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ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES AZMILS DATA

PRIMARY NAME: CIBOLA NO. 8 MINE

ALTERNATE NAMES:

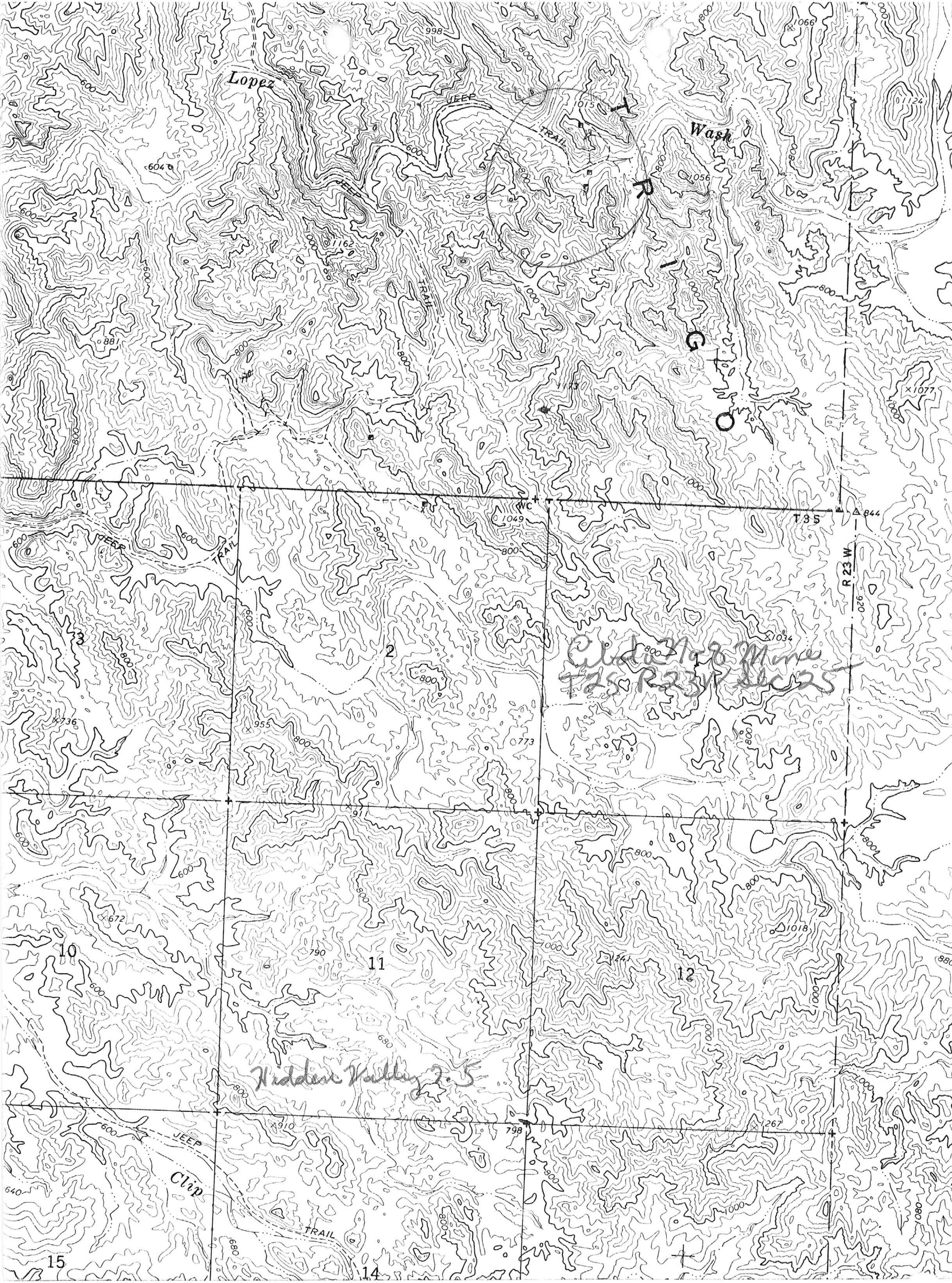
LA PAZ COUNTY MILS NUMBER: 342

LOCATION: TOWNSHIP 2 S RANGE 23 W SECTION 25 QUARTER SW
LATITUDE: N 33DEG 13MIN 02SEC LONGITUDE: W 114DEG 35MIN 28SEC
TOPO MAP NAME: HIDDEN VALLEY - 7.5 MIN

CURRENT STATUS: PAST PRODUCER

COMMODITY:
MANGANESE

BIBLIOGRAPHY:
KEITH, S.B., 1978, AZBM BULL. 192, P. 180
ADMMR CIBOLA NO. 8 MINE FILE
IC 7843, P. 79
GEO FILE - GEOEXPLORERS INTERNATIONAL, VOL 6
GEO FILE - PARKER, FRANK


Lopez
Wash
JEEP
TRAIL
T R I G O
T 3 S
R 23 W
2
3
10
11
12
15
14
Clip
T2S R23W Sec 25
Hidden Valley 2.5

aBM Bull 192

Trigo Mountains (Cibola) District, Table 4 Cont.

