Pinson Mining Company

HISTORY

In the Pinson mine area, modern history dates from 1825 when Jedediah Smith, leading a group of trappers in search of game, traveled south from Idaho to become the first white man to cross into the present state of Nevada. He reached the Humboldt River near the present community of Winnemucca, named for the famous Indian Chief who headed the local Paiute tribe.

Following the California Gold Rush, Paul A. Pinson arrived in San Francisco from France as an 8 year old boy in 1853. For the next 9 years, young Paul lived in the city with his parents as he resumed his study of the Jesuit Order, begun in his homeland.

He left home in 1862 in a dispute with his parents over his joining the Union Army in its war with the Confederacy. As a young man, he worked as a scout for early exploration expeditions in California and Nevada, including Clarence King's first ascent of Mt. Whitney by a white man, and he also did some prospecting in the early mining camps of Nevada.

While the Central Pacific Railroad was building the first transcontinental railroad, Pinson worked as a hunter, providing meat for the camps of the rail layers. He rejoined his family in Winnemucca in 1863 and worked at a mining and milling venture for the French Canal Company of Nevada until its bankruptcy.

Paul Pinson was married to Mary J. Polkow on January 31, 1880 in Spring City near Paradise Valley. He worked several silver mining claims in the area until 1885 when he bought 160 acres of land on the Humboldt River at Preble and took up ranching. The couple had a total of 8 children, although one of them, Martha, died at age 9. Before his death on August 17, 1917, the Pinson ranch had expanded to more than 1,000 acres.

Paul and Mary's two sons, Clovis and Victor bought a ranch at the eastern base of the Osgood Mountains in 1914, north of the original Pinson Ranch. The older son Clovis, held a number of ranching jobs in the area in addition to his interest in this property until 1941 when he went to work for himself full time. In 1945, he staked a group of mining claims on Granite Creek above the ranch to cover a siliceous gold outcropping he had discovered. Then, along with a partner, Charles Ogee, he solicited the interest of Getchell Mines, Inc. which operated a mine and mill about 6 miles north of his discovery. In all, about 100,000 tons of relatively low grade gold ore were processed at Getchell mill before Clovis died on January 27, 1949. After Clovis' death, the Pinson-Ogee mine was believed to have been exhausted.

The property was later explored by various companies, including Homestake Mining Company and Jackson Mountain Mining Company. These programs proved to be inconclusive and the claims were thought to be worthless. Clovis' half of the claims were passed on to his sister Josephine, who upon her death in April, 1970 left them to their sister Gertrude Pinson Collins.

Charles Ogee's half interest in the Pinson-Ogee mining claims were acquired by another sister, Camille Pinson Hibbs, who left them to her three grandchildren, Victor, Susie, and Jim Christison upon her death in January, 1969. Mrs. Hibbs' daughter, Jody Christison, kept the claims in good standing for her children only for sentimental reasons.

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In 1970, the Pinson claims were leased by the Cordex I syndicate which was organized by Rayrock Resources, Ltd. of Toronto, Canada and John Livermore of Reno. Mr. Livermore and another geologist, Peter Galli, also of Reno, mapped the area and decided to drill 20 exploration holes to test targets they felt were indicated. The first 17 holes showed only very low grade gold-bearing mineralization, but the 18th hole intersected about 90 feet of material averaging 0.17 oz. of gold per ton in what would eventually become Pinson's A-Zone. This deposit lay only 10 to 20 feet below the surface not more than 200 yards from the old Pinson-Ogee pit.

Before the assay report had been received on the 18th hole, the drilling equipment had completed its 20 hole program and left the property. It had to be called back so that delineation could continue. This additional drilling indicated 1,700,000 tons averaging 0.15 oz. of gold per ton plus additional lower grade tons in the B-Zone. In 1972, prospecting and geochemical sampling by G. W. DeLaMare led to an entirely new orebody known as the Preble deposit, 15 miles south of Pinson near the original Pinson Ranch. Here 1,500,000 tons of material at 0.08 oz. of gold per ton were outlined by drilling. Neither deposit however could be profitably mined at the then current price of $65 per oz.

Over the next several years, various economic evaluations of the Pinson gold deposits were conducted that included driving a 330 foot adit in 1975. By 1979, more than $1,000,000 had been spent on the properties when gold prices climbed to $250 per ounce and a new feasibility study indicated that development of the Pinson orebodies could be done profitably.

