



CONTACT INFORMATION

Mining Records Curator
Arizona Geological Survey
1520 West Adams St.
Phoenix, AZ 85007
602-771-1601
<http://www.azgs.az.gov>
inquiries@azgs.az.gov

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10/08/97

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES FILE DATA

PRIMARY NAME: MINERAL HILL MINE

ALTERNATE NAMES:
AZURITE

PIMA COUNTY MILS NUMBER: 228

LOCATION: TOWNSHIP 16 S RANGE 12 E SECTION 35 QUARTER SW
LATITUDE: N 31DEG 59MIN 11SEC LONGITUDE: W 111DEG 05MIN 09SEC
TOPO MAP NAME: TWIN BUTTES - 15 MIN

CURRENT STATUS: PAST PRODUCER

COMMODITY:
COPPER SULFIDE
SILVER
GOLD LODE
LEAD SULFIDE
ZINC SULFIDE
MOLYBDENUM SULFIDE
WOLLASTONITE
TUNGSTEN

BIBLIOGRAPHY:

AZBM BULL. 189, P. 135, 1974
ELEVATORSKI, E.A., ARIZ INDUSTRIAL MINERALS,
P. 53, 1978
ADMMR MINERAL HILL MINE & MILL FILE
ADMMR "U" FILE CU 36

MINERAL HILL MINE & MILL

PIMA COUNTY

Skillings Mining Review Jan. 20, 1968 p. 18

USGS Bull. 725-J p. 419

E&MJ Vol 166 No. 11 Nov. 1965 p. 21

USBM RI 5650

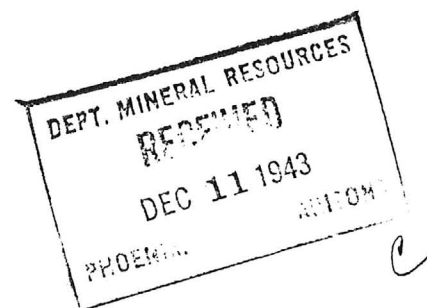
MAPS - Upstairs in the flat storage area - Third Drawer

MAPS - Upstairs in the rolled ABM file boxes - under Plumed Knight Mines
3 maps on one sheet, location map, cross-section of formation and ore zone



BARNSDALL MINING COMPANY OF DELAWARE
SUBSIDIARY OF BARNSDALL OIL COMPANY
SENECA, MISSOURI, U.S.A.

December 7, 1943



Mr. George A. Ballam
Arizona Department of
Mineral Resources
Phoenix, Arizona

Dear Mr. Ballam:

I want to thank you for the time given Mr. Lewis and myself during our visit with you last week and we hope that we will be able to work out something which will help our two properties in Arizona, namely the Johnny Bull property in the Chloride District, and the Mineral Hill property in the Pima Mining District.

Any information you might get on either of these properties, we would certainly be glad to have you pass on to us.

Yours very truly

BARNSDALL MINING CO. OF DEL.

E. H. Dobbs, Vice President

EHD:WMD

W
H
January 11, 1943

MEMORANDUM

MINERAL HILL
(Whealton & Bilby)

To: Director, Dept. Mineral Resources
From: George A. Ballam

Mr. Whealton has not yet returned to Tucson. I have called repeatedly, and his whereabouts are at present unknown. It will be necessary to see him to get the information Mr. Willis called for, since we know from previous experience that no information on this property is available elsewhere.

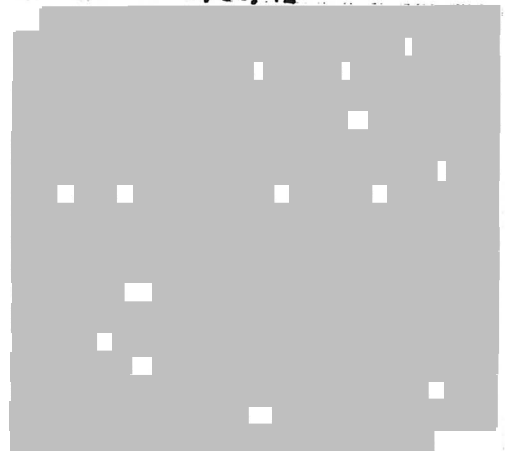
I am trying to contact him from day to day, and as soon as I can do so, will furnish whatever information I can obtain from him. Please notify CFW that I'm on the case.



George A. Ballam

C

Mining Congress Journal
9/30/42



December 31, 1942

Mr. Harold Whealton
Pioneer Hotel
Tucson, Arizona

Dear Mr. Whealton:

We have had an inquiry from the War Production Board asking us to furnish them with complete details on the Mineral Hill property. We do not have this information on hand and it might be of advantage to you to have it submitted through the Department.

If this information can be sent to us, I will gladly forward it as requested.

I have heard from Bill Broadgate in Washington and he told me he enjoyed his visit with you very much and was sorry that he could not be of more help under the existing conditions.

With best wishes and kindest regards and hoping to see you sometime soon, I am

Very truly yours,

J. S. Coupal
Director

JSC:kk

December 30, 1942

MEMORANDUM

SUBJECT: Mineral Hill

TO: George Ballam

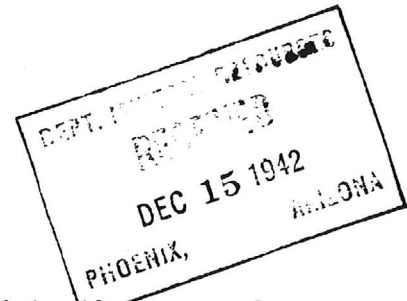
FROM: J. S. Coupal

Please note the enclosed memorandum and letter from F. H. Hayes and also the reply by Charles F. Willis to Mr. Hayes.

I suggest that you see Mr. Whealton and get what information you can so that we may forward it to the War Production Board, Copper Branch.

Washington, D.C.
Dec. 13, 1942

SUBJECT: Associated Copper Company,
 ✓ Mineral Hill
 ✓ Harold Whealton
 ✓ Ralph Bilby.



These men did not get in touch with me. I ran into them several days after they arrived in Senator McFarland's office, when Whealton presented Sam's card.

Apparently they contacted D'Autremont and he took them over to WPB. This is OK with me as it just saved that much time. However, I could have saved them a lot of running around, I think.

The answer was what I expected. In fact when they told me their project and approach, I told them that I could quote almost to a word their answer from the Copper Branch. I did, and it was exactly what they had been told.

This project sounds good. They say they have half a million tons of $3\frac{1}{2}\%$ average copper ore blocked out. If this is true, and they say they have supporting reports, it should be a good deal for WPB and MRC.

But when Silver Bell and Christmas are turned down, they can't expect much right now until we get this situation smoked out.

The Copper Branch is at least being honest and telling those who come to them with projects that although they will be glad to look over the data, they can give no encouragement to an applicant to spend a penny working up a deal, consequently he should go home, do nothing and not fret until he gets word that there is a chance of clearing his application through Facilities Clearance Board.

The Zinc and some of the other Branches are still giving applicants the run-around. This costs money and time. Besides I think it is dishonest.

Bill Broadgate

Washington, D.C.
Dec. 11, 1942

DEPT. MINERAL RESOURCES	
RECEIVED	
DEC 14 1942	
PHOENIX,	ANTON

Subject: Mine projects, WPB,
Mineral Hill Mine,
Associated Copper Mining Co.

I have been in conference with H. Wheaton and Ralph Bilby today.

It appears they have been in town several days, but did not call before.

The Copper Branch apparently has turned a pretty cold shoulder to their proposition.

Bill Broadgate

December 11, 1942

MEMORANDUM

SUBJECT: Mineral Hill
Harold Whealton

TO: W. C. Broadgate

FROM: J. S. Coupal

Mr. Harold Whealton, who has acquired a lease on the Bainsdall Oil Company property at Mineral Hill just south of Tucson, will call on you in Washington for your guidance.

Mr. Whealton has a good property and will want to know just what course to follow to get RFC help in opening the mine up. I know Mr. Whealton and am personally interested in seeing him get the best of attention.

October 8, 1942

MEMORANDUM

To: Director, Dept. Mineral Resources
From: George A. Ballam

PT. MINERAL RESOURCES
RECEIVED
OCT 10 1942
PHOENIX, ARIZONA

W
✓
H

In reply to Earl Hastings' request for information on the Mineral Hill property in the Twin Buttes area, there is little information available, but I will render a summary to date.

The property is located about 25 miles southwest of Tucson on the Twin Buttes highway which cuts some of the claims. During the past, from 1898 to 1918 it is reported to have produced \$2,000,000 in copper and silver, but all records and reports are in possession of E. S. Reeser, Pres. Barnsdall Oil Co., of Tulsa, and Mr. Reeser has refused on several occasions to give any information. Mr. George Colvocoresses of Phoenix spent considerable time on the property but was unable to obtain this information despite considerable correspondence on the subject.