MINING DISTRICT AND MINES	LOCATION T.	R.	Sec.	MINERAL PRODUCTS	GEOLOGY	TYPE OF OPERATION AND PRODUCTION	REFERENCES
1. ABC mine (Self, Cockrum & McNelly)	2S	22W	SE¼ 1 Protracted	Mn	Psilomelane in brecciated wall rock in parallel shear veins in Tertiary andesitic volcanics.	Open cut operations, worked in 1948-1950 and in 1954-1955, producing some 400 long tons of about 41% Mn.	Farnham & Stewart, 1958, p. 81 ABM Bull. 180, p. 219 ABM file data
2. Andrus claims (M & A; Tenny, Western Exploration & Development Co.)	2S	22W	SE¼ 20 Protracted	Mn	Psilomelane in bunches and veinlets along a fracture zone in Tertiary andesitic volcanics.	Open cut and pit operations. Some 50 - 100 long tons of sorted 40%± Mn ore shipped and 3000 long tons of low grade Mn ore sent for experimental concentration.	Farnham & Stewart, 1958, p. 81 ABM file data
3. Black Diamond mine group (Myrtle; Gibson, Todd & Smith, J. P. Stewart & Associated, Todd & Allen, Western Exploration & Development Co.)	2S	22W	E Cen 29 Protracted	Mn, Pb-, Zn-	Pyrolusite and psilomelane, mixed with calcite and brecciated rock, in lenticular shoots along an extensively brecciated shear zone in Tertiary andesite porphyry. Trace amounts of lead and zinc.	Open cut, shaft, and adit operations. Worked from 1953 through 1959, producing some 4600 long tons of plus 40% Mn and 9000 long tons of about 30% Mn.	Mining World, Vol. 19, Dec. 1957, p. 65 Farnham & Stewart, 1958, p. 80-81 ABM file data
4. Black Jack mine (Montoya, Gerlack, J. P. Stewart & Associates, Western Exploration & Development Co.	2S	23W	SW¼ 13 Protracted	Mn	Manganese oxides in disconnected, lenticular shoots, with calcite and brecciated rock, along a fracture zone in Tertiary andesitic volcanics.	Open cut and shaft operations. Worked from 1954 through 1959, producing some 650 long tons of plus 40% Mn sorted ore.	Farnham & Stewart, 1958, p. 81 ABM file data
5. Cibola No. 1 mine (N. & J. F. Powers)	3S	23W	N Cen 2	Mn	Pyrolusite with some manganite and psilomelane, mixed with calcite and quartz, in lenticular shoots, fracture fillings, and narrow seams cementing brecciated wall rock along an extensive and wide, brecciated zone at the fault contact between Mesozoic granitic schist and Tertiary andesitic volcanics.	Incline shaft operations. Worked from 1953 through 1954, producing some 2000 long tons averaging about 30% Mn.	Mining World, Vol. 19, Dec. 1957, p. 65 Farnham & Stewart, 1958, p. 79 ABM file data
6. Cibola No. 3 mine (N. & J. F. Powers, Manganese Mg. & Mlg. Co.)	2S	23W	S Cen 35 Protracted	Mn	Pyrolusite with manganite and psilomelane, mixed with quartz and calcite, in irregular shoots in a lensing brecciated zone in Tertiary andesitic volcanics.	Adit and shaft operations. Worked from about 1953 through 1958, producing some 500 tons of 30 - 40% Mn ore.	Farnham & Stewart, 1958, p. 79 ABM file data
7. Cibola No. 7 mine (J. F. Powers)	2S	23W	SW¼ 25 Protracted	Mn	Pyrolusite mixed with wall rock breccia and calcite in a steeply dipping fracture zone with disconnected, lenticular, mineralized lenses in Tertiary andesitic volcanics.	Shaft, tunnel, and open cut operations. Worked from 1955 into 1959, producing some 4000 long tons averaging about 30% Mn.	ABM file data
8. Cibola No. 8 mine (N. & J. F. Powers)	2S	23W	SW¼ 25 Protracted	Mn	Pyrolusite with calcite, other carbonates, and wall rock breccia in discontinuous, lenticular shoots along a strong fracture zone cutting Tertiary andesitic volcanics.	Shaft and open stope operations. Worked from 1953 to 1956, producing some 3000 long tons of 25 - 30% Mn ore.	Farnham & Stewart, 1958, p. 79-80 ABM file data
9. Fools Folly mine (Snipers, Smith, Jarroll, and Richardson) (Not shown on district map)	1N	21W	W Cen 1 E Cen 2	Mn	Pyrolusite mixed with brecciated wall rock in shoots along a fracture zone in Tertiary andesitic volcanics.	Shaft, adit, and open cut operations. Worked as early as 1930 and later in 1954-1955, producing some 300 long tons averaging about 20% Mn.	Farnham & Stewart, 1958, p. 82
10. Grand Central mine (Mexican operators, Hardt)	1S	23W	Cen 36 Protracted	Au, Ag-	Spotty, high-grade gold with minor silver, with banded quartz, iron oxides, ferruginous calcite, pyrite crystals and bunches, in cavities and fracture fillings along a fault zone cutting Mesozoic schist, intruded by granite porphyry dikes. Other similar deposits 1 to 2 miles to south (Jupiter, Boardway).	Shaft and open cut operations. Worked sporadically in early to late 1890's and again in 1930's. Total estimated and reported production from all the deposits would be some 52 tons of ore averaging better than 1 oz. Au/T and minor silver.	Wilson, 1933, p. 72; 1934 (rev. 1967), p. 148 ABM file data
11. H. H. and L. mine group (Cass, New Year Nos. 2 & 3; Hess, Hess & Lilly, Kirk & Lea)	3S	23W	NW¼ 3, NE¼ 4	Mn	Psilomelane and pyrolusite in irregular, disconnected masses and veinlets in brecciated and silicified Tertiary andesitic volcanics along fault zones.	Open pit operations. Worked in 1953 and 1954, producing some few hundred long tons of 20-40% Mn ore.	Farnham & Stewart, 1958, p. 80 Parker, 1966 ABM file data
12. Peggy B mine (Brown)	3S	23W	NE¼ 3	Mn	Pyrolusite, mixed with calcite and brecciated wall rock, in lenticular shoots along a fracture vein in Tertiary andesitic volcanics.	Shaft operation. Worked in 1954-1955, producing some 100 long tons of 20-30% Mn ore.	Farnham & Stewart, 1958, p. 80 Parker, 1966
13. Trigo gold placers (Various operators)	2S	23W	1 & 2	Au	Spotty gold placer deposits in stream beds draining from small gold quartz veins in Mesozoic schist.	Dry placer operations on small scale, and intermittently, from as early as 1860's into 1940's. Possibly as much as some 323 ounces of gold were recovered containing a few ounces of silver.	Wilson, 1961, p 25 Johnson, 1972, p. 75-76 ABM file data
14. Triple H mine group (Rosie, J. P.; Bishop, Brown, Western Exploration & Development Co.)	2S	23W	SE¼ 39, SW 35	Mn	Manganese oxides, with calcite and brecciated wall rock, in irregular bunches and lenses along strong fracture zones in Tertiary andesitic volcanics.	Open cut and adit operations. Worked intermittently from 1954 through 1959, producing some 2000 long tons of low grade Mn ore for concentration.	Farnham & Stewart, 1958, p. 80 ABM file data
XXIX. Yuma District (Yuma area)	8S-9S	23W	---	Au, Ag, Fe	Gold-bearing quartz veins and stringers along fault and fractures in Mesozoic or Laramide granitic gneiss.	One mine operation as noted below.	Wilson, 1933, p. 221 ABM file data
1. Jude mine group (Silverfields; Hedgepeth, Timmons & Gutchmaker, Burton, Fay Mg. Co.) Figure 2	8S	23W	N Cen 34	Au, Ag, Fe	Gold-bearing, iron-stained quartz, with local pyrite and pockets of limonite, in stringers and veins along fractures and faults in Mesozoic or Laramide gneiss.	Shaft and open cut operations. Worked originally in early 1900's and later in 1939-1940, and 1947, producing some 450 tons of ore averaging about 0 3 oz. Au/T with minor Ag.	