The Cordex I syndicate which had been made up of Rayrock Mines, Inc., Lacana Mining, Inc., Siscoe Metals, Inc., and International Mogul Mines Ltd., was reorganized into Pinson Mining Company wherein Rayrock Mines owns 26.5%, Lacana Mining and Siscoe Metals each own 26.25%, John Livermore 12%, Peter E. Galli 8% and Donald M. Duncan 1%. International Mogul's 20% share was purchased by Rayrock, Lacana, Siscoe and D. Duncan. Rayrock Mines is the operating partner with its headquarters in Toronto.

A project manager, and mine and mill superintendents were hired in late 1979 to expedite the development of a 1000 ton per day mine/mill complex. Plant design engineering was contracted with Industrial Design Corporation of Salt Lake City, Utah. Three experienced plant metallurgists were stationed in Salt Lake City to guide the work of Industrial Design. Among the many design criteria spelled out by Pinson, foremost was bringing the mill on line as quickly as possible at minimum capital cost. The success of this goal was evidenced by the startup of the Pinson mill only 18 months after design work began at an outlay of $18 million; all of which was recovered in the first 18 months of operation.

Concurrently with mill design and construction, mining was begun in May, 1980 at the 5,340 foot elevation of the A-Zone. Ore was stockpiled until mill startup in January, 1981. The first gold bars were poured on February 9, 1981. Then, in January, 1982 mining of B-Zone ore began with development at the 5,360 foot level.

Grand Opening

On Monday, May 11, 1981 a chartered Boeing 737, carrying 130 stockholders and Canadian mining people landed at the Battle Mountain airport. After spending the night in motels there, they were bused to the Pinson mine site. A second planeful flew in from Reno. In all, four hundred people showed up at the foot of the Osgood Mountains on May 12, 1981 to see Nevada's newest and most modern gold mine.

Almost half of the visitors were Canadians and they were treated to bluegrass music, speeches, and lots of refreshments. Crowned with straw cowboy hats distributed as part of their tour, the investors were all smiles, especially as they filed past the gold bar, safely placed behind iron bars in the refinery vault. But they also peered over the edge of the then 120 foot deep open pit mine which is now approaching 400 feet.

Finally, the crowd settled down to dine on barbecued beef and all the trimmings; sitting on bales of hay placed for that purpose in the empty maintenance building that one Reno newspaperman described as "big as an airplane hangar".

Mining Methods

After the celebration, work resumed in both the mill and the mine. The open pit mine was designed by computer optimization after initial drilling began in the early 1970's, and carried through on a five-year plan. Pinson engineers created the block model on-site and contracted with Mintec, Inc. to optimize the model. The company engineers then further refined the shell and put in ramps to arrive at the sequence they wanted.

The A- and B-Zones are being mined in two stages. Pinson, as previously noted, began mining the higher-grade A-Zone ore first. Some 2,400,000 tons of waste and about 100,000 tons of ore were mined before mill startup. Pinson is now mining both A- and B-Zone ores.

Mining, for the most part, has followed the computer model, but changes have been made. The model called for mining in slices, but larger areas were needed for efficient pit operation. Overall pit slopes are 55° on the hanging wall and 45° on the footwall. The hanging wall has 33 foot safety berms every 80 vertical feet while the footwall safety berms are 25 feet wide and are left every 60 feet.

With an overall waste-to-ore ratio of 9 to 1, Pinson moves approximately 27,000 tons of material daily five days a week, with a lean equipment fleet. Major units include a Liebherr 982 hydraulic shovel equipped with a 5½ cubic yard bucket, 2 Caterpillar 992C front end loaders with 12½ cubic yard buckets, 5 Wabco and 2 Caterpillar 50-ton trucks, 2 SK35 and 1 SK40 drills, plus the usual support equipment.

Pinson uses a 12' x 12' drilling pattern in the hard limestone hanging wall, and a 14' x 14' pattern in ore and softer rock. The 6-3/4 diameter holes are sunk to a depth of about 25 feet in order to load out 20 foot benches. ANFO, a mixture of ammonium nitrate and fuel oil is the blasting agent. Against the permanent highwalls, 3" diameter holes are drilled on close spacing and loaded and shot with a light dynamite charge. This "pre-split" blast does only minor damage to the face of the highwall, and provides an air cushion to protect it from the more violent mining blasts. This ensures a safer and more stable wall above subsequent mining benches.

Cuttings from each blast hole are sampled and sent to the laboratory at the millsite for analysis. The holes are surveyed in just before blast time so that they can be relocated afterwards. The ore control geologist can then place stakes around the various grades of ore when the results are obtained from the lab the next day. These stakes will then guide the equipment operators as they load out the material and direct the truck drivers to the ore or waste stockpiles.

The ore is relatively easy to mine, but it does contain some large boulders. Those too big to haul are blasted in the pit, but most are carried to the mill and reduced with a rock breaker mounted on a backhoe tractor.