The ore values are reported to be of milling grade, and occur as replacements in limestone beds which outcrop along the Mineral Hill, dipping gently to the south. The Hill itself is quartzite on the north and little work seems to have been done in the contact, although several shafts have been sunk in the flats to the south cutting the limestone. One of these, that farthest south is in blue limestone for its entire depth, and appears to have encountered no ore. Most of the production seems to have come from development near the hill where there is evidence of a mill and a considerable camp. A newer, incline shaft has been sunk near the quartzite zone, but it is not known whether any large ore body was developed. In fact, I visited the property with Wm. Kemp, formerly geologist with C. & A, who had worked the area, and he seemed to be unaware of the existence of the incline shaft.

Some interest has been shown in this presumed body of mill ore. Mr Shanklin visited and examined the property. Since the workings are inaccessible, and no information available, the examination was confined to surface showings. He was interested in the possibilities in the quartzite contact. Cliff Carpenter also went over the ground with Mr. Kemp, but knew nothing about the later development to the north.

Shortly after these men had looked at the property, Nickolai and Whealton of Tucson, were able to obtain a lease ~~from Mr. Reeser~~ from Mr. Reeser. Amount paid down was \$10,000. I saw a letter from Mr. Reeser to Mr. Wm. Lawson, who was also interested in the property. The former said that he had found someone who was not interested in the 'antecedents' such as reports, etc., and had negotiated a lease for substantial down payment. The feeling here is that the present lessees are not interested in operation, and are holding purely for speculation.

According to reputable men here, the ore is of low grade and would require milling. On account of the fact that there are already quite large tonnages of ore developed in the Twin Buttes district, which are unavailable due to lack of milling facilities, I believe the Mineral Hill property should be classed as one of the longer range possibilities. For further information I suggest that Mr. Colvocoresses be contacted, as he had spent considerable time investigating its possibilities.

October 1, 1942

MEMORANDUM

TO: George A. Ballam

FROM: Earl F. Hastings

KINO COPPER

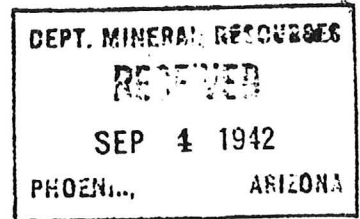
Sam thinks that this should be in our production possibility survey. Suggest that you get us some information on the mine.

MINERAL HILL

We have some information relative to the recent option from the Barnsdale Oil Company on this property but have little or no information as to its prospects. Do you believe that you can get us enough data for a brief report.

Washington, D.C.
Sept. 2, 1942

SUBJECT: Mineral Hill Mine
Willis letter of Aug. 28 to F. H. Hayes,

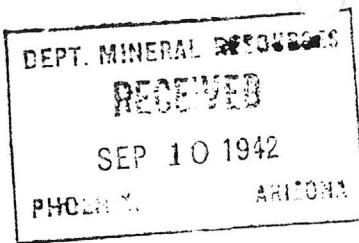


CONFIDENTIAL

I have heard at the copper branch that they have been doing some work on this property (that is, on some project) but I don't know just what it is except that evidently someone was looking for financing.

I did get the impression that they do not consider that there is any support for such a figure as a million tons of 3 to 3 $\frac{1}{2}$ % ore.

Bill
Bill Broadgate



mp

August 28, 1942

Mr. Harry Hayes,
Copper Division
War Production Board
Temporary "R"
Washington, D. C.

Dear Harry:

You will be interested to know we have found some operators with plenty of capital who are going to take over the Mineral Hill property south of Tucson. I believe you know about this property which has 1,000,000 tons of ore running between 3 and 3½ per cent copper and is adapted for large scale operation.

The property produced about 8,000,000 pounds of copper during World War No. 1 and shut down immediately after the war and has not run since. It has been owned by the Barnsdall Oil Company which has been unwilling to turn loose of it until recently. These new people will be able to finance themselves but we may have to call on your department for help in getting the necessary serial number and priorities. It can be brought into production in a relatively short time.

We are gathering the complete data regarding the property so that you may have it available in Washington.

With kindest personal regards, I am

Yours very truly,

CHARLES F. WILLIS, Chairman
Board of Governors

CFT:MH

MINERAL HILL MINE & MILL

PIMA COUNTY

Visited Mineral Hill mine, talked with A. Bowman's secretary - 4 men added to payroll.
GWI WR 11-29-65

George Green has been appointed pilot plant superintendent in the research department of Banner Mining Co., at Mineral Hill near Tucson, Arizona. Skillings Nov. 12, 1966

Active Mine List April 1967 - 52 men
Active Mine List Nov. 1967 - 20 men

Active Mine List April 1969 - 14 men
Active Mine List Oct. 1969 - 19 men-A.B. Bowman

Active Mine List April 1968 - 15 men
Active Mine List Oct. 1968 - 14 men

Active Mine List May 1970 - 19 men
Active Mine List Oct. 1970 - 20 men

DEPARTMENT OF MINERAL RESOURCES

STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Mineral Hill Mine & Mill Date Sept. 27, 1963
District Pima District, Pima Co. Engineer Axel L. Johnson
Subject: Field Engineers Report. Information from F.D. MacKenzie

References: Report of Dec. 21, 1963 & previous report.

Present Mining Activity: Mineral Hill Mine not operating.

Mineral Hill mill closed down May 27, 1963. The mill had to stop operating at that time on account of the Palo Verde Mine closing down due to a strike at the property by the Mine and Mill union. This strike is still on as of this date.

Banner Mining Co. maintains their offices at Mineral Hill. 26 men are employed by this office - 5 in the Geology Dept., 5 in the Engineering Dept., 4 in the Accounting Dept., 2 in the Assay Office, and 2 watchmen, the remaining 8 being administrative officers.

Among the officers retained by the company are:

- 'Allan B. Bowman, Gen. Mgr.
- 'E.C. Bowman, Purchasing Agent
- 'F.D. MacKenzie, Geologist
- 'F.C. Prince, Chief Accountant
- 'B.W. Venable, formerly Gen. Mine Supt., is no longer with the company, ar
- 'Frank Horton, former Mill Supt., et al are no longer with the company.

The option to lease by the Anaconda Co. of all the Banner Mining Co. properties in Pima County (see report of "Anaconda Banner Exploration" - May 17, 1963) has been extended to April 14, 1964.

Active Oct. 1963

DEPARTMENT OF MINERAL RESOURCES

STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Mineral Hill Mine & Mill

Date Dec. 21, 1963

District Pima District, Pima Co.

Engineer Axel L. Johnson

Subject: Field Engineers Report. Information from F.D. MacKenzie & A.B. Bowman.

References Report of Feb. 2, 1962 and previous reports.

Present Mining Activity

Mineral Hill Mine not operating.

One half of the Mineral Hill mill was shut down for repairs as of this date, and this repair work is expected to require from 2 to 3 months time. The remaining one half will continue to operate, however. The mill capacity is, therefore, reduced approximately 50% until the mill repair work is completed.

About one half of the men normally working on the milling operations have been temporarily laid off until the mill repairs are completed.

Exploration

Diamond drilling on contract by Glen Thatcher, with 2 diamond drills operating in the Mineral Hill area.

DEPARTMENT OF MINERAL RESOURCES

STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Mineral Hill Mine and Mill

Date Feb. 2, 1962

District Pima District, Pima Co.

Engineer Axel L. Johnson

Subject: Field Engineers Report. Information from F. C. Prince

References Report of July 26, 1961, and previous reports.

Present Activity Mineral Hill Mine is not operating.

The Mineral Hill mill is operating 3 shifts, 7 days per week, and milling about 1,000 tons of ore per day, all of it coming from the Palo Verde Mine.

The shops and offices of the Banner Mining Co. are located at the Mineral Hill. A total of 68 men are working at the Mineral Hill. Of these, 36 men are working in the mill, 13 in the shops and on surface, and 19 in the office.

The capacity of the mill has been increased since my last report, by the installation of larger crushing equipment, and more flotation cells.

The Banner Mining Co. of Tucson, Ariz., is producing about 1,000 tons of ore daily from stoping operations on the 700 and 800-foot levels at its Palo Verde mine. The ore is milled at the company's Mineral Hill mill. Capacity of the concentrator has been increased by the installation of larger crushing equipment and additional flotation cells. Banner employs a crew of 200 at the Palo Verde on production and mine development, and about 70 at the Mineral Hill mill, shops, and office.

Taken from MINING WORLD, April 1962, p 39.

Active Mine List Oct. 1962 - 90 men working

PROCESS FOR COPPER ORE TREATMENT

A process for copper ore treatment has recently been patented by Frank E. Horton of Tucson, Arizona, mill superintendent for Banner Mining Company of Tucson. The copper extraction method prepares an electrolyte from oxidized copper ore particles that contain substantial amounts of chrysocolla which are unsuitable for acid leaching because of the presence of calcium and/or manganese carbonates. The process consists of leaching the ore particles with a water solution of sodium hydroxide and potassium hydroxide of a concentration of between 5 and 10 normal, to produce a solution containing cuprate anions. Ore particles are scrubbed during the leaching to remove silica gels, so that the surfaces of the ore particles are continually exposed to continued leaching.

