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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09/09/92

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES FILE DATA

PRIMARY NAME: BLACK PEARL

ALTERNATE NAMES:

CAMP WOOD TUNGSTEN MINE

YAVAPAI COUNTY MILS NUMBER: 135

LOCATION: TOWNSHIP 15 N RANGE 7 W SECTION 18 QUARTER NW
LATITUDE: N 34DEG 41MIN 18SEC LONGITUDE: W 113DEG 02MIN 08SEC
TOPO MAP NAME: BAGDAD - 15 MIN

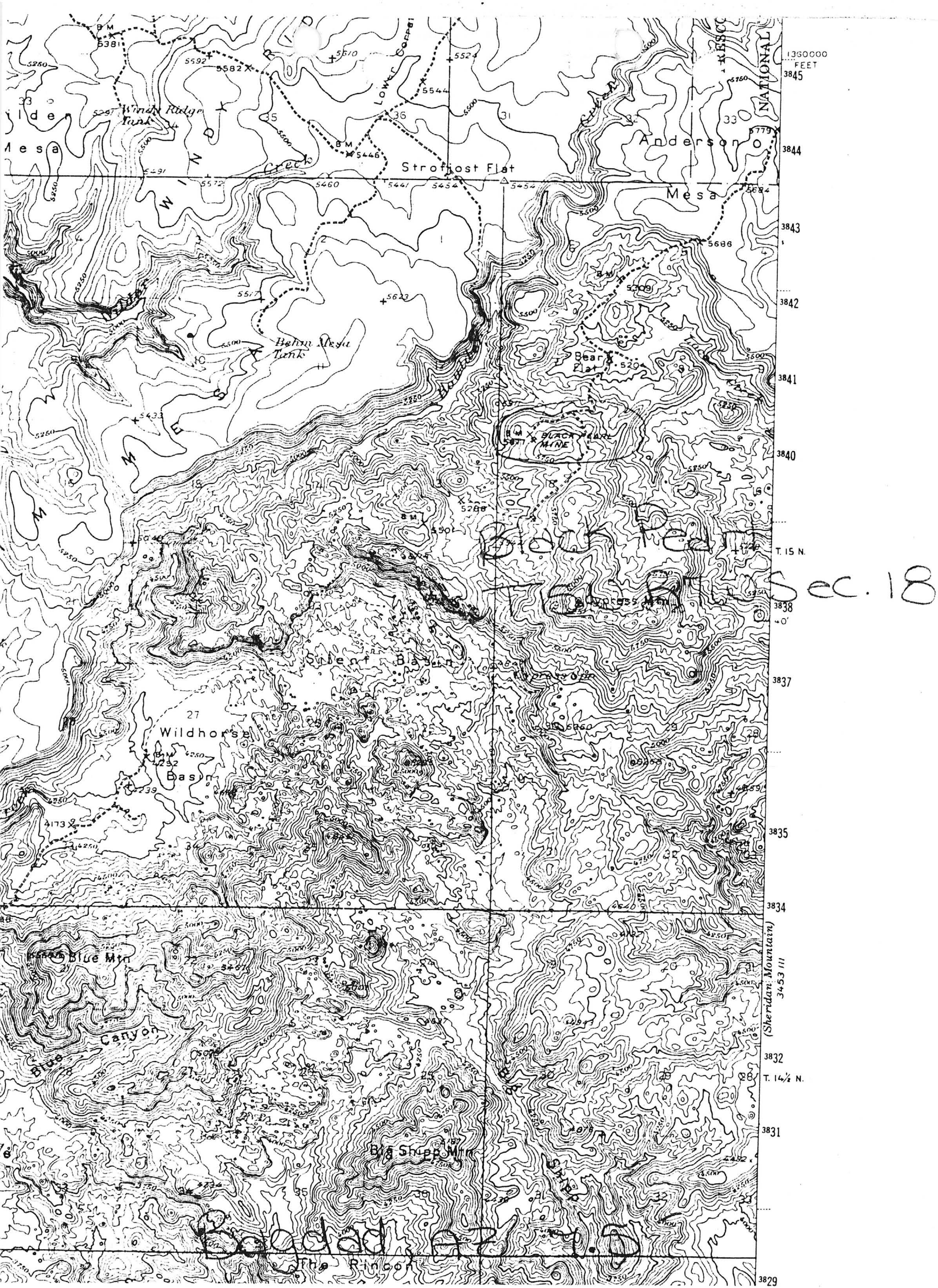
CURRENT STATUS: PAST PRODUCER

COMMODITY:

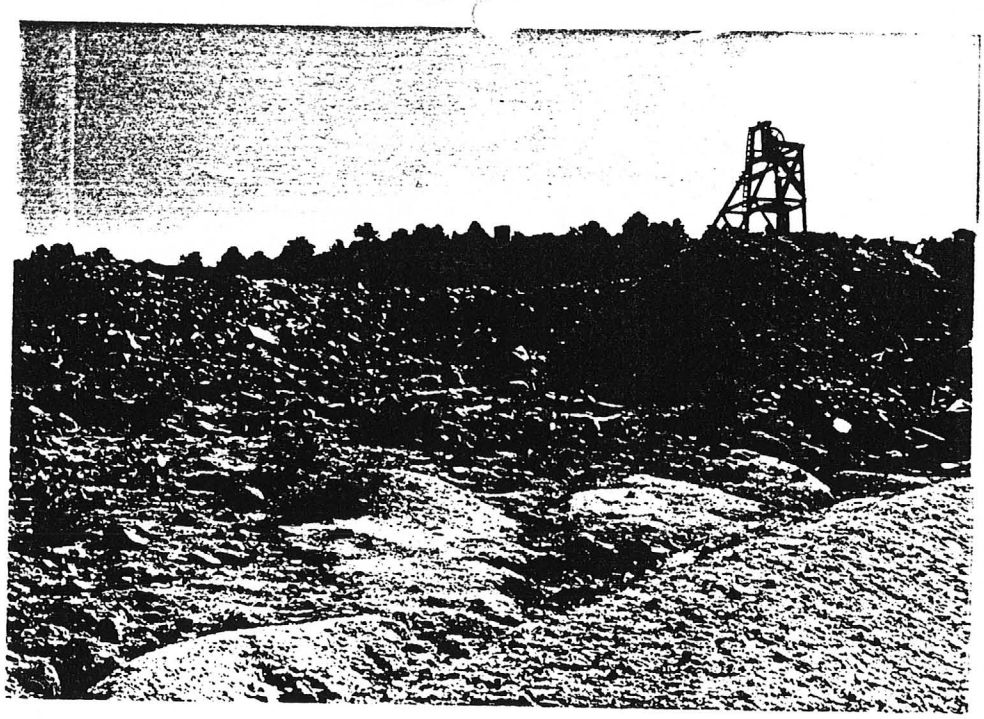
TUNGSTEN
QUARTZ CRYSTAL
BERYLLIUM
FLUORINE FLUORSPAR
BISMUTH
IRON

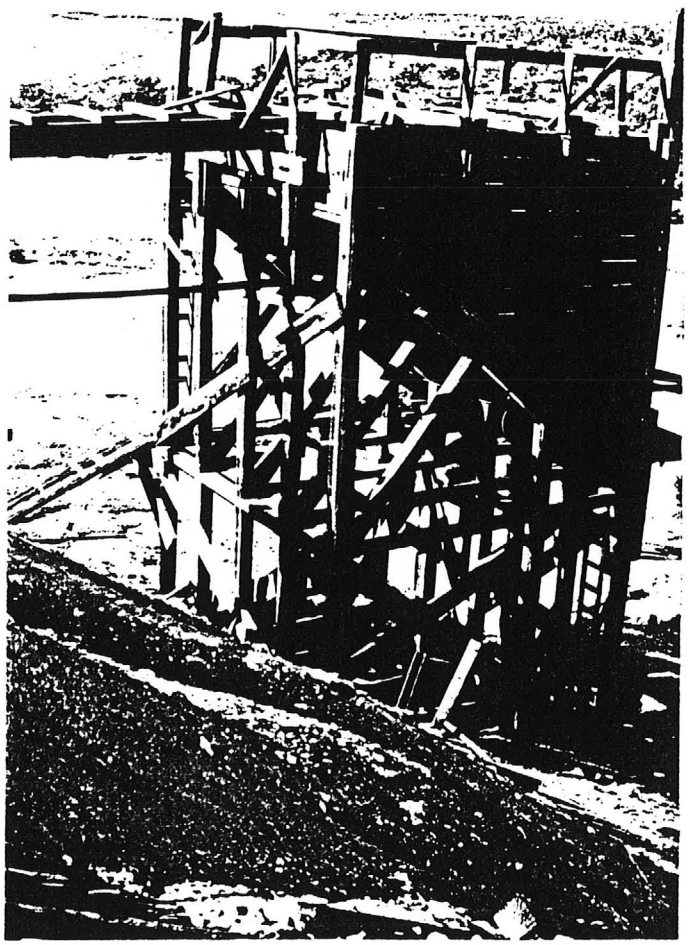
BIBLIOGRAPHY:

USGS BAGDAD QUAD
ADMMR BLACK PEARL FILE
DALE, V.B. TUNGSTEN DEPTS GILA, YAVAPAI AND MOHAVE CTYS USBM IC 8078 1961 P 43
ADMMR A.L. FLAGG VANADIUM REPTS BOOK VI
WILSON, E.D. TUNGSTEN DEPTS AZ AZBM BULL 148 1941 P 21
AZBM BULL. 180, P. 108
CLAIMS ALSO IN SEC. 7 & 8, AND SEC. 12 & 13 T15N-R8W
EVENING STAR MINE (RFC FILE)
USBM IC 8298 P. 21
ADMMR CAMP WOOD TUNGSTEN COLVO FILE
DEWITT,ED,1987,PROTEROZOIC ORE DPSTS OF SW US SOC. ECONOMIC GEOL.,GUIDEBOOK SER, VOL 1
SCHMITZ, C, GEO OF BLACK PEARL, 1987 GEO FILE


Windy Ridge Tank
Lower Corral
Anderson
Strofiost Flat
Mesa
Behm Mesa Tank
Bear Flat
BLACK PEARL MINE
Black Pearl
T16 R11 Sec. 18
Cypress Mtn
Silent Basin
Wildhorse Basin
Blue Mtn
Blue Canyon
Big Sheep Mtn
The Rincon
NATIONAL
1360000 FEET
T. 15 N.
T. 14½ N.
(Sheridan Mountain)
3453 III
Bagdad, AZ 7.5

BLACK PEARL 12/1989





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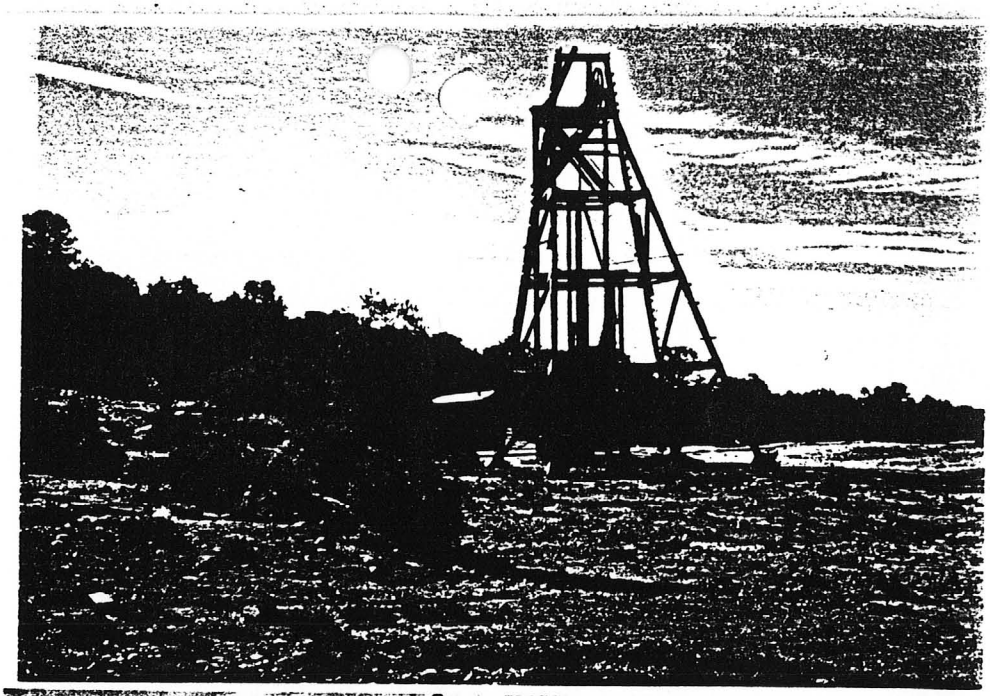