Waste haulage distances average 1/2 mile while ore haulage from the A-Zone is about a mile round trip. Ore haulage distance for the B-Zone is about 1½ miles. Haul roads are 60 feet wide and are banked and equipped with safety berms as needed.

Milling

The ore arriving from the mine is separated according to grade and stockpiled as mill feed. The faces of these stockpiles are sampled daily and analyzed in the lab so that a map can be prepared to display the average grade in several places. This map is used by the general mill foreman to blend the ore so that the mill feed is kept at about .093 ounces per ton gold. It is anticipated that this grade can be maintained for the life of the mine.

Pinson's ore is a well oxidized hydrothermal deposit in which the limestone-siltstone host rock has been silicified to a jasperoid, a portion of which has been weathered to clay. The remaining jasperoid is extremely hard with a Bond Work Index approaching 20. Silver values are so minimal as to represent only contamination of the gold dore' and mercury exists in quantities that require removal for health protection of the refiner. At times mercury content in the ore is 10 times that of gold.

Ore is fed to the crusher with a front end loader in the desired blend. The crushing plant is a conventional two stage installation, producing a minus 1/2 inch product. The most significant design feature of the system is a belt plow and open-air crushed ore stockpile. The belt plow is used to divert excess production from the final belt to the 1,400 ton bin to a 30,000 ton stockpile area. During crushing plant shutdown, this pre-crushed ore is loader fed through a Kolberg feeder located downstream from the fine ore bin. This system has prevented significant loss of production due to lack of ore. When full, this stockpile can feed the mill for up to 3 weeks.

The loader-fed ore is first introduced to a 42" x 48" Allis-Chalmers jaw crusher by a hydrostroke feeder for primary crushing. The secondary crusher, a 5½ foot Symons cone in closed circuit with a vibrating Simplicity double-deck screen produces the final 1/2 inch product. Ore is crushed by a designated crew on a single shift per day, but must be supplemented by the mill crew on other shifts.

Dry sodium cyanide briquets are deposited on the mill feed belt which then passes under 2 ore feed belts at the base of the fine ore bin. The ore feed tonnage is controlled by the speed of these 2 ore feeders. Then lime for pH control is placed on the belt just ahead of discharge into the primary ball mill. To ensure that the cyanide remains in solution and is not released as a toxic gas, pH is maintained above 10.5.

The 500 horsepower Kennedy Van Saun primary mill, measuring 9' by 12', uses 4 inch balls at 0.7 pound per ton of ore. It discharges through a 1/4 inch trommel screen into a sump that is shared by both mills. The primary trommel oversize which averages 2 to 3 tons per hour is recycled via a cleated belt back to the mill feed. Mill discharge passing through the trommel is pumped to six Krebs 15 inch cyclones. The cyclonic motion in these devices classifies the slurry so that 80% of the overflow is minus 200 mesh. The remaining slurry which underflows the cyclones is routed into the 1000 horsepower secondary mill. This 12' by 14' Allis Chalmers mill uses 1½ inch and 2 inch balls at 2.2 pounds per ton of ore.

The cyclone overflow at 12% solids passes through a DSM screen to remove remaining oversize and then flows by gravity to a 100 foot diameter Eimco thickener. Here, a flocculant is added to speed up the settling process of the solids as it leaves the center well. Approximately 75-80% of the soluble gold is in solution in the thickener by the end of the six hours it is retained there.

Beyond the thickener, the circuit splits. Pinson was the first carbon-in-pulp, (CIP), operation to adopt a split-circuit approach to the adsorption section.

The thickener overflow is pumped to a headbox which feeds a series of five fluidized - bed carbon columns. The solution is introduced at the bottom of the columns and the flow rate is controlled so that the carbon bed is partially - but not totally - suspended in the column. This prevents the carbon from acting as a filter for any solids that might exist in the solution, because such filtration would block off areas of carbon from exposure to the pregnant solution. The activated carbon adsorbs the gold from solution and the barren solution then recycles to the grinding sump.

Thickener underflow, at 40% solids is pumped to a series of four steel tanks for 22 hours of retention. Air is injected under the agitators in these tanks to aid in further leaching. The pulp then flows from the last tank in the series to the CIP circuit by gravity.

The Pinson CIP tanks are unique to North America. They contain hollow down-flow draft tube agitators and were selected for their low horsepower requirements. They provide very gentle agitation which nevertheless is adequate for suspending the slurry particles and carbon. The gentleness of agitation is important to a carbon-in-pulp circuit because of carbon attrition. Although carbon fines created by abrasion have a small replacement cost, they carry adsorbed gold to tails with them and are therefore of great concern.