Taken from MINING WORLD, December, 1961, p 40

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine ' Mineral Hill Mine and Mill

Date July 26, 1961

District Pima District, Pima County

Engineer Axel L. Johnson

Subject: Present Status. Information from F. C. Prince, Chief Accountant.

References Report of Feb. 2 & 27, and previous reports.

Present Activity Mineral Hill Mine is not operating at the present time.
The Mineral Hill mill is operated 3 shifts, 6 days per week, and
milling about 600 tons of ore per day, all coming from the Palo Verde mine.
The shops and offices of the Banner Mining Co. are also located at
the Mineral Hill.
A total of 55 men are working at the Mineral Hill. Of these,
29 are working in the mill, 12 in the shops or on the surface, and 14 in the office.
The mill capacity will be increased by the installation of larger
crushing equipment and more flotation cells, in order to take care of additional
tonnage expected from the Palo Verde mine as soon as stoping operations get well under
way.

DEPARTMENT OF MINERAL RESOURCES

STATE OF ARIZONA

FIELD ENGINEERS REPORT

Mine Mineral Hill Mine and Mill

Date Feb. 2, 1961 & Feb. 27, 1961

District Pima District, Pima County

Engineer Axel L. Johnson

Subject: Present Status. Mine visit on Feb. 2. Information by F. C. Prince on Feb. 27.

References Report of Sept. 28, 1960 and previous reports.

Present Mining Activity Mineral Hill Mine is not being operated at present time.
Mineral Hill mill is being operated 3 shifts, 6 days per week, and milling about 300 tons of development ore per day from the Palo Verde mine. No ore from the Daisy Mine is being milled at the present time.
Shops and offices of the Banner Mining Co. are located at the Mineral Hill.

Number of men working at the Mineral Hill are as follows:

20 men working in the mill

10 men working in the shops and on the surface

11 men working in the office.

DEPARTMENT OF MINERAL RESOURCES

STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Mineral Hill Mine & Mill

Date Sept. 28, 1960

District Pima District, Pima County

Engineer Axel L. Johnson

Subject: Present Status. Information from F. C. Prince, Chief Accountant.

References: Report of June 7, 1960

Present Mining Activity No ore production from the Mineral Hill Mine, and only a small amount of repair work. Water being pumped out.

Mineral Hill Mill is being operated 3 shifts, 6 days per week, milling the ore from the Daisy Mine.

Shops and offices of Banner Mining Co. are also located at the Mineral Hill Mine.

Number of men working at the Mineral Hill are as follows:

2 men in the mine, doing repair work and attending to the pumps.

18 men in the mill.

26 men working on the surface and in the shops.

6 men working in the office.

Total men working ---- 52

DEPARTMENT OF MINERAL RESOURCES

STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Mineral Hill Mine & Mill

Date June 7, 1960

District Pima District, Pima County

Engineer Axel L. Johnson

Subject: Present Status. Information from F. D. MacKenzie.

References Report of Jan. 21, 1960 and previous reports.

Present Mining Activity
at the Mineral Hill Mine.

2 men working, doing repair work, and attending to the pumps,

18 men are working at the mill, now working 3 shifts, 6 days.

22 men are working on the surface and at the shops.

6 men are working in the office.

DEPARTMENT OF MINERAL RESOURCES

STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Mineral Hill

Date Jan. 21, 1960

District Pima District, Pima County

Engineer Axel L. Johnson

Subject: Present Status. Information from F. D. MacKenzie.

References: Report of Sept. 3, 1959 and previous reports.

Present Mining Activity: 2 men working, doing repair work. In addition 6 men are working in the mill, 1 shift, 6 days per week, milling the ore from the Daisy Mine; and 34 men are working in the shops, office, and surface.

COPY

CYANAMID

Mineral Hill
Pima Co.

AMERICAN CYANAMID COMPANY
EXPLOSIVES AND MINING CHEMICALS DEPARTMENT
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

5625 East 8th St.
Tucson, Arizona
27 Jan. 1959

Mr. A. B. Bowman, Manager
Banner Mining Co.
2042 Conner Stravenue
Tucson, Arizona

ARIZONA DEPT. OF MINES & MINERAL RESOUR
STATE OFFICE BUILDING
416 W. CONGRESS, ROOM 161
TUCSON, ARIZONA 85701

Dear Mr. Bowman:

This report is based on metallurgical results obtained on various samples of material submitted by Banner Mining Co., Mineral Hill Mine, and all recommendations and opinions expressed herein apply only to the treatment of material conforming to the samples submitted.

This report will summarize results of preliminary testwork, attempting to lower zinc content of copper concentrates, currently being produced at the Mineral Hill operation. At the suggestion of Mr. Paris Brough, this work was done at the Mineral Hill Laboratory, where fresh mill concentrate and mine water-used in milling-are readily available.

The problem of rejecting zinc from Mineral Hill copper concentrate was approached from two angles:

1. Depressing zinc from current mill concentrate, with the possibility of also recovering a marketable zinc concentrate.
2. Depressing zinc in the present mill copper rougher circuit.

TEST RESULTS - PART I

Rejection of Zinc from current mill concentrate.

Screen Test

A sample of final mill copper concentrate was taken on 10-16-58 for sizing and microscopic tests. Analysis of the sized fractions were as follows:

Screen Test - Banner Copper Concentrate

<u>Product</u>	<u>% Weight</u>	<u>Assay</u>		<u>Distribution</u>	
		<u>% Cu</u>	<u>% Zn</u>	<u>% Cu</u>	<u>% Zn</u>
+ 150 Mesh	4.2	28.10	1.60	5.0	0.8
+ 200 Mesh	6.1	28.56	2.30	7.4	1.5
+ 325 Mesh	14.0	27.33	3.50	16.2	5.3
- 325 Mesh	<u>75.7</u>	<u>22.23</u>	<u>11.30</u>	<u>71.4</u>	<u>92.4</u>
Calc. Conct.	100.0	23.59	9.26	100.0	100.0
Calc. + 325	24.3	27.8	2.88	28.6	7.6

Some microscopic work on these sized fractions was done by Mr. LaMar Evans, Microscopist, U.S. Bureau of Mines Tucson Station, and will be reported separately by him.

From the forgoing, it will be noted that the zinc reporting in mill concentrate is very fine. Over 92% of the total zinc was contained in the minus 325 mesh fraction, which contained only 71.4% of the total copper. Plus 325 mesh concentrate assayed 27.8% Cu and only 2.88% Zn.

Due to the very low zinc content of plus 325 mesh concentrate, as well as to the fact that preliminary Zn separation tests showed that coarse chalcopyrite was more strongly depressed with zinc than finer copper mineral, the following procedure was employed in all tests on mill concentrate:

Mill pulps were roughly wet screened on 325 mesh, to remove approx. 30% by weight of +325 mesh material, low in Zn, which would require no further treatment. In plant practice, this size separation could be readily and economically accomplished in cyclones. Fines were thickened, if required, and zinc separation tests were then made on approx. 70% by weight of mill concentrate only.

Sample BA 1 - 12 PM mill conct., 10-31-58

In Test BA 1-1, AERO Brand Cyanide was used as a zinc depressant. In Tests BA 1-2 and 1-3, AERO Brand Cyanide that had been reacted with zinc oxide was employed as the zinc depressant, at a natural pH of 9.3, and after lowering the pH to 7.5. Best results of this series were obtained in Test BA 1-2, where 43% of the total zinc was rejected into a rougher tailing product that assayed 40.19% Zn, and contained only 1.7% of the total copper. In all discussions of test results, please refer to appropriate test data sheets attached herewith, for complete description of test conditions and metallurgical results.

Sample BA 3 - 3 PM mill conct., Sample BA -4 - 12 PM mill conct., 11-29-58.

In this series of tests, attempts were made to see if results of Test BA 1-2 could be duplicated, using AERO Brand Cyanide - zinc oxide complex, as well as with complexed sodium cyanide.

Only 30% of the zinc was rejected from sample BA 3, as compared with 43% in test BA 1-2. However, the mill concentrate contained only 5.5% Zn, as compared with over 9% in sample BA 1.

In Test LA 4-1, an attempt was made to grade up rejected zinc into a marketable concentrate. Total zinc rejected from 8% Zn mill concentrate in this test was approx. 28%. Grade of zinc concentrate produced was 44.8% Zn, representing a recovery of 27.6% of the total zinc in mill copper concentrate.

Sample BA 5 and 6 - 10:30 AM mill conct. on 1-7-59 and
9:00 AM " " " 1-8-59.

In these tests, SO₂ gas was used as a zinc depressant in place of cyanide and cyanide complexes. In test BA 5-1, zinc depression at flotation pH of 7.6 was very good, but copper recovery was somewhat lower than desired. Zinc concentrate grade was 45.1% Zn, and represented 38.3% of the total zinc in mill concentrate. The use of more copper sulfate and collector in this test would undoubtedly have raised Zn recovery in the zinc concentrate to at least 45%, with approx. the same Zn grade.

