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THE PINSON MINE--A CARLIN-TYPE GOLD DEPOSIT

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INTRODUCTION

In recent years, several important gold deposits known as "Carlin-type" have been discovered and developed in Nevada. The name Carlin comes from the first major discovery of this type, The Carlin Gold Mine, owned by Newmont. What were known as invisible gold deposits had been recognized previously but Carlin was the first to be developed and extensively studied. Gold occurs as micron size particles disseminated in silicated carbonaceous limey sediments. Deposits are commonly structurally controlled and are related to thrust faults. Generally, it is the oxidized portion of the deposit that is mined although unoxidized carbonaceous deposits can be treated by including a preoxidation step in the milling process.

The Pinson open pit mine and 1,000 ton per day mill were brought into production in January 1981, ten years after the discovery of the gold orebody. The deposit is Carlin-type but an unusual feature at Pinson is that the best grades are in jasperoid rocks. The discovery is credited to two geologists, John Livermore and Peter Galli, who obtained a lease on the property in 1970 for the Cordex I Syndicate.

In 1980, the syndicate was reorganized into a partnership called Pinson Mining Company with Rayrock Mines, Inc. as manager and holding 25.5 per cent, Lacana Mining, Inc. 26.25 per cent, Siscoe Metals, Inc. 26.25 per cent and the balance privately owned.

LOCATION

The Pinson property is located in Humboldt County in north central Nevada about 30 miles northeast of Winnemucca. The terrain of the area is typical Basin and Range, characterized by a series of narrow, rather short mountain ranges of moderate relief separated by broad alluvium-filled valleys. Pinson is in the foothills on the southeast flank of the Osgood Mountain Range.

The climate is arid with an average annual percipitation of 8.5 inches and the usual temperature range is from summer highs of 100°F to winter lows of 10°F to 15°F.

HISTORY

The Pinson Ranch was established in 1885, and in later years, one of the Pinsons who was interested in prospecting found a siliceous outcrop containing gold values on the ranch south of Granite Creek. He staked the showing in 1945 and this is the site of the present mine.

In 1949 the property was leased by Getchell Mines Inc., which operated a gold mill six miles to the north. Getchell shipped 100,000 tons of ore, with a grade of 0.20 ounces gold per ton, to the Getchell mill from a small open pit. Mining on the Pinson property ceased in 1950 when the Getchell mill was converted to tungsten ore processing. In 1963, The Goldfield Corporation, which had acquired Getchell, explored extensions of the ore zone in the open pit and developed a small tonnage, which was not considered mineable at the time. Shortly thereafter Getchell relinquished the Pinson lease. In 1968, Homestake in a joint venture with Getty Oil Company began a diamond drilling program. This was suspended after only two holes were completed although both intersected mineralization.

The Cordex I Syndicate was organized in the summer of 1970 with the primary objective of exploration for precious metal deposits in Nevada. Pinson, leased in the fall of 1970, was the first property to be acquired by the Syndicate. Geological mapping and geochemical surveys indicated some targets which had not been tested, and a program of 20 rotary drill holes was laid out. The first 17 holes were drilled mainly around the old Pinson Pit and encountered low grade values. In February 1971 the 18th hole, drilled to test a possible northeast extension, cut 90 feet averaging 0.17 ounces gold per ton in what turned out to be the Pinson A zone. This had lain undetected under only 10 to 20 feet of overburden.

Further drilling in 1971 and 1972 indicated 1,700,000 tons averaging 0.15 ounces gold per ton in the A zone plus an additional tonnage of lower grade material in the B zone. Prospecting and geochemical sampling by Cordex engineer G. W. DeLaMare in 1972 led to a second discovery known as the Preble deposit, 12 miles south of Pinson, where 1.5 million tons averaging 0.08 ounces gold per ton were indicated. These deposits were not economically viable at that time.

As the gold price increased during the 1970's, various economic evaluations were made of the Pinson deposit. The feasibility work included driving a 330-foot adit for a bulk sample in 1975. In early 1979 when the gold price had reached $250.00 per ounce, by which time over $1,000,000 had been expended on the properties, a new feasibility study was undertaken. This indicated that the Pinson project would be profitable and plans were made to put the property into production.