The pulp flows by gravity through the five CIP tanks, but the carbon is retained in each tank. Many CIP circuits achieve this by air-lifting the pulp onto mechanical vibrating screens between each stage. This inter-stage air lifting and screening was frequently identified as a serious source of carbon attrition losses. To avoid these losses, the Pinson design utilizes a transverse launder for pulp flow through the five tanks. The side walls of the launders are fitted with 20 mesh static screen panels which prevent the carbon from flowing into the launder with the pulp. Air bubblers beneath the static screens sweep the carbon away from the screen surface.

Before dropping into the tails pumpbox, the pulp discharging from No. 5 CIP tank is sampled, then screened on a Derrick screen at 28 mesh. This last step in the continuous flow part of the mill is designed to catch carbon fines which may have escaped the launder screens. Once the tails are pumped to their permanent impoundment, solution is reclaimed and pumped to the grinding circuit feed. The contained cyanide and lime reduces the requirements for addition of these reagents.

The remaining mill operations are done on a batch basis. The carbon in both of the adsorption circuits is loaded to about 200 ounces of gold per ton of carbon, then moved to a stripping vessel. Loaded carbon is stripped in 3 ton batches using 1.5% caustic and 0.15% cyanide at 195°F under ambient pressure. After approximately 72 hours, the carbon will have been stripped to 5 ounces per ton of carbon.

The pregnant strip solution flows by gravity to the refinery where gold is electroplated onto mild steel wool cathodes inside two cells. Stainless steel wire mesh is used as an anode. The cathodes are normally loaded to about 80 ounces of gold per pound of wool before they are pulled for refining. The barren electrolyte is then reheated and recirculated to strip more carbon.

The loaded cathodes are retorted in an induction-heated vessel at 650°C under a vacuum to recover mercury that plates with the gold. Approximately 2 pounds of mercury are recovered from each cathode. The retorted cathodes are then loaded into a 125 kilowatt induction furnace with appropriate fluxing agents for fire refining. The fluxes cause separation of the gold from other components as the button is poured into a mold. Once sufficient gold exists as buttons, a smaller furnace is used to remelt buttons into 1,000 ounce bars for shipment. The dore' typically runs about 97% gold and less than 1% silver.

The Pinson mill was designed to minimize manpower required to operate it, and to provide for future increases of throughput. The entire milling operation, from fine ore bin through to the tailings pond and reclaim water system, was designed to be operated by two men per shift. Control and monitoring of the operation is centralized at the control panel located in the center of the process. The operators can tour the plant quite efficiently, taking variable process measurements to be recorded in a shift log book at the control panel. Whenever both operators are needed at one location, the control panel will continue to monitor the operation. If a process variable ranges beyond specified limits, an audible alarm sounds, alerting the operator to return to the panel.

The front of the control panel graphically displays the entire flowsheet. Green lights in the panel indicate normally operating equipment motors. When an alarm sounds, a red light flashes on the graphic display, thus identifying the source of the trouble. The operator pushes the acknowledge button to silence the alarm horn, changing the flashing red light to a steady red. This light stays on until the problem has been corrected.

The Pinson mill is not automated. All decisions are left with the operator. The controls simply assist him in continuously maintaining critical flows at the point he sets. The control panel alarm system permits him to roam freely throughout the plant, watching for developing mechanical or process flow problems. No "control room operator" is required with this system.

Expansion of the design milling rate of 1,000 tons per day has already taken place with current production approaching 1,500 tons per day. However, structural and spacing provisions were made for even more dramatic changes; including the capacity to add a third mill and/or convert the primary ball mill to a rod mill.

Heap Leaching

In December 1982, Pinson began producing gold from the relatively new technology of heap leaching. The low capital cost and simplicity of this technique allows gold production from ores that would not be economical if forced to stand the cost of milling. Therefore, lower grades of gold containing material became ore when this process came on line.

The heap leach facility occupies a 160 acre area immediately to the south of the plant site. Clay lining is used on the leaching pads, because they are more cost effective than plastic liners. Clay is available locally. For leach material, Pinson uses run-of-mine ore. Permanent asphalt pads were considered, but were not used because it was desirable to be able to releach the ore over extended periods of time for additional gold recovery, and because the cost of moving the ore again was avoided.

Pads are nominally 300' by 380' diamond shaped areas which take advantage of the natural ground contours in order to minimize the required earthwork to construct them. After the natural surface is prepared, 12 to 18 inches of clay is brought in and compacted in three separate lifts. Over this clay, 6 to 12 inches of gravel is placed to provide free drainage of the heaps and to protect the clay from erosion. Ditches are constructed along the two down-slope sides of the pad and are lined with 36 millimeter reinforced hypalon-plastic. Four inch perforated PVC pipe and clean gravel are placed in these lined ditches.