In Test BA 6-1, pH was raised to approx. 8.2 after gassing with SO₂. Zinc depression was not quite as good in this test as in BA 5-1 at lower pH, but copper recovery was better, allowing the production of a zinc concentrate that assayed 49.8% Zn, and representing a recovery of 35.5% of the total zinc in mill concentrate. Final copper product contained 98.6% of the total copper and 62.9% of the Zn, representing a raise in grade from 22.99% Cu, 9.96% Zn, to 27.3% Cu, 7.54% Zn.

Note that mill concentrate samples used for this work varied from 5.5% to almost 10% Zn, which affects comparative test results to some degree. Also the burnt lime used in this work reacts slowly, and gave somewhat higher pH through flotation than desired (particularly in test BA 6-1). With SO₂, the use of fine hydrated lime to allow holding a pH of 7.5 to not over 8.5 through the rougher float should aid selectivity.

TEST RESULTS - PART II Depressing Zinc in Mill Rougher Circuit.

For this series of preliminary tests, samples of crude ore, representing mill feed for the period Sept. 9-11, 1958, was used.

Tests BA 2-1 through 2-8 were roughing tests, using various selective Cyanamid copper promoters at a Ph of 9.6 to 10.0-with and without the addition of AERO Brand Cyanide- in comparison with sodium isopropyl xanthate at the normal mill alkalinity of pH 11.0 or higher.

Although calculated zinc heads were very erratic--probably due to the difficulty in assaying small quantities of zinc in tailing products, Tests BA 2-2 using AERO Promoter 404, and Test BA 2-7, using AEROFLOAT 238 Promoter looked promising. The use of AERO Promoter 404 in test 2-2 in particular, gave higher grade copper rougher concentrate with less zinc than isopropyl xanthate, with no loss in copper recovery.

Tests BA 2-10 and 2-11 were comparative tests, using isopropyl xanthate at pH 11.4, vs. using AERO Promoter 404 at pH 10.2. In these two tests, rougher concentrates were reground and cleaned once.

These tests showed a marked reduction in zinc content of copper concentrate, when AERO Promoter 404 was substituted for isopropyl xanthate, now used as the copper promoter in plant operation. Although recovery of copper in both rougher and cleaner were 1% lower when using 404, economic results were essentially the same. Slightly more 404, or the use of a very small quantity of xanthate in the scavenger, would probably improve copper recovery with 404, without adversely affecting concentrate grade.

Test No.	Promoter	Calc. Head		Cleaner Conct.			Recovery		Economy
		% Cu	% Zn	% Wt.	% Cu	% Zn	% Cu	% Zn	
BA 2-10	Xanthate	2.59	1.20	8.28	26.47	7.95	84.6	55.0	66.0
BA 2-11	404	2.63	1.37	7.79	28.26	4.90	83.7	27.7	66.4

SUMMARY AND CONCLUSIONS

1. Results of preliminary testing indicate that further intensive laboratory work would be warranted on current mill concentrate, using SO_2 gas as a zinc depressant, with subsequent recovery of the rejected zinc in a marketable concentrate. This method has the advantage of requiring only a minimum of new equipment, and should involve a very moderate reagent cost.

2. Mill testing of AERO Promoter 404 is recommended, using a somewhat lower pH than now employed with xanthate collector. Lab tests indicate that zinc rejection should be substantially improved over current practice, with no new equipment needed. Inasmuch as we recommend addition of AERO Promoter to the ball mill, it may be necessary to alter current flowsheet slightly, to allow cycloning and regrinding of all rougher concentrate prior to cleaning.

3. Should the use of AERO Promoter 404 prove successful in improving selectivity, further testwork would be justified, attempting to:

- a. Recover a marketable zinc concentrate from plant tailing.
- b. Further improve zinc rejection in the copper circuit through the use of SO_2 gas, sodium sulfite, or zinc hydrosulfite.

We have appreciated the opportunity of working with you on this problem, and look forward to cooperating with you in the future.

Sincerely yours,

AMERICAN CYANAMID CO.



J.A. McAllister

AMERICAN CYANAMID COMPANY
ORE DRESSING LABORATORY

TABLE NO. _____

TEST NO. B A 1-1

CONDITIONS AND REAGENTS **12 PM Filter Feed, 10-31-58**

POINT OF ADDITION	CONDITIONS			REAGENTS POUNDS PER TON of conc. *									
	TIME MINS.	% SOLIDS	PH	ABC	404	Frother Mix							
Size pulp on 325-mesh, + 325 mesh direct to assay.													
Thicken undersize,													
Conditioner	1	12	9.2	.85	.06	.08							
Rougher	4	12											

REMARKS:

ABC designates AERO Brand Cyanide.

404 designates AERO Promoter 404

Frother mix is 80% Hardwood creosote - 20% MIBC

* Including + 325 mesh fraction (Total filter feed)

METALLURGICAL RESULTS

PRODUCT	% WEIGHT	ASSAYS				% DISTRIBUTION			
		Cu	Zn			Cu	Zn		
Calc. Head	100.0	25.75	9.97			100.0	100.0		
+325 Mesh	29.7	30.04	2.5			34.6	7.4		
Ro. Cu. Con.	62.8	26.5	10.6			64.6	66.8		
Ro. Cu Tail	7.5	2.67	34.3			0.8	25.8		
Comb. +325 & Ro. Con.	92.5	27.60	8.00			99.2	74.2		

RATIO OF CONCENTRATION:

REMARKS:



AMERICAN CYANAMID COMPANY

ORE DRESSING LABORATORY

TABLE NO. _____

TEST NO. **BA 1 - 2**CONDITIONS AND REAGENTS **12 PM Filter Feed, 10-31-58**

POINT OF ADDITION	CONDITIONS			REAGENTS POUNDS PER TON							
	TIME MINS.	% SOLIDS	PH	Frøther							
				S-622	404	Mix					
Size pulp on	325-mesh,			+325 direct to assay. Thicken undersize,							
Conditioner	1	12	9.3	1.2	.06	.08					
Rougher	4	12									

REMARKS:

S-622 is reaction product of AERO Brand Cyanide and zinc oxide, 5 parts AERO Brand Cyanide to 1 part ZnO.

METALLURGICAL RESULTS

PRODUCT	% WEIGHT	ASSAYS %					% DISTRIBUTION				
		Cu	Zn				Cu	Zn			
Calc. Head	100.0	26.23	9.44				100.0	100.0			
+325 Mesh	32.2	29.91	2.0				36.7	6.8			
Ro. Cu Con.	57.7	28.06	8.2				61.6	50.2			
Ro. Cu Tail	10.1	4.02	40.3				1.7	43.0			
Comb. +325 & Ro. Con.	89.9	28.70	5.98				98.3	57.0			

RATIO OF CONCENTRATION:

REMARKS:

AMERICAN CYANAMID COMPANY
ORE DRESSING LABORATORY

TABLE NO. _____

TEST NO. BA 1-3CONDITIONS AND REAGENTS 12 PM Filter Feed, 10-31-58

POINT OF ADDITION	CONDITIONS			REAGENTS POUNDS PER TON of conct.							
	TIME MINS.	% SOLIDS	PH	H ₂ SO ₄	S-622	404	Mix	Frother			
Size pulp	on 325-mesh,	+325 mesh	direct to assay,	Thicken	undersize,						
Cond. #1	$\frac{1}{2}$	12	7.5	0.5							
Cond. #2	$\frac{1}{2}$	12			1.2	.06	.08				
Rougher	4	12									

REMARKS:

METALLURGICAL RESULTS

PRODUCT	% WEIGHT	ASSAYS , %				% DISTRIBUTION			
		Cu	Zn			Cu	Zn		
Calc. Head	100.0	26.14	9.10			100.0	100.0		
+ 325 mesh	35.1	30.14	2.2			40.5	8.5		
Cu Ro. Con.	55.4	27.62	8.1			58.6	49.5		
Ro. Tail	9.5	2.00	40.4			0.9	42.0		
Comb. +325 % Ro. Con.	90.5	28.60	5.81			99.1	58.0		

RATIO OF CONCENTRATION:

REMARKS:



AMERICAN CYANAMID COMPANY
ORE DRESSING LABORATORY

TABLE NO. _____

TEST NO. BA 3-1CONDITIONS AND REAGENTS **3 PM Filter feed 11-29-58**

POINT OF ADDITION	CONDITIONS			REAGENTS POUNDS PER TON of conct.							
	TIME MINS.	% SOLIDS	PH	Frother							
				8-622 404 Mix							
Size pulp on	325-mesh, + 325			mesh direct to assay. Thicken undersize,							
Conditioner	1	14	9.2	.55 .10 .07							
Rougher	4½	14									

REMARKS:

METALLURGICAL RESULTS

PRODUCT	% WEIGHT	ASSAYS %				% DISTRIBUTION			
		Cu	Zn			Cu	Zn		
Calc. Head	100.0	26.19	5.51			100.0	100.0		
+ 325 Mesh	39.2	29.16	2.20			43.6	15.6		
Cu Ro. Con.	49.4	29.06	5.6			54.8	50.3		
Cu Ro. Tail	11.4	3.70	16.5			1.6	34.1		
Comb. +325									
& Ro. Con.	88.6	29.1	4.1			98.4	65.9		

RATIO OF CONCENTRATION:

REMARKS:

AFRICAN CYANAMID COMPANY

ORE DRESSING LABORATORY

TABLE NO. _____

TEST NO. BA 3-2CONDITIONS AND REAGENTS 3 PM Filter Feed 11-2958

POINT OF ADDITION	CONDITIONS			REAGENTS POUNDS PER TON of conc.							
	TIME MINS.	% SOLIDS	PH	S-622 404 Mix							
Size pulp on 325-mesh, + 325 direct to assay. Thicken undersize,											
Conditioner	1	14	9.1	1.3	.10	.07					
Rougher	4½	14									

REMARKS:

METALLURGICAL RESULTS

PRODUCT	% WEIGHT	ASSAYS %					% DISTRIBUTION				
		Cu	Zn				Cu	Zn			
Calc. Head	100.0	28.53	8.67				100.0	100.0			
+ 325 Mesh	39.4	29.16	2.30				45.0	16.0			
Cu Ro. Con.	50.4	27.39	8.7				54.0	52.8			
Cu Ro. Tail	10.2	2.52	13.5				1.0	24.4			
Comb. +325 & Ro. Con.	89.8	28.2	4.8				92.0	75.8			

RATIO OF CONCENTRATION:

REMARKS:



AMERICAN CYANAMID COMPANY
ORE DRESSING LABORATORY

TABLE NO. _____

TEST NO. BA 3-3CONDITIONS AND REAGENTS 3 PM Filter Feed, 11-29-58

POINT OF ADDITION	CONDITIONS			REAGENTS POUNDS PER TON of conct.						
	TIME MINS.	% SOLIDS	PH	Sod. Zn Cyan.	404	Frother Mix				
Size pulp on 325-mesh, + 325 mesh direct to assay. Thicken undersize.										
Conditioner	1	14	8.9	0.8	.10	.07				
Rougher	4½	14								

REMARKS: Sod. Zn Cyan. is reaction product of 12.5 parts white sodium cyanide with 5 parts zinc oxide.

METALLURGICAL RESULTS

PRODUCT	% WEIGHT	ASSAYS %				% DISTRIBUTION			
		Cu	Zn			Cu	Zn		
Calc. Head	100.0	26.18	5.47			100.0	100.0		
+ 325 mesh	39.4	29.14	2.1			43.9	15.2		
Cu Ro. Con.	49.5	28.49	6.2			54.2	56.1		
Cu Ro. Tail	11.1	4.37	14.1			1.9	28.7		
Comb. +325 & Ro. Con.	88.9	28.9	4.4			68.1	71.3		

RATIO OF CONCENTRATION:

REMARKS:

AMERICAN CYANAMID COMPANY
ORE DRESSING LABORATORY

TABLE NO. _____

TEST NO. **BA 4-1**

CONDITIONS AND REAGENTS **11 AM Filter Feed, 11-29-58**

POINT OF ADDITION	CONDITIONS			REAGENTS POUNDS PER TON							of const.		
	TIME MINS.	% SOLIDS	PH	Sod. Zn Cyan.	404	Froth. Mix	CaO	CuSO ₄	AF-238				
Size pulp on 325-mesh, +325				to assay.		Thicken	undersize,						
Cu Cond.	1	14	9.1	1.2	.17	.07							
Cu Rougher	4½	14											
Thicken comb. Cu Ro. Tails				from 5-test charges,		treated as above.							
Cu Scavenger	2	10											
Zn Cond.	5	10	10.2				.34	.20	.06				
Zn Rougher	3½	10											
Zn Cleaner	2	6											

REMARKS: **AF-238** designates **AEROFLOAT 238** Promoter.

METALLURGICAL RESULTS

PRODUCT	% WEIGHT	ASSAYS, %					% DISTRIBUTION				
		Cu	Zn				Cu	Zn			
Calc. Head	100.0	26.14	8.13				100.0	100.0			
+ 325 Mesh	37.4	29.18	3.3				41.7	15.1			
Cu Ro. Con.	53.5	27.30	8.2				55.8	53.9			
Cu Scav. Con	1.6	22.36	14.7				1.4	3.0			
Zn Cl. Con.	5.0	4.78	44.8				0.9	27.6			
Zn Cl. Tail	0.3	3.34	7.1				0.1	0.2			
Zn Ro. Tail	2.2	0.87	0.90				0.1	0.2			
Comb. +325,											
Cu Ro. & Scav. Ct.	92.5	27.95	6.3				98.9	72.0			

RATIO OF CONCENTRATION:

REMARKS:

AMERICAN CYANAMID COMPANY.

ORE DRESSING LABORATORY

TABLE NO. _____

TEST NO. BA 5-1CONDITIONS AND REAGENTS 10,30 Filter Feed, 1-7-59

POINT OF ADDITION	CONDITIONS			REAGENTS POUNDS PER TON of conct.							
	TIME MINS.	% SOLIDS	PH	SO ₂	404 Mix	Froth	CaO	CuSO ₄	NaAF		
Size pulp on 325-mesh, +325 mesh direct to assay. Thicken undersize, gas with SO ₂ to pH 6.2 to 6.5. Then condition 3-min, at which time pH = 7.1											
Cu Cond.	1	14	7.1		.06	.07					
Cu Rougher	3	14	7.6-end float.								
Combine Cu Ro. Tails from 5-test charges treated as above, and thicken.											
Cu Scavenger	2	18	7.6			.01					
Zn Cond.	5	17	10.3			.02	.54	.10	.006		
Zn Rougher	5	17									
Zn Cleaner	2	10	9.7				.06				

REMARKS: Not enough CuSO₄ and collector used in Zn Conditioner.

NaAF designates Sodium AEROFLOAT Promoter.

METALLURGICAL RESULTS

PRODUCT	% WEIGHT	ASSAYS, %					% DISTRIBUTION				
		Cu	Zn	Pb	Fe		Cu	Zn			
Calc. Head	100.0	25.90	6.99				100.0	100.0			
+ 325 Mesh	34.17	29.07	2.3				38.3	11.3			
Cu Ro. Con.	50.13	30.04	4.9				58.1	35.2			
Cu Scav. Con	1.94	19.07	15.8				1.4	4.4			
Zn Cl. Con.	5.94	5.93	45.1	1.55	10.4		1.4	38.3			
Zn Cl. Tail	2.45	5.64	26.9				0.5	9.5			
Zn Ro. Tail	5.37	0.96	1.6				0.3	1.3			
Comb. +325, Cu Ro & Scav Ct.	86.24	29.41	4.13				97.8	50.9			

RATIO OF CONCENTRATION:

REMARKS:

AMERICAN CYANAMID COMPANY
ORE DRESSING LABORATORY

TABLE NO. _____

TEST NO. **BA 6-1**

CONDITIONS AND REAGENTS 9 AM Filter Feed, 1-8-59

POINT OF ADDITION	CONDITIONS			REAGENTS POUNDS PER TON of Conct.									
	TIME MINS.	% SOLIDS	PH	SO ₂	404	Froth Mix	CuSO ₄	NaAF	CaO				
Size pulp on 325-mesh, +325 mesh direct to assay. Thicken undersize, and gas pulp with SO ₂ as required to maintain pH at 6.5 for 5-minutes.													
Cu Cond.	1/2	14	8.2		.06	.07			1.3				
Cu Rougher	3 1/2	14	9.0-and float.										
Combine Cu Ro Tails from 5-test charges treated as above, thicken,													
Zn Cond.	5	18	11.1			.02	.17	.006	0.8				
Zn Rougher	5	18	11.0										
Zn Clean.#1	3 1/2		10.5			.01	.01		0.1				
Zn Clean.#2	3 1/2		9.6			.02	.01		0.1				

- REMARKS: 1. No copper scav. float required prior to Zn float.
 2. More collector and CuSO₄ in Zn Cond. would eliminate need to add same to ~~RECENT~~ cleaners.
 3. 1st and 2nd Zn Cleaner tails comb. for assay.

METALLURGICAL RESULTS

PRODUCT	% WEIGHT	ASSAYS, %					% DISTRIBUTION				
		Cu	Zn	Fe			Cu	Zn			
Calc. Head	100.0	22.99	9.96				100.0	100.0			
+ 325 Mesh	36.9	28.72	2.20				46.1	8.1			
Cu Ro. Con.	46.2	26.16	10.80				52.5	54.8			
Zn Recl. Con.	7.1	3.77	49.8	9.3			1.2	35.5			
Comb.											
Zn Cl. Tail	1.9	1.19	4.65				0.1	0.9			
Zn Ro. Tail	7.9	0.25	1.00				0.1	0.7			
Comb. +325, & Cu Ro Con.	83.1	27.3	7.54				98.6	62.9			

RATIO OF CONCENTRATION:

REMARKS:

TEST NO. BA 2-1 to 2-8, incl.