grade manganese ore was created by the establishment of the Government purchase depot at Wenden, Ariz. Early in that year the first manganese claims in the central part of the Trigo range were located by the Power brothers, of Yuma, Ariz. Other locations soon followed and, when the area was visited in 1954, 10 properties were active. As estimated by the various operators, production from the district on May 1, 1954, totaled some 3,600 tons of ore containing 22 to 30 percent manganese. All of this ore was trucked directly to the Wenden stockpile, a distance from most claims of about 100 miles.

Cibola Group

The Cibola group of 9 unpatented claims covers parts of approximate secs. 34 to 35, of unsurveyed T. 2 S., R. 23 W. The claims are accessible over 6 miles of winding mountainous road that branches east from the Cibola road about a quarter of a mile north of Jim's Landing on Cibola Lake (fig. 25).

The operators, N. (Doc) Power and J. F. Power, have constructed several miles of access roads and have begun mining operations. When the area was visited late in May 1954, the production from the Cibola claims, according to the Power brothers, totaled about 2,800 tons of ore averaging 25 to 30 percent manganese. This ore had been mined from three claims of the group, the Cibola Nos. 1, 3, and 8.

Cibola No. 1 Claim.—Manganese mineralization in Cibola No. 1, the south claim of the group, occurs in a fracture zone that trends north and follows a fault contact between the older granitic rocks and the younger volcanics. The vein is exposed along the strike for several hundred feet. It ranges from 2 to 10 feet in width and dips 30° to 45° W.

The mineralized part of the fracture was developed by an inclined shaft that followed the vein down the dip for about 132 feet. A single level at an inclined depth of 120 feet extended along the vein for 125 feet north of the shaft and some 30 feet south. Several lenticular ore shoots were exposed by this work. At the time of the visit this development had just been completed, and a stope about 50 feet long was being started in the north drift. According to Power, about 700 tons of ore containing 22 to 30 percent manganese had been produced from the deposit. Future production at the rate of approximately 200 tons of ore a month was anticipated.