Over the life of the mine, approximately 60 pads will be constructed, each capable of holding 90,000 tons at 20 feet of heap height. Each pad will join the next, separated only by the ditches. Heaps will actually butt against each other, giving the appearance of a single heap. However, leaching and stacking will be done in a manner that will allow four individual heaps to be leached at the same time without intermingling pregnant solutions prior to introduction to the preg pond. This will allow good metallurgical accountability for each heap. Flumes connected to each heap underflow pipe will allow sampling for recovery calculations in one location rather than at each heap discharge.

Solution is collected at the low corner of the pad by a "manhole" system; three 12 inch diameter steel pipes, with slotted caps installed vertically. Pregnant solution is carried from the pad to the pond via 6 and 8 inch HDPE piping.

The preg and barren ponds are double lined; 8 inches of compacted clay covered by a 40 millimeter sheet of high density polyethelene. HDPE exhibits excellent resistance to weathering, which is the main reason for its selection. Heat welded seams were used to join sheets and each seam was "spark tested" prior to inundation to insure dependability of the joints. Pond capacities are 2.2 million gallons for the pregnant pond and 1.2 million gallons for the barren pond. A clay lined pond with 3 million gallons of capacity provides overflow protection for both production ponds.

Spray solution is delivered to the heap through an 8 inch HDPE pipeline, then distributed by 3 inch "Yelomine" pipe and No. 12 and 14 wobblers and rainbirds on 40 foot centers. The wobbler spray heads produce large droplets, and thus lower evaporation and wind loss. Solution loss is an important economic consideration not only because of pumping costs, but also because of reagent and gold lost in solution blown off of the pad area.

Pregnant solution is pumped from the preg pond to the mill. Here, it enters its dedicated series of carbon columns just as the thickener overflow enters in the mill circuitry. From this point, the recovery parallels mill run.

Profitability of heap leached gold is enhanced by the necessity to remove this material from the mine in order to mine mill-run grade ore. Therefore, the only additional mine cost incurred is the haulage from the waste dump where it would have gone to the heaps, and the stacking costs. The ability to leach run-of-mine ore is also a large contributor to the endeavor. Pinson is thereby able to leach .01 to .04 ounce gold per ton of material that would otherwise have been dumped in the waste piles.

Preble

The 1972 discovery by G. W. DeLaMare of a 1.7 million ton orebody averaging .062 ounces per ton led to the beginning of mining at Preble in the summer of 1984. Shortly thereafter, heap leach facility construction began to be followed by production in the fall of the same year.

While most of the Preble ore will be heap leached on site, about 86,000 tons of ore grading .239 ounces of gold per ton will stand the haulage cost to the Pinson mill. The heap leach process will include loading carbon which will then be hauled to the Pinson mill for stripping.

Testing of the Preble ore in 1983 indicated that best recovery is achieved by crushing and agglomerating the ore prior to leaching. Unlike other Pinson ores, this increased recovery more than offsets the additional cost.

Geology

Three Carlin-type gold deposits occur along the east flank of the Osgood Mountains. Pinson, Preble, and Getchell exhibit similar features in that the ore occurs along wide shear zones in carbonate and/or carbon-bearing host rocks. Altered dikes and sills are associated with the gold mineralization. The gold is generally sub-microscopic, has a high gold-silver ratio, and occurs with silica and pyrite replacing the carbonate rock in varying degrees. The mineral assemblages resemble low temperature vein deposits. Arsenic, mercury, and antimony, often with barium and fluorine are important trace elements. Silica, kaolinite, sericite and calcite are important gangue minerals.

The gold deposits occur along a structural belt known as the Getchell Fault System. The system bounds the eastern flank of the range. It is believed to be an older fault system, at least late Cretaceous in age. The fault system is similar to, and in many cases becomes a basin and range fault, parts of which have been active until present. The Getchell Fault System is the main control for the gold deposition in the Osgood Mountains. Its strike length is approximately 25 miles.

Impact

Pinson's average employment is 135 people with peak summer employment topping 145. Besides the obvious impact of this payroll on nearby communities, Pinson consumes goods and services at a rate of about 7 million dollars per year. An active member of the Nevada Mining Association, the company takes its membership in the county and state of Nevada very seriously. Staff time is devoted to activities ranging from the local chamber of commerce to providing information and resources to the statewide school system, to working with state and national representatives of government. Whenever possible, donations and other support are extended to various charitable organizations and students. Winnemucca, Golconda, and Battle Mountain all feel the effects of these "dollars from the ground", the end result of more than a century of history along the Osgood Mountains.