GEOLOGY

The Osgood Mountains are comprised mainly of Palaeozoic sedimentary rocks that have been intruded by a granodiorite stock in the east-central part of the range. The Pinson deposit occurs in the sediments adjacent to the stock and within the contact metamorphic halo.

The oldest rock unit exposed near Pinson is the Cambrian Preble Formation which has been arbitrarily divided into a lower and upper sequence. The lower unit is a massive carbonaceous siliceous shale which locally contains beds of quartzite and limestone. The limestone beds often show silication and the shales are hornfelsized. A principal characteristic of this unit is its black sooty appearance. The upper sequence is a maroon to grey colored phyllitic shale with abundant dark colored porphyroblasts giving it a mottled appearance.

Lying on the Preble Formation in a thrust relationship is the Ordovician Comus Formation. This consists mainly of intercalated thin beds of siltstone and limestone with two massive limestone beds up to 150 feet thick. Near the contact with the underlying Preble Formation, thin beds of chert and dolomite are present. The lowest limestone unit is locally silicated to diopside and tremolite--while the other members have undergone an introduction of silica in the vicinity of the ore zone. The majority of the mineralization occurs in this unit.

Cutting these Palaeozoic rocks is the Osgood Mountain intrusive - a granodiorite stock of late Cretaceous age which lies 1,500 feet northwest of the Pinson deposit.

Thin sills and dykes of dacite prophyry of Cretaceous age occur throughout the area. Due to rather complete alteration of the rock to clay near the surface, combined with heavy iron oxide staining, they are difficult to recognize. A sill-like body that ranges in thickness from a few inches to over 15 feet is often present on the hanging wall of the Pinson A orebody.

The structural geology of the Osgood Mountains is very complex. Several thrust faults, possibly closely related in time, have been recognized. High angle faults, some undoubtedly tear faults related to thrusting, offset all of the rock units in the range. The Pinson deposit lies within the Getchell Fault System, or structural trend, which has been traced intermittently for over 20 miles along the eastern side of the mountain range.

In the Pinson deposit area the general monoclinal dip to the southeast is modified in the Comus Formation by a northeast trending anticline and syncline plunging gently to the northeast. The beds show strong contortion and isoclinal folding.

Cutting the northwest limb of the syncline is a strong fault zone which has controlled the gold mineralization. It has been traced by drilling for over 8,000 feet with a northeast strike and a remarkably

uniform dip of 40 to 50 degrees southeast. For about half this distance, the structure occupies the contact between the Comus and the Preble, and is the locus of the Pinson A zone, while over the rest of the distance it cuts through the Comus and offsets the limestone and intercalated units. Where the structure occupies the contact zone it is a fairly uniform 50 to 60 foot sheared and brecciated zone with definite foot and hanging wall contacts. Where it cuts the Comus a much tighter zone with less shearing and alteration is produced. To the southwest the structure swings to a north-south strike and dips steeply to the east. Here the mineralized Comus Formation is dropped down against the barren Lower Preble carbonaceous shale. A second fault striking north-south produces a sharp western boundary to the mineralization in the Pinson B zone.

MINERALIZATON

The mineralization is of two types, A and B, both of which appear to be related to silicification in a shallow hot springs environment. There is an apparent relationship between the degree of silicification and gold content. The B zone is less silicified and the rocks are not as broken and thoroughly prepared as the rocks in the A zone.

Pinson B

The gold values are in the Comus Formation and tend to be low grade and the ore boundaries are irregular. The mineralization is associated with silicification and fracturing of the massive limestone

beds plus the intercalated limestone and siltstone unit and tends to be confined to a 105 foot wide vertical zone. There was pyrite associated with this mineralization, but it is completely oxidized down to the 400 foot depth drilled. Metallurgical testing indicates that gold recovery from the B zone will be over 90%.

Pinson A

The A zone is characterized by more intense silicification where massive limestone beds of the Comus Formation are completely replaced to a dense jasperoid which carries values from 0.20 ounces up to several ounces locally. The hanging wall is usually unbroken, silicated limestone that is oxidized and iron stained about twenty feet above the hanging wall fault of the ore zone and is always weakly mineralized. Within the zone are limestone and siltstone of varying degrees of silicification and alteration from the jasperoid to the totally leached limestone of which only the silica lattice remains. In a typical section through the zone the jasperoid occupies 30 to 40 per cent with the rest less silicified wall rocks and leached material, all of which is mineralized to some degree.