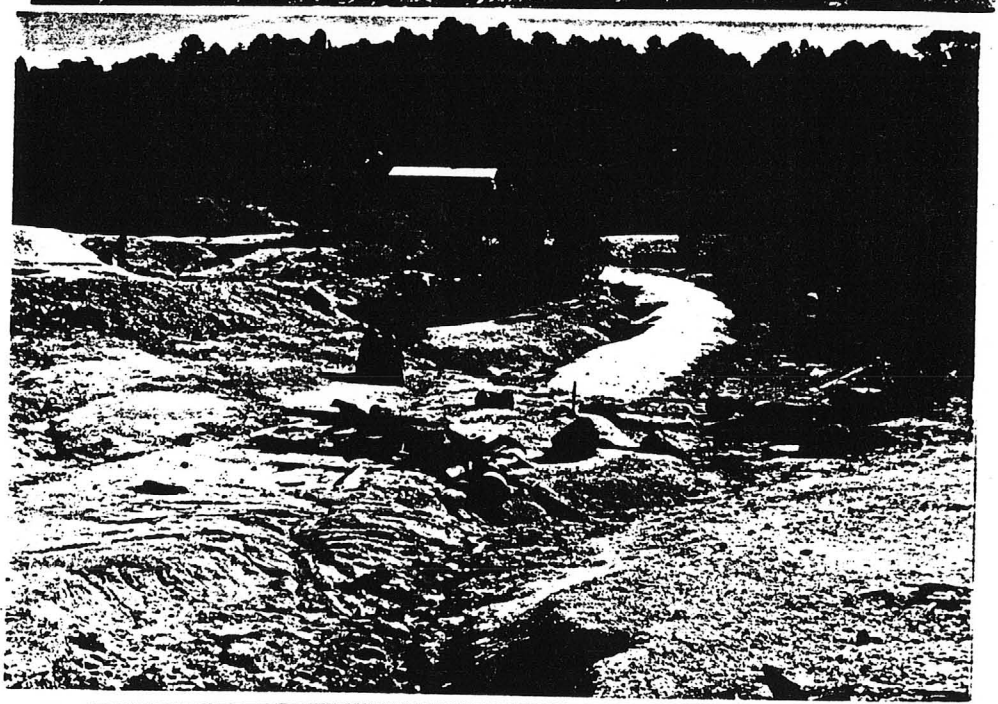

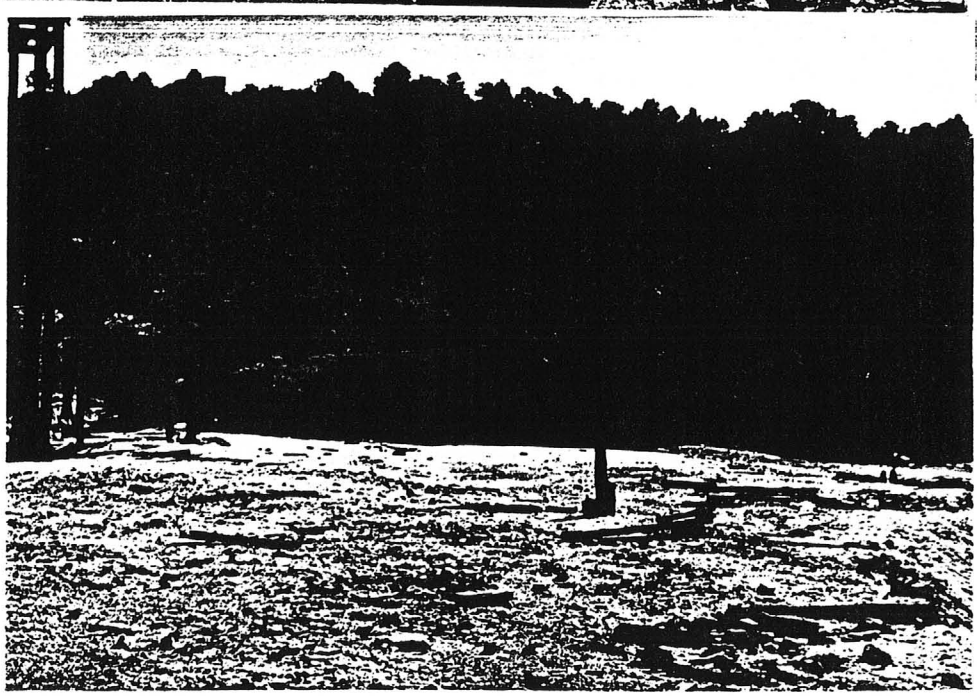

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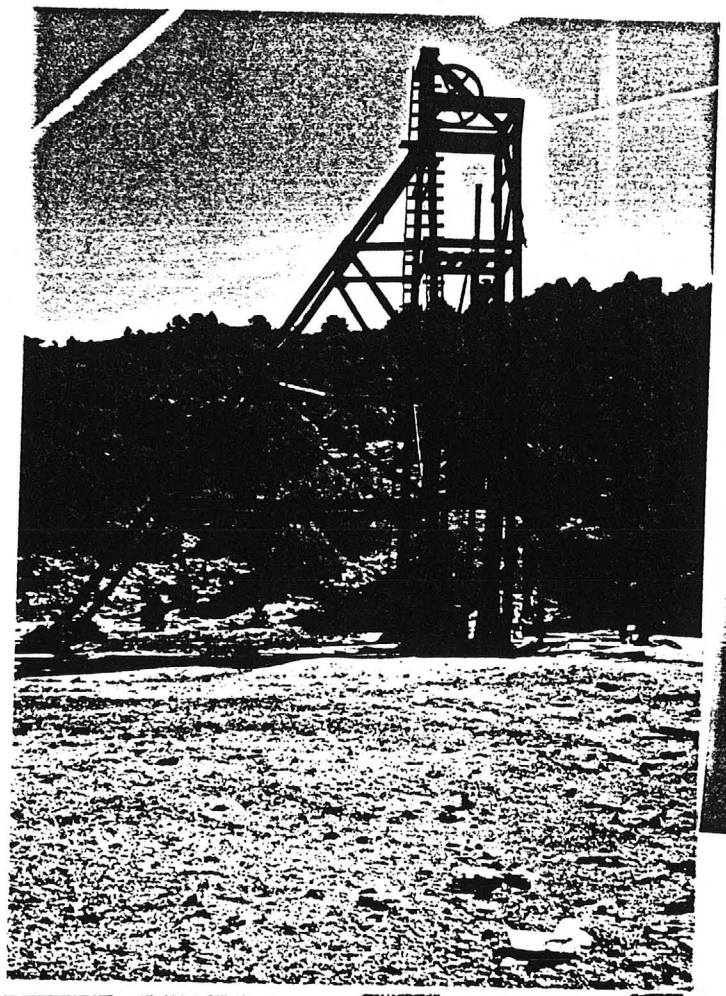

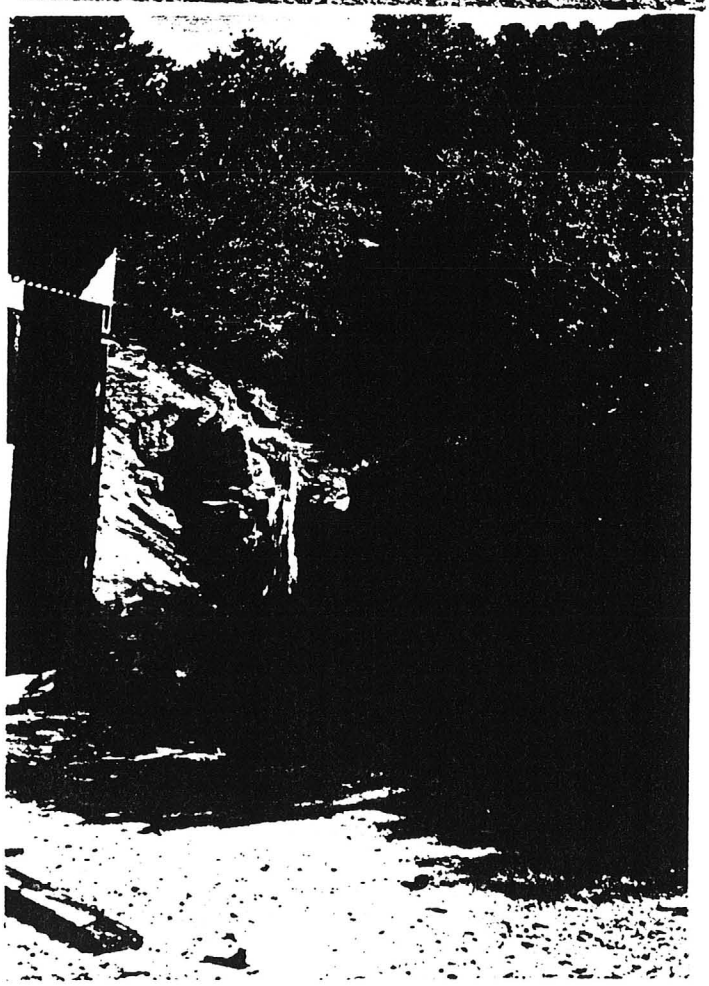

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES

INFORMATION FROM MINE CARDS IN MUSEUM

ARIZONA

YAVAPAI COUNTY

BLACK PEARL MINE

MM-1063 Beryl, Beryl-Quartz, Bismuthinite

A - 3

MILS #135

1-AKA

BLACK Pearl Mine(s)

NAME OF MINE: BLACK PEARL

COUNTY: ~~YAVAPAI~~ 2.
DISTRICT: CAMP WOOD
METALS: W

OPERATOR AND ADDRESS: DATE:		LEASE STATUS DATE:	
5/1/44	Fred Gibbs, Rt. 1, Box 115a Prescott, Arizona	5/1/44	Reported closed

*

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine BLACK PEARL Date April 20, 1955

District EUREKA, YAVAPAI COUNTY Engineer Mark Gemmill

Subject:

$127,285.00 - Govt participation

An exploration loan of $75,000 has recently been approved. Small scale* $95,463.75
production continues.

[redacted]

[redacted]

*

RECONNAISSANCE & SURFACE REPORT BLACK PEARL PROPERTY

Eureka Mining District, Yavapai County, Arizona
Brian R. Bond, Geologist, American Mining and Consulting, Inc.
April 4, 2002

ABSTRACT

The Black Pearl Property is situated upon the N55E- trending structural lineament that hosts the Baghdad Porphyry Copper-Molybdenum deposit. Tungsten-molybdenum occurrences in the hills surrounding the Black Pearl Mine, as well as workings on adjacent structures, also follow the aforementioned N55E trend. Individual veins are sheeted and generally trend N80W, dipping steeply. It is apparent that alteration adjacent to tungsten (+/- molybdenum) - bearing veins resembles that related to a porphyry system, rather than that of tin-tungsten greisens. Evidence to support that conclusion includes:

1) The occurrence of molybdenite with quartz-biotite and quartz-muscovite veinlets.
2) Potassium feldspar rims on quartz and plagioclase feldspar phenocrysts.
3) The occurrence of wolframite with secondary biotite.
4) The relative absence of tin with tungsten mineralization.
5) The overprinting of phyllic upon potassic alteration.
6) Potassic selvages on molybdenite-bearing veinlets.

