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CONSOLIDATED EUREKA
MINING COMPANY

EUREKA, NEVADA

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Consolidated Eureka Mining Company

Location and Accessibility

Consolidated Eureka's mining property, generally known as the Diamond mine, is in the Eureka Mining District, Eureka County, Nevada. The principal entry into the property is on the east side by way of a three mile gravel road from U. S. Highway 50 at a point one mile east of the town of Eureka. Eureka is the county seat and has a population of about 500. The nearest rail point is Ely, population 4,000, which is 76 miles east on Highway 50. Palisade, another rail point, is 85 miles north by way of paved State Highway 51. Mine plant and loading facilities are on the east side of the property at the Diamond adit which is near the head of New York Canyon. However, the west side of the property at the Prospect Mountain tunnel, where there are loading facilities, is also readily accessible by four miles of gravel and paved road to Eureka.

The mine facilities at the Diamond adit are served by a power line from a small plant at Eureka. This plant is inadequate and rates are high so that the company has its own generating unit. Planned at the present time is a connection of the Sierra Pacific Power Company of Western Nevada with Utah Power and Light Company from the east. This line is expected to go through Eureka and should provide much more satisfactory service and cheaper rates.

Property

The property consists of approximately ²²⁰235 acres of patented and ⁵⁴⁰515 acres of unpatented claims. These are in a contiguous group about two miles in length in a north-south direction and from a quarter to one mile in width. They cover the north-south trending Prospect Mountain Ridge which rises from about 7,000 feet on its flanks to 9,500 feet at its crest.

The present property is a consolidation of what was once a number of separate mines and prospects. These are Diamond, Excelsior, Silver Conner, Walsh, Barker, Williams, Deadbroke, Matamoras, and other smaller ones.

Old workings scattered throughout the property are extensive but the largest part of the work was done through the Diamond adit which is at an elevation of about 10,000 feet. This adit is a 2,200 foot crosscut going northwest to the Prospect Mountain Ridge. At about 1,350 feet it branches to the

north and south. At 1,500 feet is the No. 1 shaft which is vertical and goes to a depth of 500 feet (see map).

The south branch of the adit extends about 3,000 feet into the Excelsior area, and here are the No. 2 and No. 3 shafts which go to depths of 270 and 770 feet respectively. The north branch of the Diamond level goes about 3,000 feet and comes out to the surface on the west side of the ridge at the Matamoras shaft.

The most extensive workings are from the No. 1 shaft which has levels at 120, 220, 300, 400, and 500 feet. The 300 level goes north and from it there is an inclined winze with 400, 500, and 650 levels. The 650 level goes north and connects with the old Prospect Mountain tunnel which was driven from the west side of Prospect Ridge at an elevation of 7,250 feet. From the 650 level there is a vertical winze that goes down 650 feet with 750, 850, 950, 1,250 and 1,300 levels.

Over 54,000 feet of lateral work has been done on the Diamond adit and the levels below. This does not include shafts and raises. Above the Diamond level there are additional thousands of feet of lateral work in such tunnels as the Fourth of July, Dominic, Excelsior, McIntosh, Deadbroke, Orange, Matamoras, Williams, Chicago, and Wabash. This work has been done through a vertical range of about 2,000 feet--that is, from the Diamond 1,300 level up to the Deadbroke tunnels. A large part of this work is still accessible although done over 70 years ago. Except for faulted areas the ground stands well and requires but little timbering. All of the workings are dry as the deepest level, the 1,300, has not penetrated the water table. Rock temperatures are cool and air circulation is good probably because of interconnected solution channels in the limestone.

History

Ore was first discovered in the district in 1864 at the mouth of New York Canyon several miles northeast of what is now the company's property. In 1869 the rich lead-silver-gold ores of Ruby Hill, which is two miles north, were discovered. From 1870 to 1890 was the peak production period and the greater part of the district's entire production was at this time and from the Ruby Hill area. Production was sufficient for the operation of several large smelters.

Ore at what are now the company's properties was discovered in the early 1870s. Shortly thereafter there was some production from the Diamond, Excelsior, Silver Conner, Deadbroke, and Matamoras. In 1882 the Prospect Mountain tunnel was driven to intercept at depth some

of this early work, particularly that in the Silver Conner area. After 1897 the Diamond and Excelsior properties were apparently worked as a unit. Peak production from these properties was probably from 1890 to 1900. The Diamond adit was driven early in this period. From 1900 to 1923 there were only small sporadic operations, mostly leasing, except in 1923 when a more extensive exploration program was undertaken by the McIntosh Mines Company which was controlled by John Hays Hammond.