The equipment included a portable air compressor and a small hoist, both driven by gasoline engines. Small air-leg-type rock drills were used in drilling. The broken ore was shoveled by hand into wheelbarrows and trammed to the shaft, where it was hoisted in a bucket running on timber skids. Upon reaching the surface, the ore was carefully hand-sorted before it was placed in the ore bin.

Cibola No. 3 Claim.—The deposits on the Cibola No. 3 claim occur along a fractured or brecciated zone about half a mile north and slightly west of the occurrence on the Cibola No. 1 claim. The zone of brecciation, ranging from 10 to 20 feet in width, strikes north, dips steeply westward, and can be traced on the surface more or less continuously for over 500 feet. The better mineralized parts of the fracture appeared to range from 3 to 6 feet in width. An area of lower grade mineralization up to 20 feet in width was exposed on the surface for a short distance near the center of the brecciated zone.

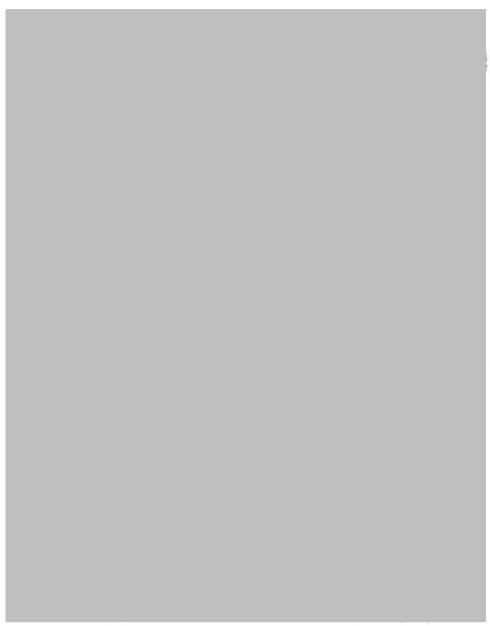
The more promising mineralized outcrops along the fracture had been explored by a short, shallow adit and 2 shafts about 30 feet deep. The shafts were about 400 feet apart, and the adit was some 90 feet north of the north shaft. At the time of the visit the adit was being driven to reach the ore in the north shaft. Exploration of the zone had not progressed sufficiently to indicate the extent of the ore bodies. About 50 tons of sorted ore containing 30 percent manganese had been shipped from the claim to the Wenden stockpile.

Cibola No. 8 Claim.—This claim, about a mile northeast of Cibola No. 3, is traversed by a steeply dipping fracture trending north and cutting volcanic rocks. The manganese minerals occur within the fracture in a series of disconnected lenticular shoots that range from 1 to 10 feet in width.

The deposit, known as the Power No. 1 mine, was developed by a steeply inclined shaft 70 feet deep. From the shaft two levels were driven along the fracture. The upper level, 35 feet below the collar of the shaft, was 325 feet long, and the lower level, 70 feet below the shaft collar, was about 220 feet long. Several lenses of ore occurring at irregular intervals along the fracture had been stoped to various heights above the levels. The largest of these stopes (on the upper level) was about 125 feet long, 20 to 30 feet high, and about 10 feet at its widest point. From this maximum width the ore decreased gradually in thickness until it was less than 2 feet in width at each end of the stope. The other stopes were less extensive and were separated from each other by narrow, poorly mineralized vein matter of various lengths. The ore lenses on the lower level appeared to be shorter and not as well mineralized as those on the upper level.

Pyrolusite was the chief manganese mineral. The gangue consisted largely of unreplaced wall rock, calcite, and probably other carbonate minerals.

Mining World, Dec. 1957, p. 65



DEPARTMENT OF MINERAL RESOURCES

STATE OF ARIZONA

FIELD ENGINEERS REPORT

Mine Cibola Area Mines — Date September 9, 1957

District Cibola District - Yuma County — Engineer Lewis A. Smith

Subject:

Owner: Western Exploration & Development Co., 800 N. Central Avenue, Phoenix Arizona. Phone - Jack Stewart, Agent - 258-5207.

Supt.: V. E. Spicer, Box 53, Ripley, via Blythe, California
Chief Engineer: Lewis W. Smith - ~~Blythe, California~~ - no longer at Blythe 1-21-58

Mill Location: In Sec. 13, T1S, R24W - Cibola

Operating Mines: Black Jack, Tenny, Gibson, Black Diamond, Rosy and some lesser ones. These are located in T2S, R22W, Sec. 30 and T3S, R23W, Secs. 2, 3 and 4 - 9 to 12 miles from the mill and hauling is done over a well-conditioned but eratically graded road.

All mining is done by open pit by means of 2 RD-8 Caterpillars, a 2½ yard shovel, a yard trackscavator, and a couple of slushers. Blasting is done by air drill holes drilled by a jumbo wagon drill and jack hammers. Stripping is necessary.

Mineralization: The ore consists of andesite or andesitic agglomerate coated on fractures, or around agglomerate fragments. The mineral is psilomelane and the coats are from 1/64 to ½" thick, with independent segregation up to 2" in diameter.