The proximity of a porphyry tungsten-molybdenum deposit is indicated by:

1) Mineral assemblages.
2) Alteration Zoning.

LOCATION

The Black Pearl Property is located between Baghdad and Skull Valley, Arizona. The property is approximately 14 miles N55E of the Baghdad Open Pit Mine. It is accessed from Camp Wood Road, eleven miles after the pavement ends.

LAND STATUS

The nine patent mining claims comprising the Black Pearl Claim Block are owned by Will Degeraty, of Prescott, Arizona. The surrounding unpatented claims have been dropped. Surface rights to the surrounding land are owned by the Yolo Ranch, as well as the State of Arizona.

WORK PERFORMED

Geological Reconnaissance and Mapping was carried out on March 14 and 15, 2002. A dump sample of molybdenite-bearing quartz-pyrite vein rock was taken (#146907); hand samples of representative rock types and mineralization were also taken.

GEOLOGY

Petrology

Mineralization at the Black Pearl Property is hosted by quartz monzonite and granite. Thin, pegmatite dikes, exhibiting graphic texture, intrude both rock types; they generally trend parallel to the regional N55E fabric, dipping steeply to the northwest

The quartz monzonite is a coarse-grained, equigranular to seriate, holocrystalline, biotite quartz monzonite. The granite is coarse-grained, equigranular and holocrystalline, containing both biotite and muscovite. Some of the biotite is secondary, while some "muscovite" is really sericitized biotite.

Structural Geology

The Black Pearl Mine is aligned with other workings along the N55E-trending lineament hosting the porphyry Cu-Mo deposit at Baghdad. Most tungsten and molybdenite-bearing veins, however, strike E-W and dip steeply to the south. Nevertheless, thin veinlets do occur along NE and NW-trending stuctures.

ECONOMIC GEOLOGY

Mineralization

Wolframite occurs with quartz veining, as well as with secondary biotite. Molybdenite was observed with quartz-pyrite veins, on the Black Pearl Mine dump. Chalcopyrite and bornite were very sparse, occurring with pyrite only at the Black Pearl Mine. Molybdenite was also observed with quartz-muscovite veinlets, in the vicinity of the North Side #1 claim. Rarely were wolframite and molybdenite seen in the same hand sample. Fluorapatite was observed with one quartz-muscovite veinlet. Localized disseminations of subhedral, coarse-grained (5 mm), opaque, brown garnet crystals were observed in potassically-altered granite hosting wolframite veining.

Alteration

Potassic alteration consists of secondary biotite, quartz-muscovite veinlets, potassium feldspar selvages on veinlets and weakly developed potassium feldspar rims on quartz or plagioclase phenocrysts.
Phyllic alteration consisted of sericite on fractures within orthoclase, as well as the sericitization of biotite. Pervasive sericitization of orthoclase was only observed at the North Side #1 claim, hosted by quartz monzonite.
Propyllitic alteration is weakly-developed, where present, consisting of epidote veinlets. With a few exceptions, epidote veining was only observed in the vicinity of the North Side #1 claim. Argillic alteration was essentially absent.

CONCLUSIONS

1) Hydrothermal alteration at the Black Pearl Claims is similar to that of a porphyry system.
2) A 3000 foot drilling program, consisting of 3-5 drillholes, would be sufficient to test this hypothesis.

RECOMMENDATIONS

1) Vein extensions peripheral to the claim block should be staked.
2) Detailed geological mapping of alteration assemblages and their zoning needs to be carried out.
3) Downdip extensions of promising mineralization need to be drilled, in order to determine whether or not molybdenum mineralization increases at depth.

Black Pearl Mine - Check Assays for Exploration

Assay #	Date Received	Type	Weight (lbs)	Au (opt)	Ag (opt)	Pb
146606	06-Oct-02	Black Pearl Dump	2	<.01	0.05	
146628	06-Oct-02	Black Pearl Dump	2	<.01	0.03	
146604	06-Oct-02	Black Pearl Dump	1	<.01	0.01	
146602	06-Oct-02	Black Pearl Dump	1	<.01	0.01	
146601	06-Oct-02	Black Pearl Dump	<1	<.01	0.01	
146631	06-Oct-02	Black Pearl Dump	<1	<.01	0.04	

BLACK PEARL MI[illegible]le) **YAVAPAI CONTY**
By Ken Phillips, Chief Engineer, July 3, 2002

On June 27, 2002, Michael DeGeraty, West USA Realty, 2311 E. Union Hills Drive, Phoenix, AZ 85024, phone came into the ADMMR office to report on the Black Pearl tungsten mine in Yavapai County.

He reported that his parents, Will and Diane DeGeraty, P.O. Box 10895, Prescott, Arizona 85304, home phone (928) 445-2777, office phone (800) 235-7918 own the patented property. Further he explained they have been talking with an individual who claims to be a research metallurgist that can extract the tungsten and molybdenum from the mine.

The tungsten mining industry and tungsten ore marketing and pricing was explained. I also discussed the cautions required of anyone that is being provided with claims of proprietary processes that can make economic extraction of metals that cannot be independently verified.

I:\COUNTIES\LIBRARY\StaffMineReports\BLACK PEARL MINE.doc 7/3/2002

BLACK PEARL

YAVAPAI COUNTY

*Beryl scattered in pegmatites near Black Pearl Tungsten mine and Boulder Creek.
Mark Gemmill 5-27-57

Mr. Chillo of Bagdad Copper informed me that the Black Pearl Tungsten Mine is owned by John Lawler of Phoenix. KP Report of 1/29/73

NJN WR 12/24/82: Ownership of the Black Pearl mine, Yavapai County, patented property is 4/6 John Lawler, 225 E. Union, Prescott, AZ 86301, 1/6 Mr. Lions, and 1/6 Mr. Harrison.

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*

News Item

It has been reported the Hillside Mining & Milling Co. has acquired the interests of Cazier and Sholtz in the Black Pearl Tunsten property. Ore from the Black Pearl will be transported to the Tunstona Mill for treatment. The Tungstona Mill is property of the Hillside M. & M. CO. This information came from a reliable source.

Mark Gemmill

MB-27

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
OWNERS MINE REPORT

This mine not visited. Data obtained from reports and talks with those familiar with property.

Report by
A. Brodie Campbell

Date June 6, 1942

1. Mine Black Pearl

2. Mining District & County Eureka Dist., Yavapai Co.

3. Former name

4. Location 15 miles SW Camp Wood P. O. On S. end of Santa Maria Mts.

5. Owner Mrs. John Lawler, H. R. Williams.

6. Address (Owner) Prescott, Ariz.

7. Operator None

8. Address (Operator) None

9. President

10. Gen. Mgr.

11. Mine Supt.

12. Mill Supt.

13. Principal Metals Wolframite, some sulphides

14. Men Employed None

15. Production Rate None

16. Mill: Type & Cap. None

17. Power: Amt. & Type None

18. Operations: Present None

BLACK PEARL

W

Yavapai 13 - 4 S 28, T 15 N, R 7 W

H. L. Williams, Box 1226, Prescott '43

19. Operations Planned None. Mine tied up in partnership fight.

20. Number Claims, Title, etc. 11 patented, 5 held by location claims.

21. Description: Topography & Geography Plateau canyon country. Rugged. Sparse timber. Moderate precipitation. Elevation 5500'.

22. Mine Workings: Amt. & Condition Several hundred feet of drifts. All caved. Examination impossible.

(over)

23. Geology & Mineralizatio. Numerous quartz veins containing wolframite in granite. The veins strike N-75-W and dip 85° SW. The main vein is about 2' wide and traceable for 2000'. The other veins vary from a few inches to 2".

24. Ore: Positive & Probable, Ore Dumps, Tailings According to old maps available there are supposed to be 40,000 tons of 0.9% WO3 ore blocked out above the caved portion of the drifts.

24-A Vein Width, Length, Value, etc. The mineralized zone is about 1.5 miles long and 0.5 miles wide.

25. Mine, Mill Equipment & Flow Sheet None

26. Road Conditions, Route Go from Prescott to Camp Wood P.O. Take road for Yolo Ranch 4 miles. Turn S. by SW. 6 miles. Do not try to find the road unless guided or word has been received that road has been signed. Do not try this trip in wet weather.

27. Water Supply Purported to be sufficient for 50 ton mill

28. Brief History Started in 1914 as small tungsten producer. Intermittent producer since then until 1938. Has produced over 3,000 units WO3.

29. Special Problems, Reports Filed Wilson, Tungsten Deposits of Ariz.

30. Remarks This property from reports available and talks with those that have seen the mine open and have worked in it shows every promise of having a nice future. It should be opened up. The quarrel between Mrs. Lawler and Williams presents some difficulty to be adjusted.

31. If property for sale: Price, terms and address to negotiate.

32. Signed.....

33. Use additional sheets if necessary.

Sunnyslope
Prescott, Arizona
October 23, 1943

Mr. Charles Willis, Consultant
Metals Reserve Company
413 Home Builders Bldg.
Phoenix, Ariz.

Dear Mr. Willis:

Re: Black Pearl Mine

Thank you very much for your letter of October 15th. I had hoped to get a reply off to you before you left for Washington, but have been away from home most of the time and couldn't get around to it.

The only data that I can give you on the Black Pearl property is that obtained from Homer Wood and from a map and data compiled by him covering the Black Pearl operation.

The property was located in 1914 and was worked very superficially by hand methods from that time until 1936 at such times as the metal price would permit. It is in an isolated section about 65 miles from Prescott, the last eight miles of which are terrible.

Various shallow pits, tunnels, shafts and open cuts dug over a length of 1900 feet of quartz vein indicate that commercial ore can be expected over that length with an average width of about three feet. The vein is very regular, not given to pinches and swells, stands almost vertically, and has good granite walls. It lends itself well to economical mining.

The diggings above mentioned produced a little over thirty short tons of WO3 running a bit over 70%. This material was all obtained by hand-sorting as there was and is no concentrating equipment on the ground. Using this figure against estimated tonnage of broken material gives a figure of 0.92% WO3 as the average assay value. There is little question that the tungsten particles too small to hand sort would raise this average grade to a little over 1.00%. Tungsten occurs as relatively coarse crystals of wolframite. There is also a small but as yet undertermined amount of molybdenite in the ore.

The longest tunnel is approximately 550 feet and gains a maximum depth below cropping of 110 feet. There has been very little stoping above this tunnel. I figure that there is at least 25,000 tons of ore to be had above tunnel level over the indicated length of minable ore. A 60 foot shaft at tunnel portal shows that the ore continues to that much greater depth at least. In addition to the main vein on which the above noted work has been done, there are several other promising veins bearing tungsten which have not yet been prospected.

Until recently, title has been held on a 50-50 basis between owners who could not agree on mutual operation. This is the reason why nothing has heretofore been done in the way of getting the thing into operation. Last

week, the Lawler family acquired control, so that the deadlock is now broken. The Lawlers propose to at once reopen the mine, sample it, and then get into production if sampling results verify Mr. Wood's data. I have been engaged by the Lawlers to manage the job.

The Lawlers will finance the initial work which includes the establishment of a camp, the building of a piece of road to connect camp with the mine and permit trucks to get to the mine, the reopening of the caved portions of the 550' tunnel, and the sampling of the tunnel when it is open. To do the latter, I plan to take in a small compressor and drill and shoot out about 300 tons of rock from the full length of the tunnel. This will be hand sorted as it was in the old days and the weighed product figured against the estimated weight of broken muck. This product should run 70% WO3. In addition, it is probable that the minus 2" material from the sorted reject will be put thru a small mill which Claude Echols has lately installed near the mine on tungsten property which he is working in a small way.