PINSON MINING COMPANY

MINING STATISTICS AS OF JUNE 1989

COMPLETED PITS

Pinson A-Pit:

Beginning Reserves:	2.5 million tons with an average grade of 0.108 oz Au/ton at 0.02 oz Au/ton cutoff
Strip Ratio:	5.4 : 1
Highwall Slopes:	50 degrees hanging wall side 38 degrees foot wall side
Berm Width/Spacing:	30 ft every 80 ft vertical - hanging wall side
Haulage Roads:	10% grade 50 ft minimum width Ore haul distance of 4400 to 5600 ft Waste haul distance of 1200 to 2300 ft

Pinson B-Pit:

Beginning Reserves:	3.4 million tons with an average grade of 0.050 oz Au/ton at 0.02 oz Au/ton cutoff
Strip Ratio:	2.8 : 1
Highwall Slopes:	55 degrees hanging wall side 45 degrees foot wall side
Berm Width/Spacing:	33 ft every 80 ft vertical - hanging wall side 25 ft every 60 ft vertical - foot wall side
Haulage Roads:	8% to 12% grade 50 ft minimum width Ore haul distance of 5000 to 8000 ft Waste haul distance of 2000 to 4000 ft

ACTIVE PITS

Pinson Mag Pit:

Beginning Reserves:	3.9 million tons with an average grade of 0.077 oz Au/ton at 0.02 oz Au/ton cutoff
Percent Mined as of June 1, 1989:	57%
Strip Ratio:	4.4 : 1
Highwall Slopes:	38 degrees
Berm Width/Spacing:	No berms other than in pit ramps
Haulage Roads:	10% grade 60 ft minimum width

Mag Pit: (cont.)

Ore haul distance of 1500 to 3100 ft
Waste haul distance of 1000 to 4800 ft

Pinson C-Pit:

Beginning Reserves: 149,000 tons with an average grade of 0.119 oz Au/ton at 0.02 oz Au/ton cutoff
Percent Mined as of June 1, 1989: 24%
Strip Ratio: 12.7 : 1
Highwall Slopes: 45 degrees overall
Berm Width/Spacing: 35 ft every 80 ft vertical
Haulage Roads: 11% grade
50 ft minimum width
Ore haul distance of 3900 to 4700 ft
Waste haul distance of 2000 to 2800 ft

Felix Canyon:

Beginning Reserves: 355,000 tons with an average grade of 0.030 oz Au/ton at 0.02 oz Au/ton cutoff
Percent Mined as of June 1, 1989: 7%
Strip Ratio: 3.2 : 1
Highwall Slopes: 40 degrees overall hanging wall side
50 degrees overall foot wall side
Berm Width/Spacing: 8 ft every 60 ft vertical - hanging wall side
17 ft every 60 ft vertical - foot wall side
Haulage Roads: 11% grade
40 ft minimum width
Ore haul distance of 7200 to 8200 ft
Waste haul distance of 1000 to 2800 ft

Preble:

Beginning Reserves: 1.7 million tons with an average grade of 0.062 oz Au/ton at 0.02 oz Au/ton cutoff
Percent Mined as of June 1, 1989: 98%
Strip Ratio: 2.6 : 1
Highwall Slopes: 34 degrees West wall
45 degrees other walls
Berm Width/Spacing: 28 ft every 60 ft verical
Haulage Roads: 10% grade
55 ft minimum width

Preble: (cont.)

Ore haul distance of 2500 to 3600 ft
Waste haul distance of 1000 to 2600 ft

MINE OPERATING SCHEDULE

Pinson pits are mined two shifts per day, five days per week, year round. Preble is mined two shifts per day, five days per week for approximately six months per year.

PRODUCTION STATISTICS (Ave 1988 rates)

Pinson Pits:	Per Day	Per Month	Per Year
Tons ore mined	1,500	45,000	547,500
Tons leach mined	500	15,000	175,000
Tons waste moved	12,000	365,000	4,380,000

Strip Ratio (waste+leach : ore) 8 : 1

Preble Pit:	Per Day	Per Month	Per Year
Tons ore mined	220	6,700	76,800
Tons leach mined	2,875	86,250	345,000
Tons waste moved	8,625	259,000	1,035,000

Strip Ratio (waste : leach+ore) 3 : 1

BLASTING

Pinson drilling patterns vary between 12' x 12' spacing in the hard limestone and siltstone rocks to a 15' x 15' spacing in the softer rocks and alluvium. The 6-3/4" diameter holes are sunk to a depth of about 25' in order to load out 20' benches. ANFO, a mixture of ammonium nitrate and diesel fuel oil, is the blasting agent. Against the more permanent highwalls, 2-1/2" diameter holes are drilled on close spacing, loaded with a light dynamite charge, and shot in a "pre-split" blast to provide a more competent, stable highwall.