Mill Feed Sept. 9-11, 1958.

REAGENTS (#/ton) & CONDITIONS*

Test No.	To Grind			Conditioner			Rougher
	CaO	ABC	Collector	Collector	Frother	pH	Collector
2-1	4.0			SIX - .10	.21	11.0	SIX - .025
2-2	2.2		404 - .125		.21	9.7	
2-3	2.2	.10	404 - .125		.21	9.6	
2-4	1.0	.10	404 - .125		.21	8.3	
2-5		.10	404 - .125		.21	7.1	
2-6	2.4		NaAF - .15		.21	9.6	
2-7	2.4		238 - .15		.21	9.6	
2-8	2.4		Thio 130 - .15		.21	9.6	

METALLURGICAL RESULTS

Test No.	Calc Head		Cu Ro. Concentrate			Tail		Recovery	
	% Cu	% Zn	% Wt.	% Cu	% Zn	% Cu	% Zn	% Cu	% Zn
2-1	2.66	0.85	13.8	17.74	5.5	0.24	0.1	92.1	89.5
2-2	2.62	0.87	11.7	20.62	4.8	0.24	0.35	92.0	64.3
2-3	2.64	0.81	11.3	21.14	6.4	0.28	0.1	90.6	88.8
2-4	2.67	0.71	10.9	21.60	5.7	0.35	0.1	88.4	87.3
2-5	2.65	0.95	10.8	22.42	7.5	0.38	0.2	87.2	81.0
2-6	2.59	0.81	9.1	24.01	4.4	0.46	0.45	83.8	49.4
2-7	2.64	1.08	10.7	22.26	5.0	0.29	0.6	90.2	50.0
2-8	2.63	0.59	10.0	23.19	5.0	0.35	0.1	88.2	84.8

*Conditions same in all tests:

1. Grind, 5-min. @ 61% solids to give product 3.2% +65 mesh, 68.8% -200 mesh.
2. Conditioning time 1-minute @ 35% solids.
3. Ro. flotation time, 6-min. @ 35% solids.

404 designates AERO Promoter 404

NaAF " Sodium AEROFLOAT Promoter

238 " AEROFLOAT 238 Promoter

Thio 130 " AERO Thiocarbonyl disulfide 130

SIX " Sodium isopropyl xanthate

ABC " AERO Brand Cyanide

CaO " Burned Lime

Frother " 80% Hardwood Creosote - 20% MIBC

AMERICAN CYANAMID COMPANY

ORE DRESSING LABORATORY

TABLE NO. _____

TEST NO. BA 2-10CONDITIONS AND REAGENTS Mill Feed, Sept. 9-11, 1958

POINT OF ADDITION	CONDITIONS			REAGENTS POUNDS PER TON							
	TIME MINS.	% SOLIDS	PH	CaO	Froth		ABC				
					SIX	Mix					
Ball Mill	5	61		4.2							
Conditioner	1	35	11.4		.10	.21					
Rougher	6	35			.025-added at 3½-min. float time						
Regrind	5			1.9			.02				
Cleaner	3	9	11.0			.07					

REMARKS:

SIX designates Sodium Isopropyl Xanthate

ABC " AERO Brand Cyanide

Screen Analysis% +65 % -200 % -325

Ro. Flot. Feed

3.2 68.8

Cleaner Conct.

METALLURGICAL RESULTS

76.0

PRODUCT	% WEIGHT	ASSAYS %				% DISTRIBUTION			
		Cu	Zn	Fe	Insol	Cu	Zn		
Calc. Head	100.00	2.59	1.20			100.0	100.0		
Cu Cl. Con.	8.28	26.47	7.95	25.50	3.20	84.6	55.0		
Cu Cl. Tail	4.86	3.40	2.10			6.2	8.3		
Cu Ro. Tail	87.06	0.28	0.50			9.2	36.7		
Calc.									
Cu Ro. Con.	12.94	18.15	5.87			90.8	63.3		

RATIO OF CONCENTRATION:

% Wt Con (6.2 X Con - 36.2)

REMARKS: Economy *

6.2 X Head

= 66.0

AMERICAN CYANAMID COMPANY
ORE DRESSING LABORATORY

TABLE NO. _____

TEST NO. **BA 2-11**

CONDITIONS AND REAGENTS **Mill Feed Sept. 9-11, 1958**

POINT OF ADDITION	CONDITIONS			REAGENTS POUNDS PER TON									
	TIME MINS.	% SOLIDS	PH	CaO	404	Froth Mix	ABC						
Ball Mill	5	61		2.4	.125								
Conditioner	1	35				.21							
Rougher	6	35	10.2										
Regrind	5			0.6			.02						
Cleaner	3	8	9.8			.07							

REMARKS:

Screen Analysis
Ro. Flot. Feed
Cleaner Conct.

% + 65
3.2

% - 200
68.8

% - 325
79.0

METALLURGICAL RESULTS

PRODUCT	% WEIGHT	ASSAYS				% DISTRIBUTION			
		Cu	Zn	Fe	Insol	Cu	Zn		
Calc. Head	100.00	2.63	1.37			100.0	100.0		
Cu Cl. Con.	7.79	28.26	4.90			83.7	27.7		
Cu Cl. Tail	3.33	4.70	3.10			6.1	7.3		
Cu Ro. Tail	88.88	0.30	1.00			10.2	65.0		
Calc. Cu Ro. Con.	11.12	21.22	4.32			89.8	35.0		

RATIO OF CONCENTRATION:

REMARKS:

$$\text{Economy} = \frac{\% \text{ Wt. Con. } (6.2 \times \text{Con.} - 36.2)}{6.2 \times \text{Head}} = 66.4.$$

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Mineral Hill

Date September 3, 1959

District Pima, Pima County

Engineer Axel L. Johnson

Subject: Present Status - Information from Creighton Bowman

Reference: July 8, 1958

Present Mining Activity: Small amount of repair work. 3 to 4 men working. Mill is closed down.

DEPARTMENT OF MINERAL RESOURCES

STATE OF ARIZONA

FIELD ENGINEERS REPORT

Mine Mineral Hill Mine & Mill

Date May 29, 1959

District Pima Mining District, Pima County

Engineer Axel L. Johnson

Subject: Present Status. Information from F. D. MacKenzie and Personal visit.

References Report of July 8^m, 1958 and previous reports.

Principal Minerals Copper ore ---- all sulphides.

Present Mining Activity Mining copper ore and milling same at the mill on the mine site. 8 men working on ore production at the Mineral Hill mine. Production averages 1,956 tons per month from this property, or about 75 tons per day. In addition, 22 men are working at the mill, 14 men in the shops, 6 men in the offices, plus 13 men as administrative and salaried employees.

Geology and Mineralization See report of July 8, 1958.

Milling & Marketing Facilities Ore is milled at the Banner Mining Co. mill, located at the Mineral Hill mine site. Straight flotation is used. About 400 tons per day from the Daisy Mine and 75 tons per day from the Mineral Hill Mine, or a total of 475 tons per day is milled at the present time. Later on, when the new Palo Verde Mine gets into production, the ore from this mine will also be milled there.

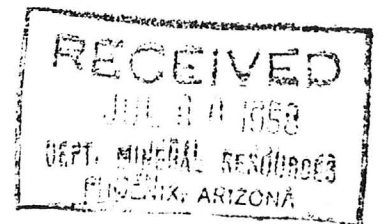
Mine Workings

- (1) Mineral Hill shaft --- inclined 54 degrees --- 950 ft. deep on the incline.
700 ft. deep by vertical dist.
- (2) 4 main levels ---- 300, 500, 600, & 700 ft. levels.

Proposed Plans It is planned to keep the Mineral Hill ore as a reserve for operations at some later date. It is planned to do considerable exploration work and development work at this mine before full production is resumed.

Mill Capacity Reported as from 1,000 to 1,200 tons per day.

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT



Mine Mineral Hill Mine & Mill

Date July 8, 1958

District Pima Mining District, Pima Co.

Engineer Axel L. Johnson

Subject: Mine Report. Information from A. B. Bowman, Manager.

References Reports of March 30, 1955, March 31, 1954 & Aug. 5, 1952.

Location About 17 miles south of Tucson. 1 mile north of San Xavier Mine.
Section 2 -- T 17 S -- R 12 E.

Owners and Operators Banner Mining Co., Twin Buttes Road, Tucson, Ariz.
Allan B. Bowman, Gen. Mgr., 2042 Conner Strav., Tucson, Ariz.
B. W. Venable, Gen. Mine Supt., 1325 E. Waverly, Tucson, Ariz.
✓ F. D. MacKenzie, Geologist, 1633 N. Harley Ave., Tucson, Ariz.
✓ Frank Horton, Mill Superintendent
✓ William Anderson, Jr., Mine Superintendent
✓ Paris Brough, Metallurgical Engineer.