The results of the above work will dictate the line of future action. If the results are favorable the Lawlers want to get into production at a minimum rate of 50 tons a day. I believe that we will find that double that rate is warranted.

The project has a great deal to recommend it, especially at this time. It will serve to open a new tungsten district which could have an important production. Labor supply needed, especially for the first six months, will be low and can be had right from the Camp Wood section from old time prospectors, chloriders, and old part-time employees of the ranches thereabouts. For instance, I shall start work Monday with five men and already have these men engaged,- they were working in the section for themselves in a small way and are very glad to work for someone else for a time in order to get another grub-stake. Heretofore, they have added practically nothing to the war effort, and yet you couldn't hire them to come out and work in the big mines, even if they were physically acceptable, which they are not.

Initial equipment needs are low and can be easily supplied locally. Later on, if and when a mill becomes necessary, it would probably be a gravite-concentration type of simple design and of low cost.

* As the Lawlers are taking the initial gamble on this they feel that it would be only proper for Metals Reserve to give them a purchase contract at prevailing prices, either for a given amount of product, or for a given time. This they intend to apply for at an early date. Any information that you can give me in this regard will be greatly appreciated. I note that a great many tungsten projects in Mexico, the Western States, and British Columbia, have folded up in the past few weeks due to WPB's recent policy and I feel that this resultant action may be too drastic for the good of our country. Possibly sufficient sources of tungsten are in hand to meet all possible war demands from now on out. I sincerely hope so, but if not, then I trust that Washington will lend enough encouragement to the tungsten industry in this country to make absolutely certain that we won't again be caught with our pants down if things don't go according to scheduled plans.

With best wishes,

Sincerely,

May 29, 1943

Mr. W. J. Forbach
San Carlos Hotel
Phoenix, Arizona

Dear Mr. Forbach:

I have just received word from C. F. Willis, who is Consultant for the Metals Reserve here in Arizona, that he has had a request from Ira B. Joralemon, who is Consultant for the Metals Reserve in San Francisco, and also Chief of the Tungsten Division of the War Production for the western area. Mr. Joralemon in part writes as follows: "The Black Pearl situation has been disturbing because Mrs. Lawler has apparently been unwilling to option the property to anyone who could operate it and without this mine there does not seem to be anything in the district big enough to justify a mill. If you have any ideas as to what might be done about this situation I should be greatly obliged to hear about them."

There are a number of other small properties in the area which can produce tungsten but no one of them justify a mill. If the Black Pearl was in production a custom mill would be justified for that area and it seems as though some steps are being considered to try and correct the bad situation there.

Tungsten is needed and needed right now. If the war stops and some of the foreign countries get back into real production of tungsten, there is no question but that the price of tungsten will be considerably lower than it is at present.

I know your interest in the property and your attempt to make some sort of a deal with Mrs. Lawler. In view of this request and the possible investigation by the War Production Board of why production is not coming out of that area, I hope you can make another effort to carry out your plans of getting a reasonable lease and option on the property and installing a mill which could handle other ores in the district.

With best wishes and kindest regards, I am

Very truly yours,

JSC:kk
cc - Charles F. Willis

J. S. Coupal, Director

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Black Pearl

Date March 23, 1957

District Camp Wood

Engineer Mark Gemmill

Subject: Present Status

A RESUME of the operations of the property during recent years is as follows: In 1953 James Cazier and Ed Scholz acquired the property under a lease and option from the owners, the Lawler Estate and others. Cazier and Scholz obtained Access Road money and a good road was built to the mine from Bagdad, a distance of about 16 miles.

The mine had considerable ore in sight developed by a tunnel driven on the vein for several hundred feet. The reported value of the ore was .7 % WO3 the mineral being Wolframite. Good mining equipment was installed and a small mill to concentrate the ore was built, and operations were started. There was no water at the mine and it had to be hauled by truck for considerable distance. This operation while not profitable, carried itself and was continued until 1955 when all of the ore above the tunnel level was exhausted. At that time Cazier and Scholz secured a DMEA loan to sink a shaft and explore the vein 100 ft. below the tunnel level. The shaft was started and durings its sinking Cazier and Scholz optioned their lease to the Hillside Mining & Milling Co. operators of the Tungstona Mine.

Hillside Mining & Milling Co. completed the exploration work and opened up the 100 ft. level. The ore on this level proved to be about the same as that in the tunnel level. Production was started, the ore being hauled and treated at the Tungstona Mill. However operation was discontinued in the fall of 1956. The mine was closed down and the option given back to Cazier and Scholz. It is now idle.

Maps of the mine and production figures can probably be obtained from Cazier and Scholz who are out of the state at present.

Addresses

Ed Scholz - 5702 No. 12th. Str. Phoenix, Ariz.

James Cazier - 1155 So. Milwaukee Str. Denver, Colo.

COPY

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine

To R. I. C. Manning, Director

District

Date April 27, 1955

Engineer Mark Gemmill

Subject: NEWS ITEMS

OLD DICK

It has been reliably reported to me that the Mudd interests, either the Coronado or the Cyprus Companies, have exercised their option and will take over the Old Dick early in May.

BLACK PEARL

Scholz and Cazier have started exploration work for which they were granted a loan, I think the amount is $125,000. This work will consist of a shaft 150 ft. deep to be sunk near the portal of the present adit, and 400 ft. of drifting from the bottom of the shaft.

DMEA Loan $127,285.00 granted in Mar. 1955
Govt participation $9[illegible]463.75

BABBAD COPPER

A new 9 yd. P. & H. electric shovel together with a fleet of large Dart trucks have just been put in operation stripping the hill to the northwest of the present pit. This work will uncover an extensive area of known ore.

CASH MINE

Owned and operated by Orr and Dickie is now shipping ore to the Poarch Plant at Humboldt for treatment when the plant is put in operation. The ore carries values in gold, silver, copper, lead and zinc.

TUNGSTONA MINING AND MILLING CO.

* The new mill is operating regularly on a three shift basis with a daily capacity of about 260 tons.

MARK GEMMILL

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine: Bagdad Area | Date: Dec. 6, 1952

District | Engineer: Mark Gemmill

Subject: Present operations

BAGDAD COPPER CORPORATION

Production is about normal or around 100000 tons per month of ore mined and milled. Preparations are under way to start the proposed expansion program. Mr. Dickie stated that financial arrangements for the program are not complete, but seemed to feel that there is little doubt but that they would be consummated within a short time.

HILLSIDE MINING & MILLING CO.

The operations of this company are now almost entirely given over to mining and milling Tungsten ore from the Tongstona mine. During the past year an extensive program of development has been carried on at the mine. Mr. Dickie stated that they have definitely proven a very large body of low grade tungsten ore which also carries a small percentage beryl. Present production at the mine averages 125 tons per day. The mill capacity is 10 to 12 tons per hour and is being operated enough hours each day to handle the mine production. Mine production is being stepped up as rapidly as possible. Mine work is now hampered by lack of power, which consists of Diesel driven equipment. A power line is being extended from Bagdad to the mine. When this is in everything will be electrified. Concentration of the ore is done with tables followed by flotation and magnetic separation to refine and seperate the tungsten minerals. Wolframite is the principal product with a smaller percentage of schelite. Both products are brought up to a prime grade and bring the top price. It was stated that the recovery percentage is very satisfactory. Tests are being made to determine a method of recovering the Beryl content in the ore which is now being lost. Mr. Dickie stated that the future plans are for a plant of several thousand tons capacity when proven feasible. A shipment of 6½ tons of high grade tungsten concentrate was recently made from the mill.

BLACK PEARL TUNGSTEN - SCHOLZ AND CAZIER, Operators.

Development work has been under way for the past year with considerable ore now reported developed. It had been planned to have the ore milled at the Hillside Mill. A recent test run of several hundred tons was very unsatisfactory, both as to recovery and grade of concentrates obtained. The milling setup at Hillside is not suitable for the Black Pearl Ore. Tests have been made and the operators are now obtaining machinery designed to successfully treat the ore. A small plant will be set up as rapidly as possible. In the meantime development and preparation work continues at the mine.

CONSOLIDATED TUNGSTEN MINES CO. J. M. Cobb, Pres. and Mgr. Bashford Bldg. Prescott.

This is a new property opened up during the past year. It is located about 1½ miles in a northerly direction from the Black Pearl. The workings consist of open

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine **Bagdad Area** Date **Dec. 6, 1952**

District Engineer **Mark Gemmill**

Subject: **Present operations**

CONSOLIDATED TUNGSTEN MINES CO. (cont'd)

cuts and a shaft 60 ft. deep with a short drift at the bottom. Mr. Cobb informed me that from the open cuts they sorted 21 tons of ore which they took to the Barstow Mill for treatment, from which about 1½ units per ton were recovered in concentrate of both wolframite and schelite, that the cost of handling the ore in that manner was too high to be profitable. I advised Mr. Cobb to get an engineer to examine the property, which I think he has done. No work going on at present.

OLD DICK

Production was stopped several months ago when the price of lead and zinc dropped. Since that time development work has continued with a reduced force of men. This work consists of deepening the shaft and running lower levels. No information is available as to the amount of new ore developed but I was informed that the findings are very satisfactory and that the property will be in shape to produce on a large scale when market conditions are right.

COPPER KING Scholz & Cazier operators

Production stopped with the drop in Lead and Zinc prices. Since then some development has been done but at present no work is being carried on. The operators are waiting for better market conditions.

COPPER QUEEN Lawler Estate Mike and Bill Lawler, Lessees

This property has had production for the past several years by the above lessees making occassional shipments from surface workings, the values being mainly in copper. During this time there had been several stages of deeper development. About three years ago Ernest Dickie took over from the lessees and drove a drift tunnel from north to south cutting the surface workings at about 100 ft. below. Results of this work were not as expected and he gave up the property. Later others joined with the Lawler Brothers in continuing work in the tunnel but without finding shipping ore so gave up. Recently the property has been optioned to the Cypress Mining Co. who are now engaged in drilling operations and continuing southward in the tunnel. No information is available as to their findings but rumors are that some very good ore has been encountered in drill holes which cut the vein some 200 ft. below present workings. That in addition to copper the ore contains considerable zinc.

October 25, 1943

Mr. Fred Gibbs
Sunnyslope
Prescott, Arizona

Dear Fred:

Subject: Black Pearl

I have received your letter of October 23 addressed to Mr. Willis regarding the Black Pearl and I am forwarding it airmail to Mr. Willis who is now in Washington.

I am enclosing the May 11 circular on "Information Concerning Purchase of Domestic Tungsten Ores and Concentrates" together with "Tungsten Application Form C for Qualified Producers".

Pending any action that Charlie Willis may take in Washington, I suggest that you execute the enclosed application and forward it airmail as indicated to the Metals Reserve Company, 811 Vermont Avenue, N.W., Washington, D. C.

Yours very truly,

J. S. Coupal, Director

JSC:LP
Enc.

CC: Mr. Charles F. Willis

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CC: Mr. Charles F. Willis

November 21, 1942

Mr. James E. Harrington
Box 761
Prescott, Arizona

Dear Mr. Harrington:

Subject: Black Pearl Tungsten Mine

Enclosed is a brief report on this property by Carl G. Barth, Jr. As there was little information available and the property quite inaccessible, this report is actually of little value to you. You might be able to obtain some data from the Veta Mines, Inc. of Denver, Colorado.

Likewise, enclosed is a reprint relative to Reconstruction Finance Corporation mine loan applications, and mimeographed copy of the official Metals Reserve Company's tungsten purchasing plan.