Mineralogy is relatively simple, consisting of iron oxides of geothite, lepidocrocite and hematite with some remnant pyrite, marcasite and gold. The gold is extremely fine, mostly less than

5 microns, and occurs as a free phase not associated with any mineral except silica. In the massive jasperoid a certain percentage of the gold is encapsulated in silica. The silver content is negligible which is typical for Carlin-type gold deposits.

GEOCHEMISTRY

Surface geochemical sampling and analysis of drill cuttings indicated an association of anomalous mercury, arsenic and antimony with the mineralized zones as is typical of most Carlin-type deposits. Analyses were also run for silver, copper, lead and zinc, but they showed no association with the gold mineralization.

ORE RESERVES

The A zone has a length of 1,500 feet and varies from 50 to 100 feet wide. The B zone has a length of 1,400 feet and varies from 100 to 300 feet in width. The C zone, a small zone northeast of A, is 30 feet wide and has a length of 300 feet.

An ultimate pit was designed to economic parameters based on a 0.05 ounces gold per ton cutoff for milling ore. The deposit will be mined to a depth of 350 feet. The following ore reserves were calculated by computer:

Zone	Tonnage	Undiluted grade ounces/ton
A	1,446,000	0.169
B	1,660,000	0.072
C	139,000	0.166
Total	3,245,000	0.119

Waste is calculated at 20,353,000 tons for a stripping ratio of 6.3:1. Within the waste tonnage there are an estimated 5,500,000 tons with an average grade of 0.025 ounces gold per ton which are expected to be amenable to heap leach gold recovery techniques.

FINANCING AND DEVELOPMENT

A major feasibility study had been carried out in 1974-75 but the project was shelved when the gold price declined. The feasibility study demonstrated that an open pit mine delivering 1,000 tons per calendar day or ore to the mill would be the optimum. Metallurgical test work showed that fine grinding would be required and also that the carbon in pulp process would be best for gold recovery because the finely ground ore would be very difficult to thicken or filter. The feasibility study was updated in 1979 and a decision was made to place the property into production, using a bank project loan to finance construction and mine development. Negotiations with the banks occupied several months

and the final agreement called for the partners to have a total equity investment of $3,250,000 (including the $1,000,000 expended on exploration and development since 1970) and the bank to provide a total of $15,750,000, which was to include interest during construction. The final figures (all U.S. dollars) for the entire project, including interest during construction, and financing and legal costs were:

Exploration and development 1980 to June 30, 1979	$1,034,313
Partners equity investment July 1979 to December 1980	2,250,000
Bank loan	15,750,000
Additional partners equity Jan-Feb 1981 to cover unforseen items and increase working capital	800,000
Overall Total	$19,834,313

The high debt to equity ratio was possible because the partners have substantial assets to back the loan guarantee. The partners were required to guarantee the loan until the project was operating successfully and had met certain completion tests. Thereafter, the project became the bank's security. Considerable time and effort was required to resolve technicalities in leases and titles to the satisfaction of the bank's lawyers and in particular, the nature of unpatented mining claims caused some difficulty. In the United States, it is important to commence remedial title work and title reports as soon as it appears that a mineable deposit might exist.

PERMITTING & ENVIRONMENT

In Nevada, as elsewhere, various permits are required but the State and local officials endeavour to maintain a balance between proper environmental protection and allowing development to proceed without excessive hinderance. Water use is carefully regulated and applying for use permits was done early in the project. Air quality permits for Pinson were applied for as soon as the design was complete for areas of the project that could generate dust or other air pollution. In 1975, a consulting firm had been engaged to produce an environmental baseline report on the project and this report was of indirect value in permitting.

The environmental impact at Pinson has been carefully limited by minimizing the disturbed areas, careful dust and tailings control, landscaping and planning the overall appearance of the plant site and by proper planning for the future reclamation of dump areas. As the mine is located in the vicinity of cattle ranching and food growing operations, it provides a good example of successful multiple use for land.

CONCLUSION

The scope of this paper does not include an operating description. However, we can report that to date the mined grade of the deposit has been slightly better than the preproduction estimates. The operation has been very successful and it appears that the entire bank project loan will be retired by the end of the first quarter of 1982; approximately 14 months from start-up.

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