Principal Minerals Copper ore ---- all sulphides.

Present Mining Activity Mining copper ore and milling same at their mill at the mine site.
5 to 6 men working on ore production at the Mineral Hill Mine (underground)
1 shift-- 5 days per week.
18 men working at the mill --- 3 shifts, 5 days per week.
43 men working at the shops and offices, and on surface work.
(note:- 85 men working at the Daisy Mine not included. See report of Daisy Mine)
Production from the Mineral Hill Mine is, at present very small, with only 1
stope and 5 to 6 men working. Production estimated at about 25 tons per day.
Tonnage milled is about 450 tons per day, with about 425 tons per day coming
from the Daisy Mine.

Geology and Mineralization Copper ore is found in a contact metamorphic type of deposit
in limestone rock, near a limestone-quartzite contact. Ore is found from the contact to
a distance of up to 120 ft. away from the contact. The hanging wall is limestone and the
footwall is Quartzite.

Ore Values No information on the grade of the ore mined at present.

Milling & Marketing Facilities Ore is milled at the Banner Mining Co. mill located at
the mine site. Straight flotation is used. About 425 tons per day from the Daisy Mine,
and about 25 tons per day from the Mineral Hill Mine, or a total of 450 tons per day is
milled at present. This is about full capacity of the mill.

Mine Workings

- (1) Mineral Hill shaft ---- Inclined 54 degrees --- 950 ft. deep on the incline.
about 700 ft. vertical dist.
- (2) 4 main levels ---- 300, 500, 600, & 700 ft. levels.

Information from MINE INSPECTOR'S OFFICE - August 15, 1957

✓ MINERAL HILL & DAISY SHAFT Mineral Hill Pima Dist. 3-7-57
 (3 shafts - 42 Claims)
✓ Owner - BANNER MINING CO., 132 South Main St., Salt Lake City.
 Operator - "
 ✓ Pres. E. S. Bowman, 741 Crest Dr., Tucson
 ✓ Sec. J. E. Hoge, 132 S. Main St., Salt Lake City
 ✓ Supt. B. W. Venable, 1325 E. Waverly, Tucson

✓ CU - 1800 tons 197 men

L.A.S.

✓ Card made on 13-10-57

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Mineral Hill Mine

Date March 30, 1955.

District Pima Mining Dist., Pima County.

Engineer Axel L. Johnson

Subject: Mine Report--Present Status. Information from Mr. Bowman Mgr., and Personal Visit.

Location 17 miles south of Tucson. 1 mile north of San Xavier Mine.
Section 2 -- T 17 S -- R 12 E.

Owners ✓ Barnsdall Mining Co., Tulsa, Okla.

Lessees and Operators ✓ Banner Mining Co., Twin Buttes Road, Tucson, Ariz.

Officers ✓ Allan B. Bowman, Manager, 2042 Conner Strav., Tucson, Ariz. Tel 6-2971.

Metals and Minerals Copper ores ---- all sulphides.

Number of Men Employed 67 men. 2 shifts working in the mine.

Production Rate About 8,000 tons per month ---- all sulphides.

Geology Copper ores are found in a contact metamorphic type of deposit in limestone rock, next to a limestone-quartzite contact. Ore is found from the contact to a distance of 120 ft. away from the contact. The hanging wall is limestone, and the footwall is quartzite.

Ore Values No information on ore values are given out. I have been advised that, according to some old maps, the ore body should average about 3 1/2 % copper.

Ore in Sight and Probable No figures on same are published by the operators.

Mine Workings

1 inclined shaft (inclined 54 deg.) ---- 950 ft. deep on the incline.
4 main levels ---- the 300 ft., the 500 ft., the 600 ft., and the 700 ft.
All the four levels are being worked, with sulphide ores being mined on all the levels.

Present Operations Copper sulphides are being mined on the 300, 500, 600, & 700 ft. levels. Besides this, the company has a few men on the 3rd shift, making a pocket on the 700 ft. level.

Milling and Marketing Facilities The ore mined in the Mineral Hill Mine is all milled in the company's mill next to the mine. Straight flotation is used. Besides the Mineral Hill production of about 8,000 tons per month, this mill also mills about 3,500 tons per month of sulphides from the Daisy Mine, also operated by the Banner Mining Co. Mr. Bowman claims that 94 1/2 % recovery is being obtained from these milling operations. The mill is run 3 shifts, and 6 days per week ---- Sunday being reserved for mill ~~repairs~~ repairs. The ore milled contains a small amount of iron and zinc, but no lead. It also contains a small amount of scheelite. The company has installed a pilot plant to see if some of this scheelite can be recovered. The mill tailings of -325 to 1000 mesh has been run through this pilot mill in an attempt to recover the scheelite. Mr. Bowman reports that the tailings milled run from 0.06 % to 0.10 % scheelite, and the concentrates obtained from this milling operation run about 1.0 % scheelite. Mr. Bowman doubts that the concentrates can be upgraded to the required amount.

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Mineral Hill Mine

Date March 30, 1955

District Pima Mining Dist., Pima County

Engineer Axel L. Johnson

Subject: Mine Report on Present Status. Information from Mr. Bowman, Mgr., and Personal Vis

Location 17 miles south of Tucson. 1 mile north of San Xavier Mine.
Section 2 -- T 17 S --- R 12 E.

Owners Barnsdall Mining Co., Tulsa, Okla.

Lessee and Operator Banner Mining Co., ~~2042 Conner Strav.~~ Tucson, Ariz.
Twin Buttes Road,

Officers Allan B. Bowman, Manager, 2042 Conner Strav., Tucson, Ariz. Tel. 6-2971

Metals and Minerals Copper ores ----all sulphides.

Number of Men Employed 67 men 2 shifts working in the mine.

Production Rate About 8,000 tons per month ----all sulphides.

Geology Copper ores found in a contact metamorphic type of deposit in limestone rock, near a limestone-quartzite contact. Ore is found from the contact to a distance of 120 ft. away from the contact. The hanging wall is limestone and the footwall is quartzite.

Ore Values No information on ore values are submitted. Have been advised that, according to some old maps, the ore body should average about 3 1/2 % of Copper.

Ore in Sight and Probable No figures on same being published.

Mine Workings

- 1 inclined shaft (incl. 54 deg.)---950 ft. deep on the incline.
- 4 main levels ----the 300 ft., the 500 ft., the 600 ft., and the 700 ft.
- All 4 levels being worked, with sulphide ores being mined on all the levels.

Present Operations Copper sulphide ore being mined on the 300, 500, 600 & 700 ft. levels. Besides this, company has a few men on the 3rd shift, making a pocket on the 700 ft. level.

Milling and Marketing Facilities The ore mined in the Mineral Hill mine is all milled in the company mill next to the shaft. Straight flotation is used. Besides the Mineral Hill production of 8,000 tons per month, this mill also mills about 3,500 tons of sulphide ores from the Daisy Mine, also operated by the Banner Mining Co. Mr. Bowman claims that 94 1/2 % recovery is obtained in the milling operations. The mill is run 3 shifts and 6 shifts per week---Sunday being reserved for mill repairs. The ore contains a small amount of iron and zinc, but no lead. It also contains a very small amount of scheelite. The company has installed a small pilot plant to see if some of this scheelite can be recovered. The tailings from the mill, -325 to 1000 mesh has been run through this pilot plant for an attempt to recover the scheelite. Mr. Bowman reports that the tailings milled run from 0.06 % to 0.10 % scheelite, and the concentrates obtained from this pilot plant, run about 1.0 % scheelite. Mr. Bowman doubts that the concentrates can be upgraded to the required amount.

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Mineral Hill Mine

Date March 31, 1954

District Pima Mining District, Pima County.

Engineer Axel L. Johnson

Subject: Mine Report. Information from Mr. Bowman, Manager, and Personal Visit.

For location and general information, see report of Aug. 5, 1952.

Owner Barnsdall Mining Co., Tulsa, Okla.

Lessee and Operator Banner Mining Co., Twin Buttes road, Tucson, Ariz.

Officers Allan B. Bowman, 2042 Conner str., Tucson, Arizona.-----General Manager.
B. W. Venable, 1325 E. Waverly, Tucson, Arizona. -----Mine Superintendent.

Principal Minerals Ores of copper.

Number of Men Employed 100. (of this 40 men are employed underground, and 50 are employed on the construction of the mill and miscellaneous surface buildings)

Production Rate Company is currently shipping about 1,000 tons per month of oxidized copper ore, obtained from the sinking of the Daisy shaft and on drifting on the 100 ft. level at the Daisy shaft.

Company is stockpiling the sulphide ores, obtained from the development work and stope preparation they are conducting at the Mineral Hill shaft. Approximate tonnage being stockpiled not determined.

Ore Values Drill holes at the location of the Daisy shaft averages about 4 % copper. Shipments to the smelter average about 5 % copper, with selective mining, and a small amount of hand sorting.