If we may be of further assistance to you, do not hesitate to call on us or on our Field Engineer located in Prescott, Mr. A. C. Nebeker.

Very truly yours,

Earl F. Hastings
Assistant Director and
Projects Engineer

EFH:kk
Enclosures

RECOMMENDATIONS
THE BALCK PEARL GROUP OF
TUNGSTEN MINING CLAIMS

PREAMBLE

In the fall of 1940 my attention was called to the possibilities of the Black Pearl Group of Tungsten Mining Claims by Mr. E. C. Hammond, a mining engineer, residing in Tucson, Arizona. In the fall of 1936 Mr. Hammond camped for over a week in the immediate vicinity of the mine. At that date most of the underground workings were accessible and he visited them on several occasions. He made a very careful inspection of the workings and noticed the presence of wolframite crystal in all of the exposed faces of the vein. At one particular point, the face of the drift now known as the 560 foot tunnel, there was four feet of ore exposed. Mr. Hammond states that in this face there were several wolframite crystals measuring three to four inches in diameter. He is of the opinion that at this particular point the four feet of exposed ore would assay 4 to 5% WO_3.

At the time of his visit Mr. Hammond did no sampling. This was due to the fact that at that time the property was being sampled by Mr. Phelps. Upon his return to Prescott, Mr. Hammond attempted to get a bond and lease on the property but was unsuccessful.

At the time of Mr. Hammond's visit half of the property was owned by Mrs. Mary Lawler and her son, John W. Lawler, and the other half by Mr. Homer R. Wood. In 1938, H. L. William, Joseph P. Walton and William Stephenson secured an option on the half interest held by Homer R. Wood. Mr. J. B. Frost, a Mining engineer, then in the employ of Messers Williams and Walton at the Hillside Mine, was sent to make an examination of the property. Shortly afterwards Messers William, Walton and Stephenson purchased Mr. Wood's half interest at a price said to have been in the neighborhood of $30,000.00.

At the time Messers Williams, Walton and Stephenson purchased the half interest of Homer R. Wood, it was their intention to make a deal with Mrs. Lawler and her son for the other half interest. After more than a year of negotiations with Mrs. Lawler, they were unable to arrive at any agreement; the price asked by her being several times the prospective value of the property. Since then she has refused to have any dealings whatsoever with Messers, Williams, Walton, and Stephenson.

A copy of the report made by Mr. J. B. Frost for Messers Williams, Walton and Stephenson is appended hereto. The signed original is in the possession of Mr. Williams. A copy of the report made by Mr. Harlow D. Phelps, Mining Engineer of Prescott, Arizona, is also appended. A signed copy of Mr. Phelps' report is in the possession of the writer. The examination made by Mr. Phelps was for Colorado parties. Before the examination was completed their option expired and Mrs. Lawler refused to grant them an extension of time.

It would seem in passing that some comment should be forthcoming regarding that part of the report of Mr. Frost regarding the capital required to put the property in operation. In the writer's opinion the amount named by Mr. Frost, namely, $200,000 is extremely excessive. Parties close to Messers Williams, Walton and Stephenson are of the opinion that this figure was used in their negotiations with Mrs. Lawlwer in an endeavor to impress upon her the large sum of money that they contemplated spending on the property. This may be the reason for Mr. Frost's assumption that such a large sum would be necessary.

During the past three months the writer has made two different visits to the property, and checked in every way possible findings as outlined in the reports by Mr. Frost and Mr. Phelps. Most of the workings are now in bad condition and I was unable to do any systematic sampling. However, the ore body was inpected wherever possible and in all instances found to contain coarse wolframite crystals visible to the naked eye. A few indication samples were taken, together with several from the dump. These samples averaged

slightly higher than the average mentioned in the Phelps report and the dump samples, .51% as against .4425% WO_3 as mentioned in the Frost report.

CONCLUSIONS:

A shoot of good grade ore is quite definitely opened up for a longitudinal distance of possible more than 2000 feet as mentioned by Mr. Phelps in his report. His estimated average of 3 feet in width for this distance is in my opinion quite conservative. From all the samples taken by Phelps, Frost and the writer, together with the important data submitted by Mr. Wood covering the period that the property was operated by him and Mr. Lawler, I am of the opinion that values of .75% WO_3 can be depended upon for the mine workings, and .45% for the dump.

I am also of the opinion that the Black Pearl Group of claims is a most attractive prospect, decidedly worthy of further reasonable expenditures for development and the immediate installlation of a 75 ton daily concentrating plant. I believe that a most substantial profit can be made during the recommended development period, together with excellent possibilities of developing a body of ore that will within twelve months justify the installation of a 150 to 200 ton mill.

It is quite safe in calculating that at the present time there is available at least 8,000 tons of blocked out ore having a value of .75% WO_3 together with 6,500 tons of dump ore having an average content of .45% WO_3. Preliminary metallurgical tests show it is possible to recover 95% of these values by a coarse grind of around 16 mesh, screen classification, and table concentration. Some oxidation has taken place in the dump, therefore, 1000 tons have been deducted from the total dump tonnage.

PRESENT DEVELOPED ORE:

8,000 tons x .75%, (15# WO_3 per ton) =	120,000 # WO_3
5,500 " x .45% (9# " " ") =	49,500 # WO_3
Total WO_3 content	169,500 # WO_3
Less 5% loss in extraction	8,475 # WO_3
Net extraction	161,025 # WO_3
Less 20% royalty	32,205 # WO_3
Net remaining pounds of WO_3	128,820 # WO_3

The present price of wolframite concentrates is $24.00 per unit. For the purpose of this report a price of $20.00 per unit is used, therefore the net remaining 128,820 pounds of concentrates
* would have a value of $128,820

Milling costs for both mine and dump ore are estimated at $1.25 per ton. Haulage to mill of both ores $.50 per ton. Stoping mine ore $2.00 per ton. Overhead and taxes $.50 per ton

Mining and milling	8000 tons	at $4.25	$ 34,000.00
Milling dump	5500 "	" 2.25	12,375.00

Total mining & milling costs $ 46,375.00

Net extractable value of mine and dump ore after loss in extraction and royalties have been paid	$ 128,820.00
Less all mining and milling costs	46,375.00
Net remaining profit	$ 82,445.00

RECOMMENDATIONS:

I recommend that a fund of $50,000,00 be available immediately for the purpose of installing a 75 ton mill, and the starting of a twelve months' development campaign which will be described more fully later on. This capital will be used as follows:

Mine equipment	$ 11,500.00
Mill complete	17,000.00
Road building	3,000.00
Camp & Buildings	3,000.00
Truck and Automobile	2,500.00
Contingencies	3,000.00
Working capital	10,000.00
Total	$ 50,000.00

DEVELOPMENT:

At a point about in the middle of the ore shoot there is a 55 foot shaft. (See Mr. Wood's production map). It is proposed to continue this shaft to a depth of approximately 360 feet, or 200 feet below the present level of the western or 560 foot tunnel. At this point drifts both east and west should be driven along the strike of the vein, together with upraises every 200 feet to connect with the upper tunnels.

On the eastern end of the ore shoot a tunnel should be driven, starting at a location deemed most favorable. It is quite possible that the mouth of this tunnel would be more or less in the locality indicated on Mr. Wood's production map, marked "Proposed Tunnel."

The western tunnel should be advanced towards the shaft and both it and the eastern tunnel continued until they are connected. Once this has been done, the 72,000 tons of probable ore as indicated on the maps of Mr. Phelps will have been proven.

Full development and mill operations should be started well within 60 days after the property is taken over. This would allow 10 months of active development during which time it is estimated that a total of approximately 6000 feet of development work would have been done. Details of this work are as follows:

East and West tunnels	1500 feet at $	8.00	$12,000.00
Shaft	300 " "	40.00	12,000.00
Drifts off of shaft	2000 " "	9.00	18,000.00
Upraises	2200 " "	8.00	17,600.00
Total costs, 10 months development			$59,600.00

For details of the proposed development work, see map attached.

ORE FROM DEVELOPMENT:

Assuming that the ore body maintains its present estimated width of 3 feet as reported by Mr. Phelps, the development work as set forth in the foregoing paragraph would produce approximately 10,000 tons of ore. This tonnage together with the present developed and dump ore would be more than sufficient to keep the mill operating for 10 months, or until the end of the proposed twelve months' development campaign. The cost of this ore from development would be approximately $6.00 per ton.

Assuming that the ore shoot maintained its present wolframite content of .75% WO_3, or 15# per ton, profits from this developed ore would be approximately as follows:

10,000 tons x 15# per ton =	150,000# WO_3
Less 5% loss in extraction	7,500# WO_3
Net extraction -	142,500# "
Less 20% royalty	28,500# "
Net remaining at $1.00 per pound	$114,000.00

Mining at $6.00 per ton	$6.00
Haulage to mill	.50
Overhead and taxes	.50
Milling	1.25
Total cost per ton	$8.25

10,000 tons x $8.25 per ton = 82,500.00

Net profits from development ore $ 31,500.00

It is anticipated that in addition to the above tonnage, the development work as outlined will have placed in sight, the 72,000 tons mentioned in the report of Mr. Phelps as probable ore, plus 100,000 tons below the tunnel level, a total of 172,000 tons.

SUMMARY OF PROFITS FROM DEVELOPMENT CAMPAIGN:

As mentioned under "Present developed ore" the profits to be derived from this class of ore are approximately $82,445.00. As noted above the expected profits from the development ore are $31,500.00; making the total profits for the twelve months operating period $113,945.00. During this period the royalty payments will have amounted to $60,705.00, bringing the total profits up to $174,650.00.

FUTURE OPERATIONS:

At the conclusion of the proposed twelve months development campaign, and assuming that the vein has maintained its width and values as outlined in this report, there will have been blocked out a total of approximately 172,000 tons of mill ore, or sufficient to keep a 150 ton mill in operation for three years. Operating under this sized mill costs should be considerably lower per ton. The following is an estimate of these costs:

Mining	$2.25
Development	.25
Haulage	.50
Milling	1.00
Overhead & taxes	.50
Total	$4.50

Operating on a basis of 150 tons daily, the balance of the purchase price,

approximately $40,000.00 will be paid off in less than four months. From then on operating profits should be in the neighborhood of $10.00 per ton, or $45,000.00 monthly.

CONCLUSION:

I strongly recommend the taking over of the Black Pearl Group, and their operation as outlined in this report. If at any period during the development campaign widths and values did not continue as anticipated, development work should be suspended, and all efforts concentrated on the milling of the then developed ore. This should be accomplished at a sufficient profit to return the investment, plus a profit and the salvaging of all equipment and machinery placed on the property.

Respectfully submitted

/s/ James M. Hall
James M. Hall, E. M.

BLACK PEARL GROUP
TUNGSTEN CLAIMS

Details of Estimates
Mine Equipment

Air Compressor, 485 to 520 cubic feet	$	4500.00
Machine Drills, 7		2000.00
Machine Steel, Jack bits, etc.		350.00
Air and water pipe, fittings, etc.		500.00
Air Receivers, 3		300.00
Cars and Rails		700.00
Hoist 40hp		1200.00
Head frame and 3 ore bins		1000.00
Misc. & small tools		450.00
Total	$	11,500.00

Mill Installed

Coarse ore bin & grizzley	$	350.00
Sorting Belt, 24" x 60' long		250.00
Jaw Crusher 10 x 16		650.00
Fine ore bin, 100 tons		450.00
Belt ore feeder		75.00
Ball Mill, non-slime		2750.00
Concentrating tables, 3		1500.00
Engine 75 hp. Semi Deisel		2750.00
Generator, 7kw, wire, fittings, etc.		500.00
Shafting, pulleys, bearings		300.00
Belts		350.00
Pipe, hardware, misc tools		400.00
Water and fuel tanks		300.00
Cement , 200 sacks		200.00
Lumber, 20M		500.00
Corrugated Iron		200.00
Pumping plant and water lines		1500.00
Dam with small concrete core		200.00
Ball mill charge for mill		375.00
Labor		1600.00
Freight 30 tons		600.00
Overhead, incidentals, etc.		1200.00
	$	17,000.00

*

Hillside, Arizona
c/o Hillside Mines, Inc.
April 30, 1938

Mr. H. L. Williams
Present.