In 1934 the Diamond Mining Company and the Excelsior Mining Company were consolidated into the present company which at that time was called the Diamond-Excelsior Mining Company. James A. Hogle and associates of Salt Lake City under a lease called the Eureka Prospect did considerable work in the Diamond-Excelsior area. A small cyanidation plant was constructed near the portal of the Diamond adit and operated from 1935 to 1937. After it was shut down small shipments of ore to smelters continued for several years until operations ceased in 1939.

In 1946 the present name of the company was adopted and funds were raised from the sale of stock. Irregular exploration and development were carried on until 1954 when a new discovery of ore was made on the 300 level of the No. 1 shaft. This ore was followed and mined until 1962 when it became uneconomic. During this period the inclined winze was sunk from the 300 to the 650 levels and the vertical winze from the 650 to 1,300 levels. Connections to the west side of the ridge were made on the Diamond level with the old Matamoras workings and on the 650 level with the old Prospect Mountain tunnel.

Some exploration work was done from 1962 to 1969 by the company and by lessees but there was no production. In 1968 a lease was given to Eureka Nevada Ltd., Partnership. It did some work on the 400, 500, and 650 levels, produced some good ore, but ceased operations in 1970 because of high mining costs.

Pertinent to exploration in the district is the more recent history of the rich Ruby Hill area. After the peak production period from 1870 to 1890 there were only small sporadic operations into the 1930s. It had early been recognized that the Ruby Hill deposits had been displaced to a much lower elevation by faulting, but efforts to reach the down-thrown segment were unsuccessful because of water. In 1937 Eureka Corporation, a Canadian-controlled company, acquired leases and options on the area. Drilling indicated the faulted ore-block to be of considerable size at a depth of from 2,200 to 2,400 feet below the surface. The Fad shaft was sunk to a depth of 2,500 feet, 1,500 feet below the top of the water table, and a level was started out at a depth of 2,250 feet. A large volume of

water was encountered and the shaft was flooded. Several pumping tests were made and much study was given to the problem. To control the water, pumping estimates ranged from 5,000 to 15,000 gallons per minute to be lifted to the surface from 1,700 to 2,500 foot depths. In 1960 a joint venture of Newmont, Cyprus, and Hecla mining companies, with U. S. Smelting Company and Eureka Corporation as lessors, was formed to further explore the situation. Additional drilling was done and in 1964 and 1965 the shaft was recovered by grouting and a new 2,250 level was driven into the north edge of the orebody to obtain knowledge of the ore occurrence and samples for metallurgical tests. There is a probability that there are over 2,500,000 tons that might contain .13 to .30 ounce gold, 4 to 12 ounces silver, 3 to 8% lead, and 6 to 14% zinc per ton of ore. At present metal prices of \$35 gold, \$1.70 silver, and \$.155 lead and zinc this orebody could have a gross value of about \$175,000,000. Further exploitation of this ore is probably dependent on metal prices, cheaper power, and improved techniques in sealing off water.

Production

Production figures for the properties now held by Consolidated Eureka Mining Company as well as the Eureka Mining District are fragmentary and conflicting even though the productive part, which is essentially within an area four miles north of the company's property, was one of the richest lead-silver-gold camps of the West. During the peak production period 1870-1900 the only data available are for the most part the old records of the county tax assessor which are based on reports made by producers for tax purposes. Obviously, these would be on the low side. Furthermore, many did not include the lead content which is one of the major items. Usually there are no assay values given, only dollar valuation which was smelter settlement and less than the valuation of the actual metal content. These dollar valuations do not mean much in terms of present economics as they were made when gold was \$20 an ounce, silver from \$.50 to \$1.00 an ounce and lead around \$.05 a pound contrasted with present prices of \$35, \$1.70, and \$.155 respectively.

The best general production figure for the district is that of T. B. Nolan in U.S.G.S. Professional Paper 406. He estimates that from 1869 to 1959 the value of metal produced was \$122,000,000. In terms of present metal prices this would be well over \$200,000,000. All of this would be termed very rich ore contrasted with production from mines at the present time.

The production and settlement assays as far as known from the

company's Diamond and Excelsior properties are tabulated as follows:

Period	Tons	Ounces		Percent			Area
		Au	Ag	Pb	Zn	Cu	
1890-96	25,652	.51	24.6	20.2			Diamond
1895-98	7,207	1.57	39.4	7.1			Excelsior
1923	386	.19	14.0	10.6			Diamond (McIntosh Mines)
1935-37	11,996	.23	5.4				Diamond and Excelsior
1938	1,374	.26	9.5	3.2		.05	" " "
1949	12	1.50	22.3				Excelsior
1950	115	.27	31.9	12.5	1.3	.14	Diamond
1951	30	.25	22.1	10.7			"
1954-57	11,256	.76	35.4	27.3			"
1958-62	5,192	.83	10.0	8.4			"
1969-70	1,215	.61	20.6	17.1	1.9	.16	"