Sulphide ores at the Mineral Hill shaft average about 2.6 % copper. Principal mineral is ~~xxx~~ chalcopryrite, with a small amount of chalcocite. Ore contains a large amount of pyrite.

Note:- Operators do not want the figures on the value of the ore published.
Please treat same as confidential.

Milling Facilities Company is at present engaged in the construction of a mill, at the Mineral Hill mine-----which ~~will~~ is to be used for the milling of the ore from the Twin Butte and the Mineral Hill mines. The rated capacity of this mill will be between 300 and 400 tons per day of 24 hrs. The mill is nearing completion now. Operators expect to have it ready for mill test runs about April 15th, and to be able to start in full operation about May 1st.

Present Mine Workings (1) Sinking the Daisy shaft (a part of the Mineral Hill mine) at present. Shaft is a little over 250 ft. deep now, with about 300 ft. of drifting on the 100 ft. level. Copper carbonates produced from this shaft work and drifting is shipped directly to the smelter.

(2) Development work and stope preparation is conducted from the Mineral Hill shaft. This ore is stockpiled for future milling.

(3) The Twin Butte mine is being pumped out and dewatered, so as to be ready to start operating this mine also, as soon as the mill starts operating.

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Mineral Hill Mine

Date March 31, 1954

District Pima Mining District, Pima County.

Engineer Axel L. Johnson

Subject Mine Report. Information from Mr. Bowman, Manager and Personal Visit.

For location and general information, see report of Aug. 5, 1952.

Owner Barnsdall Mining Co., Tulsa, Okla.

Lessee and Operator Banner Mining Co., Twin Buttes road, Tucson, Ariz.

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DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Mineral Hill Mine

Date Aug. 5, 1952.

District Pima Mining Dist., Pima Co.

Engineer Axel L. Johnson

Subject: Mine Report. Information from Mr. Bowman, Mgr., and personal visit.

Location 17 miles south of Tucson--- 1 mile north of San Xavier.
Section 2 -- T 17 S. -- R 12 E.

Number of Claims

Owner ✓ Barnsdall Mining Co., Tulsa, Okla.

Lessee and Operator ✓ Banner Mining Co., 2042 Conner strav., Tucson, Ariz.

Officers ✓ Allan B. Bowman, 2042 Conner strav., Tucson, Ariz. Tel 6-2971 --Mgr.
✓ E. E. Bray, 2632 N. LaVern dr., Tucson, Ariz. Tel 5-2802 -- Foreman

Metals Found ✓ Copper

Men Employed 22 men

Production Rate No production. Doing exploration work on D. M. E. A. Program.

Milling Facilities None at present. Operators plan on the installation of a mill, when enough ore has been developed at this property and the Copper Queen and Copper Glance properties to warrant its installation.

Ore Values According to the old maps, the ore body should average about 3 1/2 % Copper. Exploration work will provide further information on ore values.

Old Workings & Past Production Considerable.

Present Operations Doing exploration and development work in accordance with Defense Minerals Exploration Administration contract in amount of \$ 126,786, with 50 % of government participation. The work called for reopening, unwatering, and repairing the shaft and the bottom 3 levels of the mine--- the 500, 600, & 700 ft. levels(vert. dist.). The shaft is a 2 compartment 6' x 10' inclined shaft (inclined 54 deg. to the south). Extensive sampling, and mapping of geology is being done. No ore is shipped. The D. M. E. A. contract is roughly 50 % completed, and will roughly take 6 to 8 months more to finish.

Proposed Work Continue the D. M. E. A. contract until the completion of the contract. Plan on installing a mill, when this work is completed, if the tonnage of ore developed will justify same.

Proposed Plans May apply for a government guarantee of price support. May be interested in production loan at the expiration of their D. M. E. A. contract.

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Mineral Hill Mine

Date Aug. 5, 1952.

District Pima Mining Dist., Pima Co.

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Year 1942 (continued)

1. Mineral Hill Group
2. Pima Mining District, Pima County, Arizona
3. Barnsdall Oil Company
4. E. D. Morton and R. M. Hernon
5. Several days spent examining this and other properties in Pima Mining District
6. Copper-lead-zinc
7. In his report in 1942, Hernon stated that "this property is supposed to have a half-million tons of 2.5 per cent copper ore with a little silver and a trace of gold."
8. _____

Addendum by G. J. Duff - May 22, 1951: The Mineral Hill Group consists of 39 patented claims, all in one block and adjoining the San Xavier Mine to the north. The property has been brought to Eagle-Picher's attention many times during the past ten or fifteen years. Several shafts have been sunk on the property and the last actual work was done about 1919 by an eastern company. These shafts have all been inaccessible, so that no underground examination work has been done. However, the surface has been gone over at different times by several members of our organization and in 1947 George M. Fowler recommended that eight churn drill holes be drilled on the Plumed Knight portion of this group of claims in an attempt to develop some lead-zinc ore, samples of which were found on the dumps in that vicinity. No drilling was done at that time, but believing that the property had merit and particularly due to its proximity to our San Xavier Mine and the Sahuarita Mill facilities, I have in the past four years made three recommendations that a minimum of \$10,000 be spent on this drilling but no authorization was granted.

Late in 1950 a bond and lease was secured by the Banner Mining Company and they are now engaged in cleaning out and retimbering the old No. 4 shaft in the general area covered by the proposed eight churn drill holes. In addition, they are also retimbering and installing necessary mining equipment at the old No. 1 (?) incline shaft near the San Xavier-Tucson highway. In addition to the initial consideration, the Banner people have recently made a payment of \$10,000 on the property.

NAME OF MINE: MINERAL HILL (PLOMED KNIGHT)		COUNTY: PIMA DISTRICT: METALS: CU	
OPERATOR AND ADDRESS: W. M. Harper		MINE STATUS DATE: 5/1/44 Unwatering Idle	

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine ✓ MINERAL HILL

Date October 8, 1942

District Twin Buttes

Engineer George A. Ballam

Subject:

The property is located about 25 miles southwest of Tucson on the Twin Buttes highway which cuts some of the claims. During the past, from 1898 to 1918 it is reported to have produced \$2,000,000 in copper and silver, but all records and reports are in possession of E. S. Reeser, Pres. Barnsdall Oil Co., of Tulsa, and Mr. Reeser has refused on several occasions to give any information. Mr. George Colvocoresses of Phoenix spent considerable time on the property but was unable to obtain this information despite considerable correspondence on the subject.

The ore values are reported to be of milling grade, and occur as replacements in limestone beds which outcrop along the Mineral Hill, dipping gently to the south. The hill itself is quartzite on the north and little work seems to have been done in the contact, although several shafts have been sunk in the flats to the south cutting the limestone. One of these, that farthest south is in blue limestone for its entire depth, and appears to have encountered no ore. Most of the production seems to have come from development near the hill where there is evidence of a mill and a considerable camp. A newer, incline shaft has been sunk near the quartzite zone, but it is not known whether any large ore body was developed. In fact, I visited the property with Wm. Kemp, formerly geologist with C. & A., who had worked the area, and he seemed to be unaware of the existence of the incline shaft.

Some interest has been shown in this presumed body of mill ore. Mr. Shanklin visited and examined the property. Since the workings are inaccessible, and no information available, the examination was confined to surface showings. He was interested in the possibilities in the quartzite contact. Cliff Carpenter also went over the ground with Mr. Kemp, but knew nothing about the later development to the north.

Shortly after these men had looked at the property, Nickolai and Whealton of Tucson, were able to obtain a lease from Mr. Reeser. Amount paid down was \$10,000. I saw a letter from Mr. Reeser to Mr. Wm. Lawson, who was also interested in the property. The former said that he had found someone who was not interested in the 'antecedents' such as reports, etc., and had negotiated a lease for substantial down payment. The feeling here is that the present lessees are not interested in operation, and are holding purely for speculation.

According to reputable men here, the ore is of low grade and would require milling. On account of the fact that there are already quite large tonnages of ore developed in the Twin Buttes district, which are unavailable due to lack of milling facilities, I believe the Mineral Hill Property should be classed as one of the longer range possibilities. For further information I suggest that Mr. Colvocoresses be contacted, as he had spent considerable time investigating its possibilities.

Signed: George A. Ballam

*Copper Branch, War Production Board.

MINERAL HILL, Nickolai and Whealton, Lessors, Pioneer Hotel, Tucson, Arizona.

A production of 2 million dollars, the value principally in copper, has been credited this property. Little, if any, work has been done on it since 1918 when it was last operated. Records of the last operators are indicative of large tonnages of commercial milling ore exposed from present development.

Due to the length of time the workings have been idle, and the extent of development to be made accessible for re-entry, the Preliminary Development Loan limitation of \$5000.00 is entirely insufficient for the reopening of the property. While this mine can only be classified in the long-range category, there is an abundance of copper to be ultimately gained if finances can be arranged.

from COPPER REPORT NO. 2, DECEMBER 23, 1942, by Earl F. Hastings, for
COPPER BRANCH, WAR PRODUCTION BOARD.