Mill: The mill consists of a grizzley, Gates Jaw Crusher, screen system, Traylors Cone Gyratory Crusher, sink float machine, magnetic separator and 7 tables for gravity concentration of fines. Sink float discharge is recrushed to further separate psilomelane from gangue. The heads run 8-10% Mn and 2±% SiO_2 and the concentrate runs 40-44% Mn and 8-10% SiO_2, the silica limit being 15%. Concentration ratio is 4 or 5 to 1 on manganese and silica.

The plant is now producing about 10 cars of concentrates per month, and shipping them to Wenden. Power is furnished by 350 H.P. Diesel Engine operating at 350 rpm. A new engine, of similar specifications, is on order. This will provide subsidiary power. Electric power from Parker Dam is available on the west side of the Colorado River, but the cost of installation is, at present, prohibitive. The fines have to be kept under 15% and are being stockpiled with the sink float tailings for possible futuer chemical extraction.

They are now working 40 men, 12 of which are in the mine. The mine is working 3 shifts.

July 14, 1955.

To: Mr. Jack Stewart,
800 N. Central, Phoenix, Ariz.

Dear Mr. Stewart:

Persuant to your request I have examined certain manganese mines and operations located near Aguila, and near Cibola, in Southwestern Arizona.

Purpose of Examination.

The purpose of the examination was to establish whether or not sufficient commercial ore was assured to warrant rather heavy capital expenditures to improve the overall economy of your operations and consequent profits.

General Geology.

Generally speaking there are two types of manganese deposits in southwestern Arizona - (a) vein deposits, and (b) basin deposits. In both types the manganese mineral is usually a cementing material for angular particles (breccias) of andesite and other types of volcanic flows prominent in the southwest.

In the vein type the manganese came from below and was injected up through the brecciated zones or fault planes, originally in minor amounts. Subsequently downward percolating waters dissolved and carried the manganese downward where it was reprecipitated in the same structure or channel of circulation, causing an enriched or secondary zone. Erosion of the surface kept in some balance with leaching and secondary precipitation, repeating the above process many times, and resulting in the exposure of commercial ore at the surface or a short distance below.

In this typw of deposit one usually finds an increase in manganese content for a short distance below the surface - say 30 to 50 feet- followed by a gradua.. decrease in manganese to a point where the ore is no longer commercial. While this breaking point is very irregular it usually occurs at a depth between 60 and 200 ft.

Most, or all, of the deposits under consideration, or hereinafter described, belong to this type. They are sheared or brecciated zones in andesite, and the ore limits are often controlled by faults which may have caused some

displacement, but have also acted as channels for mineralizing solutions, or dams precluding too much disbursement.

In the bedded type deposit the manganese originated as a minor component of surrounding rock masses, and as erosion took plase the manganese was leached and precipitated on a definate floor. While some of your deposits have been insufficiently explored to make positive determinatio, I do not believe any belong to this type. Even if you find a definate floor in some instances it is probably due to lateral faulting rather than original deposition.

While I prefer the vein type of deposit, the bedded type has also produced some large tonnages of excellent ore.

For economic reasons few, if any, Ariaona manganese deposits have been explored down into the primary zone below the secondary. Here the mineral typw would change from the oxides to rhodochrosite or alabandite, and the manganese content probably become quite lean. Some such situations are known, when assessory minerals have warranted deep development, such as at Tombstone, and I have seen rhodochrosite silver bearing veins in northern Mexico, and they are well known at Butte. However no commercial ore below the secondary zone should be expected in Arizona.

Deposits Visited.
Aguila Area.

Purple Pansy.

This deposit is 15 miles south and east of Aguila, and 4½ miles southeast of your mill. It is a sheared and brecciated zone in andesite, strikes southwest and northeast, and dips flatly (about 20 degrees) to the northwest. At the southeast it is in fault contact with a granite wall.

The ore is about 50 feet wide (thick) and is opened up for about 500 feet in length. Some 200 feet northwest of the granite the zone is dipping beneath a low ridge but should continue underneath this and on to the northwest. It is being mined in open pit manner but some stripping may be necessary in mining further on its dip.

The general tenor of the ore as mined is about 10% manganese. Some 70,000 tons have been mined, 50,000 of which went to the custom mill at Aguila, and 20,000 to your own mill.

While there has been no drilling or other exploration to actually block out tonnage I can see no reason why this deposit should not continue for some distance to the northwest on its dip. Assuming 100 feet of continuousness, and 40 feet thickness, 150,000 tons would be produced. In all probability it will be much greater than that.

Allowing for a reasonable amount of stripping and some selectivity in the pit this ore should be mined for not over $2.00 per ton. Hauling to your mill would not be over $1.00, and milling $2.00. Add $1.00 for marketing (hauling) concentrates and general overhead and you have a total cost of $6.00. Profits would depend largely on mill recovery and will be discussed under another heading.

Black Queen.

This property is 4½ miles south of your mill and was worked as a high grade underground mine for the Wenden stockpile. Some 5000 tons were produced averaging about 20% manganese.

The high grade vein was 3 to 10 feet wide and about 500 feet long and was worked by means of a shaft to a depth of about 150 feet where it started to get too lean. The mine has apparently been quite well gutted of high grade, but alongside that high grade streak is a sheared zone some 40 feet wide (possibly wider) of mill ore said to average 12% that could not be sent to the stockpile. This could be cheaply mined by open pit or quarry methods.