MINING EQUIPMENT

Two Wabco 50 ton haul trucks
Four HaulPak 85 ton haul trucks
Three Cat 992C front end loaders with 13.0 cyd buckets
One 982 Liebherr shovel with a 6.5 cyd bucket
Three SK35 drills
One SK40 drill
Two motor graders
Three Cat D8 dozers
One Cat D6 dozer
Twenty-one miscellaneous pieces of support equipment

PINSON MINING COMPANY

MILL STATISTICS

CRUSHER

Equipment : Cat 980 loader
42" x 48" Allis-Chalmers jaw crusher
5.5 ft. Symons cone crusher
7' x 16' Simplicity Double Deck vibrating screen
(1.5" top screen, 0.5" bottom screen)

Approximate throughput = 150 - 200 tons per hour
Product (feed to fine ore bin) = -1/2 " material

MILL

Equipment : 9 ft. x 13 ft. Kennedy Van Saun ball mill (500 hp)
12 ft. x 14 ft. Allis Chalmers Mill (1000 hp)
8" x 10" Georgia Iron Works cyclone feed pump
Six 14" Krebbs cyclones

Fine ore capacity = 1,700 tons
Mill throughput = 55 - 75 tph
= 1,300 - 1,800 tons per day
Moisture content of ore feed = 3% - 9%
Typical mill product = 85% minus 200 mesh (75 micron)

THICKENER, LEACH AND CARBON ADSORPTION TANKS

Equipment : 100 ft. flat bottomed thickener with Eimco mechanism
2 leach tanks with 60 hp Lightnin agitator drives
2 CIL tanks with 60 hp Lightnin agitator drives
Five 11 ft. x 23 ft. CIP tanks with 7.5 hp Lightnin agitators with daft tubes.
Five 6 ft. x 13 ft. Upflow Carbon adsorption columns

One CIL and one leach tank - 27' x 32'
the other CIL and leach tank - 27' x 29'-6"

Thickener feed = 11% - 15% solids
Thickener underflow = 38% solids (at approximately 600 gpm)
Leach/CIL retention time = 16 hours

Carbon concentration in each CIL = 3.5 gpl (1.5 tons total)
Carbon concentration in each CIP's = 22 gpl - 28 gpl (1.5 tons total)
Carbon in each mill column = 1 ton
Average CIL loaded carbon value = 100 oz/ton
Average mill column loaded carbon value = 125 oz/ton
Normal tailings values = 0.010 oz/ton of solids
<0.001 oz/ton of solution

CARBON STRIPPING CIRCUIT

Equipment : Four 42" diameter x 24' insulated strip tanks
Two 8' diameter x 10' Electrolytic heat tanks
Two 50 hp hot water boilers
Two 80 cu. ft. electrowinning cells each with 13 stainless steel anodes and 12 cathode baskets.

Strip tank capacity (each) = 3 tons
Average gold content of one strip = 350 oz.
Value of stripped carbon = 5 - 10 oz/ton
Average strip time for 3 tons of carbon = 50 hours
Electrolyte : 0.3% NaCN
1.5% NaOH
Temperature = 185 deg.F
Flowrate = 35 gpm

