10 to 15 pounds of iron fillings and the pulp was stirred another 6 hours. Amalgamation in this manner resulted in a recovery of as high as 92 to 93 percent of the silver.

It was later discovered that much of the silver was present as chloride, and an extraction equally as good could be obtained without roasting; consequently, the furnace was abandoned and the ore was treated by the Washoe process at a saving of $5,000 per month in operating expenses and with treatment of ore that had previously been considered waste.

With the Washoe process, dry-crushing was also employed to prevent the loss of silver chloride, which would otherwise float away if wet-crushing were used. About 18 tons of ore were treated per day, and the bullion produced averaged 950 fine. It brought a premium at the mint, whereas the bullion from the Reese River process was penalized because of the copper content. The cost of treating the ore by the Washoe process was $12.22 per ton, which was considered efficient milling practice at that time. The tailings from the Reese River process, which have been impounded, averaged 12 ounces silver per ton; and Eissler found that after having been exposed to the weather for several years the sulphides had decomposed, making their retreatment economically feasible. The 20-stamp mill was altered to handle this material, and about 7,000 tons of tailings were treated at the rate of 48 tons per day and at a profit of $20,000. This is the first instance in Nevada of the treatment of tailings from roasted chloridized ore.

During the first 10 years the ores in the Mineral Hill district are said to have averaged, at first, 100 ounces of silver per ton, which decreased to 20 ounces per ton after careful sorting toward the end of the period. In the early days it appears that 20 ounces of silver was the economic low limit for profitable operation.

Mineral Hill Consolidated Mining Co.

The Mineral Hill Consolidated Mining Co. owns 9 patented and 1 unpatented claims covering virtually all of the old workings. The company

is incorporated in Arizona with a capitalization of 1,000,000 shares, par value $1. S. F. Stollenwerck of Palisade is principal owner. Development consists of the Queen tunnel, 700 feet long, Taylor Tunnel about 600 feet long, and other workings totaling about 2,000 feet. Nearly all the usable equipment on the property has been removed. In 1937, the property was idle. A flow of water estimated to be about 10 gallons per minute is available from Cave Canyon, about 1 mile distant. Water can also be developed in nearby Flynn Canyon.

The geology of the district has been described by Emmons.27/ A lengthy report on the property was written in 1914 by T. Poole Maynard for the Mineral Hill Consolidated Mining Co. This report is in the possession of S. F. Stollenwerck.

The prevailing rocks in the vicinity of the ore bodies are dolomitic limestone underlain by carbonaceous shale. The limestone is intruded by several narrow dikes of decomposed igneous rock. The ore occurs as irregular replacement deposits in the limestone along the fracture zone trending north and south for about 1/4 mile and several hundred feet in width. This zone is outlined on the surface by a number of open cuts ranging from 20 to 100 feet in length and 20 to 40 feet in width. The maximum depth of these stopes does not exceed 120 feet. According to Emmons the localization of the ore bodies is due to the intensity of fracturing and sheeting in the ore zone, the larger deposits having formed where there was a maximum amount of shattering. Some work has been done in the shale under the limestone, but no deposits of economic importance were discovered.

The ore bodies are thoroughly silicified and the minerals are quartz, calcite, barite, silver chloride, argentite, gray copper, galena, copper carbonates, zinc-blend, pyromorphite, cerrusite, pyrite, and iron and manganese oxides, according to Emmons. Eissler mentions polybasite and steffanite, molybdenite, and silver bromide as other minerals. Principal values are in silver and a small amount of gold. The smelter returns on a small lot of ore shipped by S. F. Stollenwerck to the United States Smelting, Refining, & Mining Co. on July 7, 1934, furnished the following data:

27/ Emmons, William H., Some Mining Camps in Elko, Lander, and Eureka Counties, Nev.: U. S. Geol. Surv. Bull. 408, 1910, pp. 96-99.

Metal quotations:	Gold	$34.9125 per ounce	
	Silver	.64125 " "	
		Ounce per ton	
Settlement assay:	Gold	0.035	
	Silver	52.0	
		Percent	
	Insoluble	82.8	
	Iron	1.2	
	Zinc	0.6	
		Pounds	
Wet weight		21,540	
Moisture 0.5 percent		108	
Dry weight		21,432	or 10.716 tons

Metal payment:	Gold, 100 percent at $31.8183 per ounce	$1.11	
	Silver, 95 percent at $0.64125 per ounce	31.68	
		32.79	
	Treatment charge	4.98	
	Net value per ton	27.81	
10.716 tons at $27.81			$298.01
Deductions:	Freight, $6.50 per ton		70.00
	Net proceeds		228.01

PALISADE DISTRICT

Palisade is a station on the Southern Pacific and Western Pacific Railroads at the north end of the Cortez Range. It is also on the Humboldt River, which cuts across the Cortez Range through a narrow, steep-walled canyon known as the Palisades.

Deposits of ashphaltite, pumice and diatomaceous earth occur in this area, but there has been no production of these minerals.

Asphaltite

Asphaltite occurs in the Pinon Range, 15 miles south of Palisade, about 4 miles east of the Yates ranch. It was discovered about 1900, and shortly after this the deposits were prospected by a number of trenches and open cuts, but no production was made. The best showings are covered by six unpatented claims owned by Stanley Fine and associates of Eureka, Nev.

According to Anderson,[28] the asphaltite is of the impsonite variety, resembling coal, except that it is very light, having a specific gravity of

28/ Anderson, R., An Occurrence of Asphaltite in Northeastern Nevada: Geol. Surv. Bull. 380, 1909, pp. 283-285.