There is insufficient proof of either the quantity or value of this ore although it is self-evident that there is a large tonnage. (See "Recommendations"). Costs would be about the same as at the Pansy.

Deposits Visited,
Cibola Area.

I will not attempt to draw a sketch showing the location of the various depsoits contributory to your Cibola mill. In attempting to do so I might incriminate myself, but any of your men familiar with the terrain could supply a sketch to go with this report. Generally speaking the various properties are within a radius of 10 miles from your mill.

Tenny (or Anderson) Property.

Here there is a vein outcropping on the surface for a length of 1500 ft and a width varying between 10 and 40 ft. There has been very little development and tonnage.

though no doubt large, is not proven or measurable.

A test run made on the ore yielded 32 tons of concentrates for 186 tons of feed. This would indicate a feed value of 12.5% Mn (assuming 40% recovery and 42% Mn in the concentrates). I understand that you do not own this property but have a 50-50 milling contract on the ore. This property should be able to supply large tonnage and your contract should be profitable.

Allen Property.

I was advised that you have a one third interest in this property and that you make a charge of $4.00 per ton for milling the ore, and the mining is being contracted for $2.00 per ton.

Mining so far has been underground via tunnel and the vein has averaged about 4 ft wide. The ore was being milled during my visit and was running about 20% Mn. This should be a profitable deal, especially if mill recovery can be improved.

The vein crops on the surface for 1500 ft but except for the portion near the tunnel, has not been developed.

Gibson.

This is a large outdrop across the gulch from the Allen, and has been successfully worked to some extent. I understand that you do not have ownership or a contract, but if you have a large and efficient mill at your location it will be a "natural" for the ore to go to your mill on some favorable arrangement.

Triple H.

This property shows a vein 4 to 10 ft wide just being opened up. No definate quantity of ore is measurable but it will no doubt produce large tonnage.

A test run of 200 tons produced 35 tons of concentrates indicating a grade of about 15% Mn. The ore showed improvement a few feet below the surface in the manner described under "Geology".

John P. Jr.

This is the largest prospect of all, showing a width of about 100 ft, but is as yet entirely undeveloped. The tenor of the ore is similar to the others.

The property should be drilled and a nominal amount of drilling might easily prove up over 100,000 tons.

Mining Facilities.

The Aguila mines are only 4½ miles from your mill which in turn is 10 miles from the railroad at Aguila.

The side roads from mill to mines need improvement but such improvement would not be expensive.

There is some shortage of water at the mill but an abundance of water can be developed. It is merely a matter of wells and power.

Operations are close enough to Aguila so employees can live there and commute. This usually works out better as there seems to be great reluctance among present day mine employees to stay at remote camps.

At Cibola you have an abundance of water but commuting conditions are not good. You may have to offer something along the line of extra incentive pay or special camp facilities to obtain and retain good men - especially in summer.

The closing of the Wenden Depot has closed a great many small mines in the general district, and at the present time there many experienced manganese miners out of employment.

Considerable road improvement is needed to the various mines tributory to the Cibola mill to lower ore hauling costs.

Ore Dressing Metallurgy.

Your present mill recovery is not good- probably 40% of gross content on average. And therein lies a great chance for improving your economic situation and final profit.

Your present flow sheet consists of fine crushing; screening; coarser material to jigs, fines to tables; table middlings to a secondary table. The weaknesses in the set up are that the fines (slimes) produced are not amenable to table concentration, and that the middlings cannot be successfully separated unless reground, but the more grinding the more slimes.

A true middling is a particle composed partly of desired mineral and partly of gangue. Nothing can separate the two unless they are ground apart. Your middlings however also contained many particles of pure manganese mineral aand of pure gangue indication that some of the manganese is light and frothy, or that the first tables are being overfed.

I think you should do a considerable amount of research on improving mill recovery. It is your most vital point and best chance to improve your overall economy.

First I would test the ores for heavy media (sink-float) separation on about ⅛" crush. Gravity of media

should be adjusted to give you a 40% plus concentrate, regardless of recovery at this point.

Also test the fines and slimes for flotation. The Government has reported that your ore has high amenability. Their tests are made by flotation and if they can get it in their laboratory, you can get it in practice.

As a pure guess - not backed up by laboratory tests - I would suggest the following flow sheet.:
Crush to ½" and sink-float as suggested above.
Recrush "float"in your present manner.
Pull a 40% plus concentrate from tables, and jigs.
Return true middlings in closed circuit with crusher or rolls.
Treat fines and slimes by flotation.

In the above plan you are removing the mineral as soon as it is freed, thus avoiding unnecessary grinding, which is the best practice. And you would have more coarser material in your concentrates helping with any "excessive fines" penalties in marketing your concentrates.

Such a plan should increase your recovery to 70 - 75%. The new installations would double your capacity but still make use of what you have. Considering the increased capacity, operation costs would not be increased.

Manganese Value and Marketing.

Since the Wenden Depot has closed all products under 40% Mn must go to Deming, New Mexico. Present thought is that that depot will have reached its quota in another year.