Dear Sir:

Given below is a preliminary report on the Black Pearl Group of Tungsten Mining Claims in Yavapai County, Arizona. The inspection of the property was made April 12 to 23 (incl.) 1938 by Mr. W. W. Stephenson and myself. Assay results and other data are not yet available, hence this "preliminary report."

Every detail (except one plat of claims that has since been amended) which has been possible to check on the work of Mr. H. R. Wood, has pointed to its accuracy and correctness. Details will be given below of additional checks to be made. Consequently, data given on his drawing "Section of Workings on Black Pearl Group" will be used in various calculations made herein. Only in case of marked discrepency in average assay results (which I believe highly improbable) will the final report differ in substance from this preliminary report.

SUMMARY:

1. One very strong vein has been superficially developed on the property.

2. The shallow workings (at no point more than 70 Ft. below the surface and mainly much nearer the surface) from 1900 feet of length of this one vein have produced a recorded 59,615 lb. of wolframite which contained 70% WO_3.

3. Total recorded production is 62,100 pounds.

4. Various other strong veins outcrop on the property. Wolframite can be found in several of these outcrops. None of these other veins have been developed sufficiently to determine their value.

5. Since the above recorded production, 180 ft. of drifting has been done. This drift was mainly in sulphide (FeS2) ore and showed an average of 0.784% WO_3 an average width of 4.2 ft. The maximum depth below the outcrop was 106 ft. It is noteworthy that the average WO_3 content of the oxide ore checks very closely with the reported average WO_3 content of the sulphide ore after correcting for enrichment by substraction of FeS2.

6. There are no serious natural obstacles to the successful exploration, development and exploitation of the property.

7. There is a reported possibility of finding good silver ore at some place on the property.

8. Present reserves are calculated at $67,000 net operating profit.

CONCLUSION:

1. The future price and market for tungsten is the greatest factor of uncertainty in my mind. If a satisfactory market at near present quotations can be expected, then:

2. The program for development which is outlined near the end of this report is strongly recommended.

3. A total capital expendiute of $200,000will be required. Only a few thousand will be required for initial exploration. Additional amounts will be required only upon satisfactory results from the completion of each step until the entire amount will be required to place the property in satisfactory operation.

4. Based on assumptions given herein, an exceptionally profitable operation is indicated.

Drawing No. 2 shows the general location of the property. Drawing No. 1 gives the exact location and ties to legal subdivisions of land. It will be noted that there are 11 patented claims and 5 unpatented claims. Each claim is of the full size of 20.66 acres. The vein from which practically all production to date has been obtained, is covered for a length of 6000 feet by patented claims. There are also certain showings of wolframite to the north and west of the Black Pearl Group which are not covered by the group.

The question of title, ownership and terms for operation and/or purchase not studied in this examination.

According to a report by Mr. Wood the claims were located in 1914 by Mr. William Conners. It is evident from the present condition of the mine workings that operation was under the "lessee system"--whether by the owner or by actual lessees. By that is meant that the mine was not developed nor operated systematically but rather with a view of obtaining a little more tungsten with the minimum outlay of effort. If waste from sorting operation was in the way, it was thrown to the bottom of the shaft instead of hoisting it by hand. Inadequate timber was used; and so on. Such a method had one distinct advantage and one distinct disadvantage from the viewpoint of future large scale operation. The advantage is that by the nature of operation, the workings were shallow. Hence the vein was explored over a greater length than perhaps would have been the case by other methods. The disadvantage is that the value of the vein at considerable depth has never been proven, nor is there much available ore blocked out (except by drifting in 1936 and dumps.)

The past production of the property is shown in detail on the attached "Section of Workings on Black Pearl Group" by H. R. Wood. At present quotations, the value would be slightly in excess of $40,000.

The Black Pearl Group is in a granite formation. Various large granite pegmatite dikes cut the granite. The veins are largely quartz with muscovite in almost pure veinlets in places. The vein material can well be designated, greisen. Numerous large vugs from which pyrite has been weathered are to be found in the oxidized zone. A carefully cut samples from an oxide dump contained 5.7% Fe; that from the sulphide dump 10.9% Fe and another sulphide dump 15.0% Fe (average sulphide 12.9% Fe.). This would mean a reduction of at least 15.5% in weight by weathering of FeS2. The average

of the 180 ft. of drift in sulphide is given as 0.784% WO_3, which checks remarkably well with the 0.922% reported by Mr. Wood. Two important conclusions can be drawn from the above:

1. Reported assays of WO_3 agree exceptionally well with themselves.

2. The greatest depth yet obtained (though still very shallow) shows no trend toward a decreasing WO_3 content of the original vein material.

Very few specimens were found wherein the wolframite occurred as small (10 mesh) particles in a mass of pyrite. The common mode was as pieces of wolframite in quartz or muscovite from 1/4" or 3/8" to 1½". Much larger pieces are reported and I found several larger pieces in recently caved vein material.

In addition to the massive minerals mentioned above, namely; quartz, muscovite, pyrite, and wolframite, numerous other minerals were found in lesser amounts. Fluorite apparently worked into the joints of the granite. A few large crystals of microcline were found. A few specimens of bismuthinite (carrying 30 oz. Ag.) were found in the sulphide dump (assays for Mo are being made). Silver assays of several hundred ounces per ton are reported but I do not know from whence they came. Gold and silver assays were made on all samples taken by myself but no commercial amounts were found in those samples.

The elevation is guessed as near 6000 feet. This indicates a more agreeable summer temperature than in the lower regions of Arizona. Scrub oak and similar brush, pinon, juniper, and cedars cover the property. Large pines are in the vicinity of Camp Wood some 8 miles north. A sawmill is said to be operating in the pine timber. Lumber and mine timber should be readily and cheaply obtainable.

The property is connected by road with Prescott, Arizona (see drawing 2). Unfortunately, there is about 3/8 of a mile of road going down into Loco Creek which has been constructed entirely too steeply--grades as steep as 11°-50'. Using a tractor, it would be possible to get equipment for exploration to the property. But for satisfactory construction and operation some two miles of road would have to be built into the property. Also the road across the malpais mesas (lava flats) from the rim above Loco Creek to near Camp Wood would need to be surfaced with decomposed granite for satisfactory wet weather travel. In places the road across the mesa should be straightened and changed to the tops of the low ridges. The mesa road is probably six miles in length. In no place are exceptionally difficult mountain road building problems encountered. It is not known just how much of this road Yavapai County would construct should it be demonstrated that work on a large scale is to be done on the property.

There are three possible sources of water for milling:

1. Possibility of developing water in mine workings.

2. Loco Creek--shown on drawing 1--quantity somewhat doubtful.

3. Boulder Creek--some 600 feet west of Black Pearl claim No. 8 and probably will be sufficient at all times.

The lower tunnel was caved about 100 feet from the mouth and was filled with water behind the cave. It is very desirable to have this ground timbered and the debris removed so that the 180 feet should give a valuable check on reported results and, as it is the deepest point now accessible, should give the best indicator we now have as to the prospects with depth.

As no mine workings were open for a sufficient distance to warrant systematic sampling, the program consisted of sampling some dumps, a cut across both walls of a shaft and samples from various outlying shallow workings to determine the extent of distribution of the tungsten. Because of the very spotty nature of the deposit, i. e., large pieces of barren quartz and large pieces of wolframite, it was necessary to cut samples weighing from 50 lbs. to 175 lbs., then carefully break all material down to 3/8" or less, before reducing the auantity of sample with a riffle. Assays have not been received to date. A further description of each sample will be made when the assays are reported.

No metallurgical tests have been made. The character of the ore would indicate that recogery on jigs should start at a rather coarse size (say 3/8"). It is quite probable that a considerable quantity of clean tailing can be discharged at such a coarse size. Middling products will have to be ground finer in steps (say to 10 or 20 mesh). The recovery methods will be jigs and tables. Flotation will probably be useful in removing pyrite from the wolframite concentrates. Should the molybdenite prove to be in paying quantities, the tails from the tungsten mill should be reground and floated to recover the molybdenum.

As stated in preceding paragraphs, operations at this property have not been of such a nature that an ore reserve would be created. The work done in 1936 was an exception.

The following figures are made from the data on "Section of Workings on Black Pearl Group" by H. R. Wood. Vein areas marked in green have been selected as being reasonable to assume as ore reserve of the average width and analysis, viz., 4.2 ft. wide containing 0.784% WO_3. Each square on the section is 10 ft. by 20 ft.-200 sq. ft.

106 x 200 = 21,200 sq. ft.
21,200 x 4.2 = 89,040 cu. ft.
89,040/12 = 7,420 tons @ 0.784% WO_3

The data given on the same drawing indicate 6,475 tons of dump material containing 0.4425% WO_3 (0.33% recoverable at 75% recovery).

The greatest uncertainty in calculating the value of these reserves as well as calculating the possible outcome of operation of the Black Pearl Group lies in the future price of tungsten. No doubt each reader of this report will have his own ideas as to the future price of tungsten, in which case the financial outcome figures will be changed accordingly. A figure of $20.00 net per unit of WO_3 is herein used. Only one thing can be said in defense of that particular figure, viz. it is slightly below present published quotations at a time when steel operations are at a low ebb and other metals are exceptionally low in price.

The question of costs is also a factor in the equation from which net profits are derived. Taking into consideration that the vein is fairly wide, dips steeply, has granite walls, and would not be sorted underground, it is hoped that a fairly cheap shrinkage stops mining method can be used. Also it seems probable that considerable coarse quartz can be discarded as a clean final tailing early in the milling process, thereby making low milling costs per ton. Construction costs are assumed which will put the property into proper shape for efficient operation. The assumed basis is 100 tons per day.

Mining and development	$ 4.00 per ton
Milling	1.00 per ton
Overhead and taxes	2.00 per ton
Total operating cost	$ 7.00 per ton

The dump material is calculated at:

Cost to place in mill bins	$ 0.50 per ton
Milling	1.00 per ton
Overhead	1.00 per ton
Total cost dumps	2.50 per ton

The recovery on newly mined ore is assumed to be 80%; on dumps 75%. At $20.00 net received per unit of WO_3 present reserves would show the following operating profit per ton:

Present ore block 7,420 tons at $5.00	=	$40,810 Total operating profit
Dumps 6,475 " " 4.10	=	26,540 Total operating profit
Total operating profit on present res.		$67,350

Conservative business calls for sufficient ore reserves to be blocked out to refund the total capital expenditure. The following program is outlined to provide 75,000 tons of ore reserve (assuming 75% of the vein material encountered will be ore of 0.784% WO_3 and width of 4.2 ft.) Seventy-five thousand tons will provide slightly more than two years operation at 100 tons per day. Drawing 4 shows a proposed plan of accomplishing this development. It will be noted that this proposal leaves untouched a lot of ground to the east which can very reasonably be expected to yield ore. All ore found in this area, that below the tunnel level, and other favorable places will add to the estimated net profit from the operation. The expenditure, not including cost of equipment, for this proposal would be:

Crosscut	(see drawing 7)	1255 ft. @ $10.00	=	$12,500.
Drifts	(" " 4)	1700 ft. @ 10.00	=	17,000.
Raises	(" " 4)	700 ft. @ 7.50	=	5,250.
	Total			$34,750.