In explanation of the above tabulation the 1890-96 production is probably typical Diamond ore as the assays are similar to those of the ore the company mined in 1954-57. The 1935-37 production is not typical; it is an estimate of material that was treated at the cyanide plant and I understand it was mineralization from the fringes of old stopes and stope fill. Net smelter return for this production was \$106,238. The 1938 figure is material shipped direct to a smelter and was also from old stopes. Shipments in 1949-51 are production by lessees. Production from 1954-70 is from the orebody discovered and mined by the present company. The 1954-57 and 1969-70 production is from the orebody discovered and mined by the present company. The 1954-57 and 1969-70 production is from the upper part and that in 1958-62 from the lower. The above record is by no means complete as the annual volumes of Mineral Resources of the United States indicate that from 1905 through 1933 there was some production, principally by lessees, from the Diamond, Excelsior, and Silver Conner areas.

There is also record of production during 1873-96 from the following now held by the company. Again these figures are from the tax assessor's

records and are probably an understatement.

<u>Location</u>	<u>Tons</u>	<u>Location</u>	<u>Tons</u>
Antelope	208	Prospect Mountain	891
Banner	1,217	Pioneer	137
Delaware	484	Silver Conner	4,626
Diamond	7,053	Whip-poor-will	950
Deadbroke	456	Matamoras	1,479
Fourth of July	303	Mountain Boy	354
		Total	18,158

It is known that a number of these had some production subsequent to that above.

Geology

Only the geology pertinent to the company's property is discussed here. Much of it is very complex and not well understood.

A summarized stratigraphic tabulation of the formations on the property is:

<u>Age</u>	<u>Formation</u>	<u>Rock type</u>	<u>Thickness (Ft.)</u>
Ordovician	Pogonip	Limestone and shale	1,600-1,830
Cambrian	Windfall	Sandy limestone	650
"	Dunderberg	Shale	265
"	Hamburg	Dolomite	1,000
"	Secret Canyon	Shale and limestone	625-675
"	Geddes	Limestone	330
"	Eldorado	Dolomite	2,500

Practially all of the workings are in, and all of the production has been from, the Hamburg dolomite. The Diamond adit crosscuts the Pogonip and Windfall formations, the Dunderberg is exposed in some of the workings, and the Prospect Mountain tunnel penetrates the Secret Canyon, Geddes, and Eldorado. The Eldorado is the important ore-bearing formation at Ruby Hill.

These formations are steeply-dipping to overturned and strike north-south parallel to Prospect Mountain Ridge. The Hamburg and

Eldorado are massive, bedding is difficult to identify, and there have been much flowage and recrystallization. Distinguishing the Hamburg from the Eldorado is usually difficult. Irregular bleaching of both formations is common.

No igneous rocks have been found on the property. The nearest is a small exposure of quartz diorite on the top of Prospect Ridge, one mile and a half to the north. Drilling in the vicinity of Ruby Hill has found a similar rock at depth in several places suggesting that it may closely underlie a large part of the district. Geologic considerations and aeromagnetic surveys suggest that it may underlie Prospect Mountain Ridge and therefore the company's property. Where the quartz diorite is exposed or has been found, it has altered the surrounding limestone but apparently has not developed contact-type ore deposits.

Prospect Mountain ridge is structurally a complex block. Broadly speaking it is a tightly-folded, in part overturned to the east, north-south-trending anticline. Thrust faults which dip to the west accompanied the folding. On the east and west flanks of the ridge are north-south faults of several thousand feet normal displacement. One transverse fault, the Silver Conner, with several thousand feet normal displacement cuts across the ridge. It may be contemporaneous with the thrusting, but the north-south faults are later. In addition to these major faults many minor ones are exposed underground. Thickening and thinning of the formation have accompanied the deformation.

Mineralization

Lead, silver, and gold are the principal products from mining. The major part of this mineralization is almost completely oxidized even down to the lowest workings so that it is shipped as a direct smelting ore. Only here and there are relict nodules of galena, and in small tight quartz veins some galena, sphalerite, and pyrite are present. The typical ore is limonitic with cerussite, anglesite, and plumbojarosite with probably some silver chloride minerals and free gold. Assays usually show small amounts of zinc, arsenic, and copper. The original sulphide mineralization was galena, sphalerite, pyrite, arsenopyrite, and slight chalcopyrite similar to that found below the water table at the Ruby Hill-Fad shaft. The oxide ore is also similar in character and value to that at Ruby Hill.

Some zoning of metal may take place. Old production records indicate that the Excelsior had more gold and silver but less lead than the Diamond. The ore shoot found by the company in 1954 on the 300 level

of the Diamond had high lead with good silver and gold. However, ore shoots that branched off from it in depth on the 650 and 750 levels had much less lead and silver but slightly more gold. These examples are shown by assays of production on page 5 where the production from the Diamond and the Excelsior mines in the period 1890 to 1898 can be compared and also the company production from 1954 to 1957 with that from 1958 to 1962, the latter being from the lower levels.