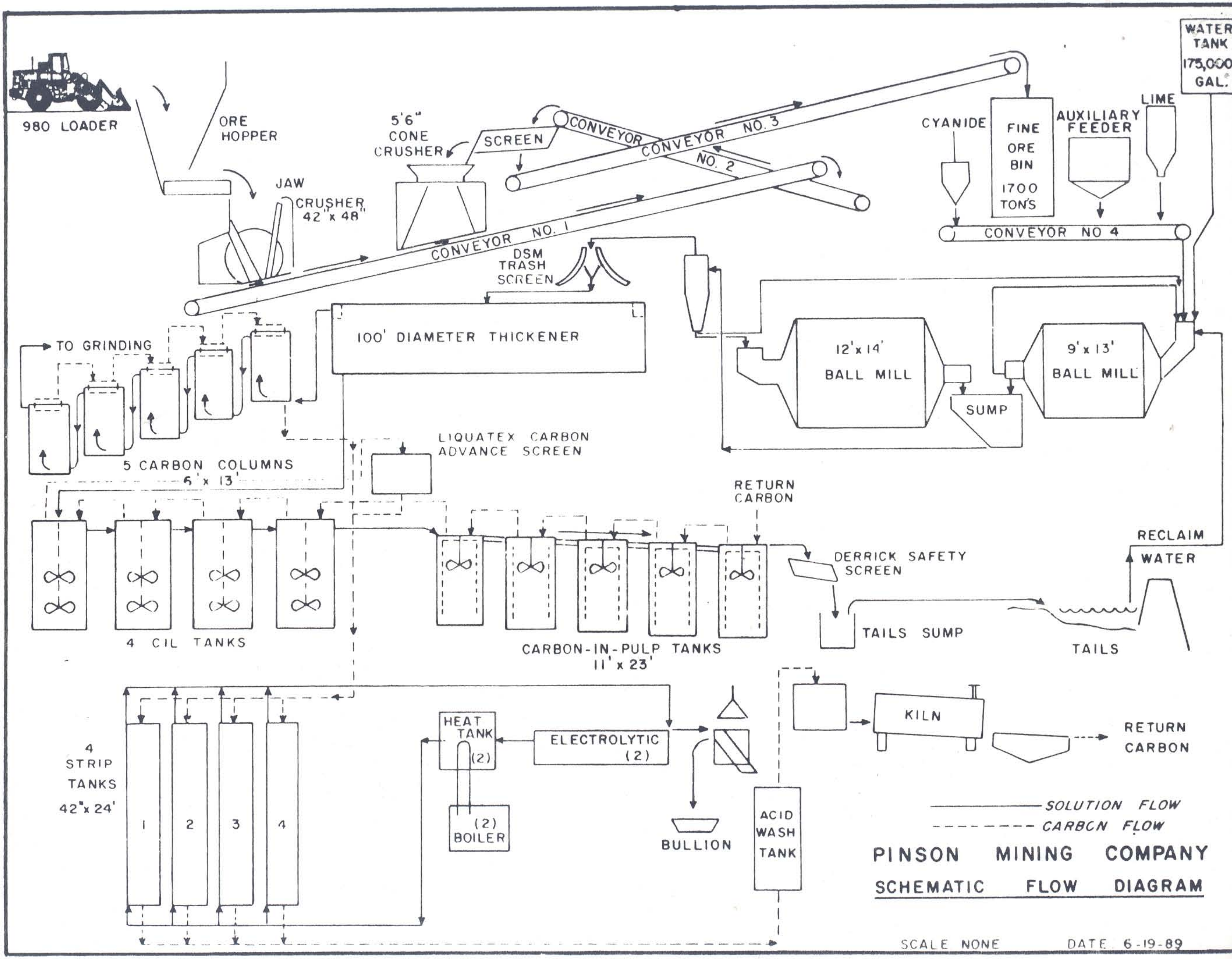
REFINERY

Equipment : One induction heated vacuum retort
125 kW induction furnace
25 kW induction furnace

Approximately 2.5 lbs of #2 steel wool used per cathode
Approximately 20 - 30 oz. Au per pound of steel wool loaded on cathodes.
Mercury recovered per strip = 7 - 33 lbs.

TYPICAL REAGENT CONSUMPTIONS

Cyanide	: 0.58 lb/ton
Lime	: 2.6 lb/ton
Carbon	: 0.09 lb/ton
Caustic	: 0.09 lb/ton
Flocculant	: 0.013 lb/ton
Balls	: 2.7 lb/ton
Hydrochloric acid	: 0.09 lb/ton


980 LOADER
ORE HOPPER
JAW CRUSHER 42" x 48"
5'6" CONE CRUSHER
SCREEN
CONVEYOR NO. 1
CONVEYOR NO. 2
CONVEYOR NO. 3
CONVEYOR NO 4
WATER TANK 175,000 GAL.
CYANIDE
FINE ORE BIN 1700 TON'S
AUXILIARY FEEDER
LIME
DSM TRASH SCREEN
100' DIAMETER THICKENER
TO GRINDING
12' x 14' BALL MILL
9' x 13' BALL MILL
SUMP
5 CARBON COLUMNS 6' x 13'
LIQUATEX CARBON ADVANCE SCREEN
RETURN CARBON
4 CIL TANKS
CARBON-IN-PULP TANKS 11' x 23'
DERRICK SAFETY SCREEN
RECLAIM WATER
TAILS SUMP
TAILS
4 STRIP TANKS 42" x 24'
1
2
3
4
HEAT TANK (2)
(2) BOILER
ELECTROLYTIC (2)
BULLION
ACID WASH TANK
KILN
RETURN CARBON
SOLUTION FLOW
CARBON FLOW
PINSON MINING COMPANY
SCHEMATIC FLOW DIAGRAM
SCALE NONE
DATE 6-19-89