Given below is a very rough estimate of total capital required to place the property on an operating basis. It should be noted that the $35,000. for development is a prepaid development charge which is included in operating costs but for which funds must be provided before operation starts. The refund of that amount is included in assumed "Mining and development" costs.

Power	$ 35,000.
Mine Development	35,000.
Mill	75,000.
Mining machinery and shop	22,500.
Road (mine proportion)	10,000.
Offices, buildings, water supply	7,500.
Misl. not included above	15,000.
Total capital necessary	$200,000.
Deduct prepaid development	35,000.
Amount which net operating profit must refund----------	$165,000.

All of the assumptions made above show a net operating profit of $412,500. for 75,000 tons of ore. Also the purchase price of the property must come out of this amount.

The logical steps in the development and exploitation of the Black Pearl Group seem to me to be the following (see drawing 4):

A. Open the lower tunnel and carefully check the figures on the last 180 feet of drift. If these check, then proceed with:

B. Without spending any money on roads, take a portable compressor and supplies to the property with a Caterpillar Tractor. Continue driving the present lower tunnel for another 600 feet (cost $6,000 plus equipment). Provide sample crushing equipment to sample very carefully all material obtained from drifting operation. If the results from this work hold up to expectations, then:

C. Remove compressor and equipment; also additional equipment to the crosscut tunnel site (see drawing 7), and drive the 1255 ft. crosscut tunnel. Then drive lower drifts and raises (see drawings 4). During this period run metallurgical tests, design mill, make road survey and ahve all details to go into execution as soon as "C" is completed satisfactorily.

D. Construct roads, mill, shops, power plant and other surface work necessary. Prepare chutes and stopes underground,

E. Start operation and continue drifting east.

Various alternatives to the above plan have been studied. Drawing 5 offers a slightly more conservative policy but will cost more in the end.

Additional data will be given as soon as obtainable.

Respectfully submitted,

J. F. Frost,
Engineer of Mines.

*

Hillside Mines, Inc.
Hillside, Arizona
May 25, 1938

Mr. H. L. Williams
Elks Building
Prescott, Arizona

Re: Assays--Black Pearl

Dear Sir:

We have the following assay report from Chas. O. Parker & Company of Denver, Colorado:

		WO_3	MOS_2
Sample No.	1	0.60%	
	2	0.12%	Trace
	3	0.44%	Trace
	4	Trace	
	5	Trace	
	6	0.80%	
	7	2.54%	
	8	Trace	
	9	Trace	

Determination for molybdenum was requested on only two samples.

The descriptions of the above samples and comments follow:

No. 1 This is a sample of an oxidized ore dump at the blacksmith shop level. Several cuts were taken from the sides and face of the dump after local surface concentration effects had been removed. Also several shallow pits were sunk on top. There were not many large boulders in this dump. A sample of about 175 lb. was taken and broken down to about 1/4 inch before reducing by means of a riffle. This dump is only one of many included in Mr. Wood's average of 0.44% WO_3. The above assay of 0.60% WO_3 merely indicates the average of 0.44% used in the calculations sounds reasonable. This is material which is the reject from hand sorting.

No. 2 This is a sample of a small sulphide ore dump. The figure of 0.12% WO_3 is somewhat lower than was expected. Two possible reasons stand out:

A. It is reported that the tunnel was driven some distance in 1936 before good ore was encountered. (See sample 3)

B. It is known that considerable hand sorting from these dumps has taken place, and it is reported that this particular dump was also sorted as it was made.

* No. 3 This is a sample of the larger sulphide dump just below No. 2. It has also been sorted somewhat. 0.44% WO_3 remaining from a reported original vein content of 0.784% WO_3 is only slightly lower than should be expected. (See note at end of this report.)

No. 4 This is a sample from the discovery pit on Black Pearl Claim No. 8. (See map No. 1). An inspection indicated that very little wolframite could be seen in the material now accessible. Sample No. 4 was taken to prove or disprove this point. Result was "trace".

No. 5 This is a sample from the discovery pit on Black Pearl Claim No. 7. (see map No. 1). It was taken for the same reason that sample No. 4 was taken. It should be noted, however, that sufficient work was not done at the time of the examination to expose the vein properly. It is entirely possible that, were the solid vein exposed properly, results higher than the reported "traces" would be obtained.

No. 6 This is a sample of some 50 lb. cut from channels of 5.9 ft. on each side of the shaft "c". (See Section of Workings on Black Pearl Group). It was taken 14 ft. below the collar of the shaft, which is the lowest point now accessible. This particular spot evidently was not what the old operators considered good ore because it was left in place while the vein below and to the sides had been thoroughly "gouged out". In spite of this, however, it should be noted that 0.80% WO_3 compares well with previously reported averages.

No. 7 This is a collection of various pieces of float and old dump from North Side Claim No. 3, approximately 150 ft. north-east of the 44 ft. tunnel (See map No. 1). Apparently there is another vein, or possibly two veins, which have not been explored. This can be considered a collection of specimens at this point which show the presence of tungsten and not a true sample. The assay was 2.54% WO_3.

No. 8 This is a sample of 3.1 ft. of the face of the 80-ft. tunnel on North Side Claim No. 3 shown on map No. 1. The assay of "trace" probably explains why the tunnel was stopped at this point. However, wolframite can be found on the dump, so possibly this was a barren spot in a vein which had been carrying tungsten.

No. 9 This is a sample of 0.4 ft. of the face of the 44-ft. tunnel on North Side Claim No. 3. The assay was "trace". The notes regarding sample No. 8 apply to this sample also.

In conclusion I may state that these preliminary results add strength to the assumptions made in the preliminary report of April 30, 1938. Samples 1, 2, and 3 and 6 are especially indicative. Step A in the recommendations of April 30th, namely, the accurate sampling of 180 feet nearest the face of the lower tunnel is the next job to be done in the exploration of the Black Pearl Group. The vein being naturally spotty, as formerly explained, will require a quite short sampling interval to give accurate results.

Respectfully submitted,

W

J. F. Frost

Samples numbered 4,5,7,8 and 9 are from parallel veins, as noted above.

*

REPORT OF THE BLACK PEARL
TUNGSTEN MINE
YAVAPAI COUNTY, ARIZONA

Foreword:

The purpose of this report is to present as briefly as possible, the information and data I have acquired as the result of my study and examination of the Black Pearl property which with the tunnel sampling extended over a period of several months; included are the results and deductions therefrom.

The sampling was partly under my direction. The surveying done for the map of the tunnel and profile was done by me as was the patent survey. In fact, it was while making the patent survey that I first became interested in the property, and thought of its possibilities.

I have not, in this report undertaken to recommend or to outline a method of mining and development or to estimate what this cost might be. There are many factors entering into these questions and entail more study and investigation then I felt like giving the matter at this time.

There are difficulties to be overcome and problems to work out, particularly in regard to the method of mining and the development of water. But they are not beyond the ability of good miners and engineers to solve.

Summary and Conclusion:

The main vein of the Black Pearl is an unusual and promishing occurrence of Wolframite (Tungsten) having a strong and well defined outcrop, averaging 3 feet wide and 2000 feet long. A 560 foot tunnel with an estimated 8000 tons of ore developed has an average assay of from 0.7 to 0.9 WO_3 with an approximate net value of $56,000.

Probable ore, - ore indicated between the outcrop and a level 40' below the present tunnel level has approximately 72,000 tons with a net value of approximately half a million dollars.

The owners and leasers from 1915 to 1933 have mined and shipped 62,000 pounds of tungsten having the remarkable average of 70% WO_3 by hand sorting. Most of this came from shallow workings all along the outcrop. This ore was mined and sorted by hand and packed down the mountain.

an
It is/interesting fact that no capital has ever been put into the property. Roads, trail, buildings, tunnels etc. have all been financed from the sale of Tungsten; with, I understand, a good profit left for the owners.

The market for Tungsten has been steadily increasing for the past 4 years to the present price of $20.00 per unit. A unit being 20 pounds or 1/100 of a ton for a standard content of Tungstic acid--60% WO_3. If the supply from China should be cut off Tungsten would command a high price in this country. While considerable Molybdenum is being used as an alloy in the manufacture of steel it does not take the place of Tungsten for high speed tool steel.

Because of the purety of its wolframite the Black Pearl product, I understand, can be sold at a premium direct to steel companies, under contract, rather than to ore buyers.

The vein shows not only unusual length but a remarkable persistence in width throughout its entire length. The geological indications and mineral associations are favorable as are in the physical indications.

The mystery is that the property has not been snapped up before now. The answer to that is--1/2 of the ownership has repeatedly refused to sign up with anyone under any conditions.

I believe the black Pearl property is one of unusual merit with real possibilities and that it may develop into one of the greatest tungsten mines of this county if it is properly handled.

GENERAL INFORMATION:

The Black Pearl property consists of 11 patented and 5 unpatented lode claims,--Mineral Survey No. 4186--located in the Eureka Mining District, covering parts of Section 7, 8, 12, 13 & 18, T 15 N R 7 & 8 W. Yavapai County, Arizona. It consists of the Black Pearl and North Side groups as shown on the claim map included with this report.

The mine is located 57 miles via the Williamson Valley and Camp Wood road, in a northwesterly direction from Prescott. At 25 miles from Prescott the road turns left and westerly onto the Camp Wood Road and in 15 miles is within the pine forest of the Camp Wood country. At mile 46.5 the Tungsten Mine road leads southerly from the Camp Wood Road. Thus far the road is very good, negotiable easily in two hours. The road from here on is over a winding ungraded and unsurfaced road over a "malapai" Mesa of varying grades. At mile 54 the road reaches the rim of the Mesa. Below and to the south lies Bear Flat and the head waters of Loco Creek. Farther south stands Tungsten Mountain like a sentinel rising above the surrounding country.

The present road down from the Mesa rim is very steep for a short distance, having a grade in places as high as 23%; but when the road is in good repair can be negotiated with a good car or light truck. This road could easily be carried more gradually down the side of the Mesa. It is two miles from the top of the rim to the mine camp at Bear Flat; from here it is one mile by a good trail to the main tunnel on the west slope of Tungsten Mountain. This route is generally closed by snow during a part of the winter months.

The CCC or some other alphabetical agency of the government has started a road, which if completed will come within a mile or so of the property and would join the road to Camp Wood and a saw mill. This would connect the mine with Hillside, the nearest roailroad point; and is a part of the Hillside Mine road. The total distance to Hillside would probably be about 35 miles and the road would be open the year around. I understand the road has been constructed as far as Wild Horse Basin on Boulder Creek within about six miles of the mine. This, I understand would not be a difficult road to build into the property. Included with this report is a map showing the location of the mine with reference to Prescott and Hillside.

The elevation at Bear Flat is approximately the same as Prescott, one mile above sea level. The portal of the main tunnel is about 520 feet above Bear Flat or 5,900 feet elevation. The top of the mountain is 165 feet above the portal of the tunnel or approximately 6000 feet elevation.

The regional topography is that of the irregular high mesa plateau of Basalt or "Malapai" flows, broken and distorted by earth movements and intrusions of granites, pegmatite, and other chrystalline rocks, presumably of pre-cambrain origin.

The property is located over the major part of Tungsten Mountain, which rises above the surrounding mesas. The drainage is to Boulder Creek and Loco Creek at the base of the mountain. Both creeks flow to the Santa Maria River but by quite different routes.

Mine timbers can be obtained from a saw mill off the Camp Wood road about 20 miles from the mine. Tungsten Mountain has a scanty growth of cedar and pinon.

Water for domestic use is obtained from a spring at the camp on Bear Flat. Boulder Creek has water all year, although very low during dry seasons; showing only in places as running water. There is probably a fair underground flow even during dry seasons, and I believe sufficient water can be developed for milling purposes from Boulder Creek. If it was found advisable to build the mill at the mine workings the lift would be about 650 feet; the length for a pipe line approximately 4,000 feet.