However the so called "car lot" program will no doubt be open for at least 3 years longer. Under this program a 40% plus grade must be submitted (with certain other specifications). It is accepted FOB railhead and consigned direct to consumers. With certain variations, penalties, and premiums, the price is $2.25 per long ton unit (22.4 lbs) FOB railhead.

This is a govenment supported price. The foreign or free market price is about 90¢ per unit at present.

It is entirely feasible that you could get your house in order so you could continue successfully indefinately under the 90¢ price, even if the $2.25 price expires in 1958. There are several bills in Congress now to continue the Government support. Some such continuance is possible but doubtful.

Recommendations.

It is self evident that you have a large tonnage of profitable grade ore assured in the combined properties, but there is a lack of data on which to base positive estimates of either tonnage, or grade, or mill recovery, or operating costs.

I would recommend that first a moderate amount of drilling (either churn, rotary, or diamond core) be done on each property to develop positive tonnage and obtain average samples. In the case of the Queen lateral drilling might be done from the old workings.

When one has an outline of the shape, size and assay of an orebody it is much easier to inaugerate an eeconomical mining plan. More money than the cost of the drilling would be save by being able to plan the mining operation ahead.

Secondly I would recommend that thorough research tests be made to improve the mill recovery. One percentage point added to the recovery would pay the entire cost of milling. If you can add three units it would pay all your costs.

All of your operations hinge on trucking and while I would hesitate to recommend installing your own trucking department, a thorough study should be made of your trucking problems, with view to determining an economic balance between capital expenditures for roads and equipment, and per ton hauling costs.

Conclusion.

All of the above recommendations require expenditures, and it could well be that the more successful the preliminary work the greater the financial requirements will be.

Presuming for instance you spend $10,000 in drilling and positively develop 500,000 tons of 10% ore, which is a reasonable expectation. With that as a base point you would be well justified in spending $100,000 in mill improvements to increase recovery. If only increased by $\frac{1}{2}$ unit it would much more than pay the cost; and if improved by 2 units, as it should be, it would increase the overall net by $2,000,000.

All in all you have several semi-developed or prospective manganese deposits that should produce a large tonnage of profitable ore and if your operations are carried along in proper engineering, business, and financial manners, they should be highly successful.

Respectfully Submitted,

July 15, 1955.

CWD

To: Mr. Jack Stewart & Associates,
800 No. Central Ave., Phoenix, Ariz.

Manganese Mines Near Cibola.

Following your request I have made a new examination of the manganese properties you hold near Cibola, Arizona. A previous examination and report was made in July, 1955. Reference is made to that report for some details, such as the geological treatise, and same will not be repeated here. This report will be mostly confined to the changes that have taken place in the past two years.

You have several separate properties, or manganese deposits, and they are all within a ten mile radius of your centrally located mill. A brief description of each will follow: GIBSON. The Gibson deposit was not owned at the time of my previous examination, although it was visited then. I understand that it has since been purchased. It consists of two large orebodies with a narrower neck connecting them. The northern part was formerly called the Allen. A sharp canyon, over 100 feet deep separates the two parts. An open pit has been started on the northern segment and promises well.

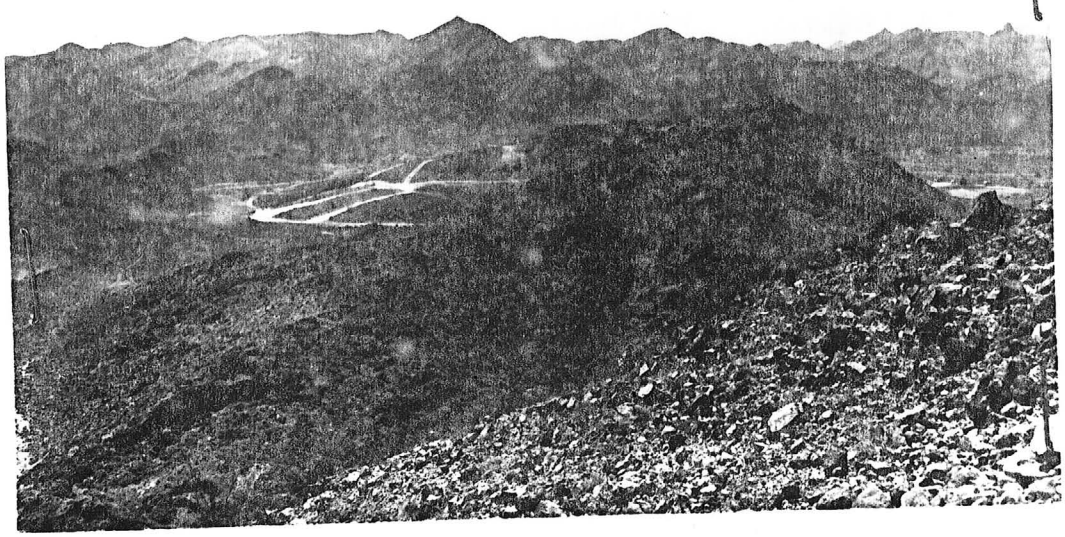
Standing at the north orebody of the Gibson looking at the south orebody. All of the big hill on right ahead is ore. Note shovel cut, and shovel attacking hill from bottom of canyon. Intermediate benches will be run.