The lower grade ore produced in 1958 to 1962 does not indicate that the ore is becoming lower grade in depth as about seven tons mined from a small lens on the 1250 level had an average assay of .03 ounce gold, 187 ounces silver, and 50.3% lead per ton.

Although many of the old stopes are inaccessible, from what can be seen at the present time, and judging from old reports and maps, most of the ore occurred in the bottom of caves and a minor amount in and along fissures.

The cave type is mostly in very irregular, pipelike, and branching openings which frequently pitch steeply or at moderate degrees to the north. There are exceptions as old maps show some almost horizontal stopes and cave stopes a short distance above the Diamond level in the vicinity of the No. 1 shaft. The usual habit is for the lead oxide minerals to be on the floor of the gentler slopes of the caves. Frequently overlying the ore is some silty clay with distinct bedding and obviously waterlain. This in turn is overlain by cave breccia or angular fragments of limestone, although the cave breccia may also lie directly on the ore. It appears reasonable that the original sulphide mineralization was deposited in this irregular pipelike shape either massive, disseminated, or a combination of both, perhaps the latter. Subsequent oxidation and disintegration of the pyrite and the ore minerals provide an opening and a water course was established. This water course effected, at least in part, a concentration of the heavier ore minerals on the gentler slopes. Subsequently these minerals were usually covered with silt from flowing water and angular limestone fragments breaking from the wall and roof of the opening. This essentially is the occurrence of the ore mined by the company from 1954 to 1962. These cave-type deposits are usually small containing from a few hundred to 10,000 tons of ore although the caves may be quite large from solution of the limestone. They are difficult to locate as to date no structural control has been found and wall-rock alteration is not evident, although the oxidation of the original minerals and other iron-bearing minerals has in some cases stained the country rock surrounding the orebody. Some of the caves in the Diamond-Excelsior area have continuity and have been followed from near surface downward for hundreds of feet. On the company's property all of the

cave-type deposits are in the Hamburg dolomite.

The fissure-type ore occurrence is best exemplified by the north-west-trending Banner fissure from which possibly several thousand tons of ore have been produced above the Diamond level and near the surface. The Wabash and Deadbroke tunnels near the top of Prospect ridge show a similar occurrence. The pattern of underground work on an old map of the now inaccessible Williams mine also suggests fissure control of mineralization. In general the mineralization in the fissures is similar to that in the caves.

Future Possibilities

It would appear certain that the belt of Hamburg dolomite extending from the Excelsior area on the south to the north and of the Diamond area contains more orebodies similar to those mined in the past which, although of very good grade, have been relatively small. Workings and drilling may go within a few feet of one without any apparent indication of it. Some immediate objectives would be the upward continuation of the 1954 orebody of the company, exploration of the Banner fissure in the deeper workings, and a fresh study and review of the Excelsior and Fourth of July areas at the south end of the property.

Of a more speculative nature but with a hope of larger targets would be the exploration of the property at depth--that is, considerably below the 1300 level which is the present bottom of the mine. Geologically and geophysically (aeromagnetic), there are indications that the area is underlain by igneous rock. With this in mind there could be contact-type mineralization, or orebodies a short distance away from the contact such as that at the Fad shaft. Around Ruby Hill the top of the water table is at an elevation of about 5,900 feet. It may be somewhat higher at the company's property. The lowest workings are the 1300 level at an elevation of 6,529 feet or a maximum of perhaps 600 feet above the water table. Any ore in this interval would be oxidized and perhaps even below the top of the water table as at Eureka Corporation's TL shaft where oxidation was over 400 feet below. Deep exploration of this area should be by drilling to depths of at least 1,000 feet below the 1300 level. Suggested drill setups are from the 650 level, perhaps one hole in the Eldorado dolomite under the Silver Conner area, and two at intervals in the Hamburg dolomite under the productive area at the Diamond. Three such holes would entail 5,000 feet of drilling. Two more holes would be advisable to explore the area further south. The most accessible sites for these would be the Diamond level south of the No. 1 shaft. Such holes should be around 2,000 feet in depth so that the recommended drilling

would total 9,000 feet. The first several holes would give considerable stratigraphic and structural information and might necessitate some change in the suggested procedure. In view of the widespread occurrence of good-grade ore on the company's property, and the occurrence and size of an orebody nearby, such speculative drilling is justified.

Ralph Tuck

Ralph Tuck

August 13, 1970

CONSOLIDATED EUREKA MINING COMP

SHOWING

PROPERTY BOUNDARIES
AND
PRINCIPAL TUNNELS AND SHAFTS

SCALE

1" = 1000'