Bore holes put down in the north orebody, together with the croppings in the canyon below, give reasonable assurance that the ore continues for over 100 feet in depth. The south orebody is being mined now with a 2½ yard power shovel, starting in the canyou over 100 feet below the ore apex, as shown in the picture.

Altogether these two orebodies comprise an area at least 500 by 300 feet, which at 100 foot depth, would furnish over 1,000,000 tons. A test run was made on ore produced by the shovel, and some 650 tons produced over 100 tons of concentrates. This ratio of 6½ to 1 is probably a little better than would be maintained in mining the entire orebody, but an expected ratio of 9 to 1 would seem conservative.

May it be explained here that it has become the custom to speak of the grade and character of the crude ore in terms of its concentration ratio. No matter what the grade of the ore may be, the grade of the concentrates is quite uniform at about 42% Mn. Better or poorer ore simply makes more or less concentrates. Such concentrates are worth $90.00 per ton. Therefore if an ore yields concentrates at a ratio of 9 to 1, the gross value of the crude ore is $10.00 per ton.

M&A DEPOSIT. This deposit is on the strike of the Gibson



Looking toward the Gibson from the M & A DEPOSIT.

about one-half mile north. It has only been slightly opened up. It appears to be another orebody similar to either body of the Gibson, and will furnish large tonnage by open pit methods.

Centrally located near the Gibson and the M & A you have facilities for hand sorting the crude ore from the pits. There approximately 30% of the bulk is removed in the form of coarse chunks of waste. This waste is quite clean of manganese, and the expense of hauling to the mill, and milling, is thus reduced. This is good practice and should be continued.

BLACK JACK and MYRTLE. These deposits are nearer the mill, seven and eight miles, respectively. They are vein-like orebodies along a vertical wall, which is a fault. The vein averages 10 to 30 feet wide. The ore is considerably higher grade than the general average, concentrating about 5 - 1. Mining will be more expensive although a slusher drag line could be used for awhile. The 5 to 1 ratio might well support the extra cost of underground mining. No very large tonnage is indicated.

JOHN P and TRIPLE H. These properties of nine and four claims, respectively, were not revisited as little had been done there since my last visit. They do have large potentialities and when needed could furnish considerable tonnage.

MILL. The mill results have been greatly improved and the capacity increased several fold. These improvements include a heavy-media plant, several more concentrating tables, and adequate crushing equipment. You should now have no trouble in handling 1000 tons of ore per day. Extraction has apparently been brought up to around 75%, which is very good considering that andesite gangue minerals, such as hornblende, usually carry manganese, which would be quite impossible to separate by any mechanical means. It would be interesting to sample various bands of tailings as they come off the tables, to determine whether some bands, such as the coarsest and the finest, carry a preponderance of the lost values. If so, some further recovery might be easily made. However, it may not be worth while to go into such refinements until you have finished more essential things.

GENERAL DISCUSSION and RECOMMENDATIONS. Ordinarily I am very insistent on the positive proving by drilling or development of adequate tonnage before making other heavy expenditures. But your case is now different, and in my

opinion you have sufficient proof of tonnage to warrant the expenditures necessary for you to reach a high plane of efficiency and economy.

Although your ore does not meet the strict intrepretation of proved or developed ore, I believe you have reasonable assurance of over 1,000,000 tons, and probably double that. This opinion is based on the wide diversification amongst your several ore-bodies, and the way they act or "shape-up" on development. It is of course a pleasure to note that the geological deductions and opinions expressed in my previous report have been so well born out. There have been no disappointments -- in fact wherever development has progressed, results have been a bit better than anticipated.

Petty troubles, causing production delays, are the bane of most small mine operations. Weak points, causing such delays, should be sought out, anticipated, and eliminated. I could not give your operation sufficient study to make an extended list of suggestions, but the following are apparent:
(1) General improvement in getting the ore from the pit to the mill is needed. This requires improvement in road conditions, and acquiring better trucking facilities.
(2) Better camp facilities, so you can acquire and retain a more dependable labor force.
(3) Adequate power with stand-by facilities to prevent shutdowns.

Assuming an operation of 1000 tons per day on a 10 to 1 ore, you would produce 100 tons of conc'ts per day, worth $9,000. My estimate of costs to do so are as follows:

Mining 1300 tons by shovel, including necessary deadwork	1000.
Sorting out 300 tons of coarse waste near mine (4 men)	80.
Hauling 1000 tons, including road maintenance	700.
Milling 1000 tons, including upkeep, repairs, and improv'ts	1000.
Shipping 100 tons concentrates, via Ripley,	100.
Prospecting and development on other properties,	200.
General Overhead, inc: management, engineering, basic taxes, camp losses, accounting, assays, legal, etc	250.
Contingencies. Unexpected items	170.
Total expected daily expense	3500.

Analysis of above:

Profit per day	$5500.
Profit per ton 5500/1300	4.20
Cost per unit Mn@ 3500/4000	.87

It is evident from the above that you have a very large potential profit. The important point is get your operation in shape to produce it, and keep it so doing.