Power would have to be developed as there is no transmission line within each of the property.

The surface equipment consists of a blacksmith shop, mine track, rail and cars at the tunnel portal, two bunk houses, and a warehouse at Bear Flat.

There are no mines operating close to this property. Some work has been done on a Tungsten showing south and adjoining the Black Pearl.

The largest mines in this district are the Hillside and Bagdad, 10 to 15 miles southwest; shown on the location may included as a part of this report. The Hillside Mine, a gold mine, has been a big producer. The Bagdad is a large low grade copper deposit in the development stages. There are many other smaller properties in this section of the Eureka Mining District.

History and Ownership:

The property was located in 1914 by William Conners. Mr. Homer R. Wood and William Lawler acquired a half interest at that time. Mr. Lawler died leaving his interest to his widow and son. The present owners are: H. L. William, Joseph P. Walton, and William Stephenson, a total of $\frac{1}{2}$ interest; Mary Lawler and John William Lawler, the remaining $\frac{1}{2}$ interest.

The title of the property is in good shape. The government passed on that before recently issuing patent to the property.

The property has a unique history in that all expenditures have come out of the profits. No capital has ever been put into the property. The road, trail, building, small tunnel and shafts have all been financed from the sale of Tungsten, which was mined almost from the grass roots, hand drilled, sorted and shipped by pack burro down the mountain and by truck 57 miles to Prescott. Thence by rail to eastern buyers.

Mineralization and Geology:

The main vein has a length of almost 6,000 feet with Tungsten showing on the outcrop for a distance of 2,000 feet. Beginning at the shaft and the portal of the main tunnel on the west slope of the mountain, the outcrop has been opened up at intervals along its entire length, extending over the top of the mountain and down the east slope.

The profile map made by Homer R. Wood, part owner at that time, and a mining engineer of excellent reputation, gives a very graphic picture of the actual development and production from this vein. Apparently, only the surface of this remarkable deposit has been scratched. Mr. Wood's map shows a total of 62,100 pounds of Tungsten mined and shipped from 1915 to 1935, having a most unusual high content of over 70% WO_3

This work was all done by hand drilling and rather crude timbering. Most of the old workings are badly caved.

The work done by the leasers is included in the profile map by Mr. Wood. Their method was to shoot very light and sort out the coarse Tungsten underground. The balance went to a sorting platform where it was cobbed and sorted.

Mr. WOod's map shows that 300 pounds of Tungsten was mined from the shaft on the north side No. 4 claim. See my claim map for location.

"1,185 pounds of Tungsten from placer" see map, came from the side slope of Tungsten Mountain as a result of erosion from the ledges.

The direction or strike of the main vein is S74°E. The dip almost vertical in places and varying from 75 to 85° S. W.

The width of the main vein varies from 1.7 to 6 feet. The measurements taken by me at accessible cuts and in the ain tunnel are shown in the small profile map accompanying this report. It is not possible to give a definite agerage from these measurements as they could not be equally spaced. I believe that 3 feet is a conservative and fair average for the width of the main vein for a distance of 2,000 ft.

The deepest shaft according to Mr. Wood was about 65 feet. The main tunnel is now in 560 feet from the present portal; at the face it is 120 feet vertical below the surface outcrop. Ore was found 40 feet below the main tunnel in the stope off the shaft near the portal and according to Mr. Wood's profile map produced 900 pounds of Tungsten. This is therefore a depth to which ore is indicated below the present level.

Other veins found are indicated on the claim map in color, showing Tungsten at a number of other workings on the property. There is Tungsten float over a considerable area of the North slope of Tungsten Mountain. The vein system has not been fully worked out but a series of parallel veins is indicated. A half mile tunnel from the base of the mountain would cut the main vein at a depth of 500 feet below the present tunnel and would intersect other veins at lesser depth. This possibility is worth investigating more fully.

The Tungsten occurs in the form of wolframite, a tungatate of iron and manganese, black in color with a metallic luster. Hence the name Black Pearl.

The Gangue material, that is the material associated with the tungsten in the vein is largely quartz, mica, and pyrite. Veins of this type are classed as high temperature deposits, resulting from the metamorphism of the granitite and pegmatite. "Such metamorphic products when essentially consisting of quartz and mica are called "greisen"--Kemp.

A pegmatite is essentially a coarse grained granite in which the constituents have crystallized into large crystals, due to slow cooling under great heat and pressure. Associated are many rare minerals. Cassiterite or tin is mined in Goffney, South Caroline in Pegmatite; also in New South Wales, greisen in Pegmatite contains casseterite associated with wolframite (tungsten) and molybdenite, . Lindgren "Mineral Deposit," page 769.

Because of the fact that wolframite and casseterite are commonly associated in pegmatite dykes of this character and formation, see Lindgren, (page 621-764) there is at least a possibility that cassiterite will be encountered with further development at depth.

Molybdenite is present and shows in many of the specimen samples taken. It may be practicable to recover it in the milling process.

Another rare mineral found at one of the cuts on the outcrop was bismuthinite. As stated, a sample I took here assayed 245 oz. of silver per ton. This was at the cut shown on the claim map at the intersection with the Hematite vein.

Because of the manner in which deposits of this character were formed it is not unreasonable to assume that the veins will have considerable depth. Especially so considering the length of the outcrop and width of the vein.

SAMPLING:

The results of the sampling undertaken under the direction of Mr. Sayre and myself in 1936 are fully shown on the assay map of the main tunne.

The tunnel had caved in places and it was necessary first to clean it out and retimber to the face-381ft.

It was decided that the best way to sample would be to advance the tunnel a definite distance and get a uniform cut from each car. It was decided to shoot rather heavy to break any large chunks by hand while loading the car. The car was dumped into a shoot with a slot in it about 3 inches wide, for the sample. This was dropped onto a shhet iron covered platform where the sample was broken to about 1 inch by hand, coned and quartered to approximately a 90 pound sample.

These "head" samples were taken to the sampling works at Prescott where they were ground to $\frac{1}{4}$ - $\frac{1}{2}$ inches size..

At the sampler they were first ground to $\frac{1}{4}$ - $\frac{1}{2}$ inch. Mixed by a large Jones splitter 3 times. Then cut once. Reject saved; other $\frac{1}{2}$ ground in a cone pulverizer to a sand fineness. Again mixed in a Jones sampler and cut by a smaller cone sampler to about a 3 to 4 lb. sample.

The reject for the shute (that which did not drop through the slot for the samples) passed to a sorting platform where the Tungsten was cobbed and sorted. The reject from this or "tailing" was sampled by taking every 20th shovel full and this sample coned and quartered to about 90 pounds for the "tail" samples, which was sacked and run through the Prescott sampler as described for the "Head."

Lots 1 and 2 were handled this way, while lots 3 to 6 inclusive were shipped by freight direct to the assayer rather than have the expense and time of running though the Prescott sampler.

By more careful coning and quartering, the size of the samples was reduced to approximately 50 pounds each.

There were two miners and one sorter doing all the work, hand drilling, mucking, packing, and trucking to Prescott. It had taken $2\frac{1}{2}$ months to sample 54 feet of tunnel--represented by 53 haad samples and 24 tail samples.

* It was decided to get in a portable compressor. In order to speed up the work, to see more of the vein, and to get more samples, we changed the method as follows: Installed the compressor and a mounted jack hammer, increased the force to four men and a packer, changed the slot to a horizontal position in the shute, installed a small crusher to reduce the entire slot-sample to $\frac{1}{4}$ inch, mixing and cutting through a Jones sampler, or splitter.

This did not leave time for sorting. However, about 100 pounds of Tungsten was recovered from the side of the dump by the top man, when he was not busy cutting samples.

Samples of four lots, shipments Nos. 6 to 10 inclusive as shown on the tunnel sample map, were taken in this way. It represents a distance of 126 feet of the tunnel.

A copy of the assay return for all the samples included in lots 1 to 10 inclusive are a part of this report. A total of 126 samples from 180 feet of tunnel.

The sampling and work done in the tunnel showed that the walls, foot wal in particular, is soft and caved badly in places. This resulted in badly diluting the sample with waste material as is shown by the variable "numbers of cars" for the "foot advance" in the table results, on the tunnel sample map.

To correct this I measured the tunnel at regular intervals and calculated as follows: The average of all the samples, that is the foot assay value divided by the foot advance, equals 0.504% WO_3. The factor of 1.4 is the ratio of the sample width to the acutsl width of the vein. Which, multiplied by the average of 0.504 equals 0.705% WO_3 as the value of the vein. See tunnel assay map.

I carried this a little farther with respect to the last four samples. I measured the area mined and determined the volume by using the prismoidal formula. See table at upper right hand part of tunnel sample map. This gave a result of 0.72% WO_3.

Mr. Sayre and I arrived at a result of 0.784% WO_3 on the first eight samples as follows: See following page 12-A.

Mr. Wood calculated the total tons of ore mined to 1935 and determined the average as 0.922% WO_3. This was largely from ore closer to the surface where the iron was oxidized and little or no sulphides showing, which would give a higher per cent of WO_3 and check fairly close to the 0.784% WO_3 average of the sulphides ore in the tunnel.

The sampling indicated that the wolframite is disseminated all through the vein but that it is more highly concentrated in lense or shoots throughout the vein, and intimately associated with the quartz, pyrite and mica. Many large solid pieces of pure wolframite showing crystal faces were recovered. I have a specimen in my office which weight 4 3/4 pounds. A large specimen was given away. Mr. Wood reports a specimen which weighed approximately 80 pounds, found wholly encased within about 8 inches of mica on one of the walls.

The sampling also shows that it is impossible to make much of a recovery by hand sorted, but that the entire vein can be mined and milled with average heads of not less than 0.7% WO_3. Many tail samples, after the Tungsten had been sorted out by hand, ran high in comparison with the corresponding head sample.

Ore Deposits:

The ore developed by the main tunnel 560 feet with a vertical height of 120 feet from the face of the tunnel to the surface outcrop, and width of approximately four feet would indicate at least 8,000 tons of ore partly blocked out after making an allowance for the ore already stoped out.

For the "Probable Ore," or the ore partly blocked out, I have assumed ore to a depth of 40 feet below the present main tunnel level. The horizontal length of which is 2,000 feet and the average width as stated, I have estimated to be three feet (assuming 12 cubic feet per ton of ore in place) the total ore above a level 40 feet below the present tunnel level would be $3 \times 289{,}000 \div 12 = 72{,}250$ tons.

The "Probable Ore" is dependent on the depth of the vein. As previously discussed under geology, indications for considerable depth are good. If the depth and length are equal to the showing of the outcrop, which is entirely within the realms of possibility, there is indicated an ore body of 2,000 feet long, 2,000 feet deep, and three feet wide or the equivilent to one million tons of ore. Even with tungsten at the present price this would be a first class bonanza.

Tonnage and Value of Ore:

Ore developed--8,000 tons. Ore partly blocked out, or probable ore 72,250 tons. Possible ore, indicated by the length and width of the outcrop and the geology, 1,000,000 tons.

Using the conservative fugure of 0.7% WO_3 and the present quotation of tungsten of $20 a unit for 60% WO_3. This is equal to $14 a ton ore. Assuming $7 as the total cost for mining, milling, development, and transportation, there would be a net profit of $7 or a value as follows: Ore developed 7 x 8,000 =$56,000. Probable ore, 7 x 72,250=$505,750. Possible ore, 7 x 1,000,000 = $7,000,000. Assuming the production of 1,000 tons a month to start, with a 50 ton mill, the ore developed would be recovered in about 8 months.

Mining:

As stated in my introduction I will not attempt to outline the method of mining. It is a matter to be worked out in a practical manner by experienced miners.

The walls caved quite badly in places in the present workings, apparently the result of surface waters and oxidation. However, I do not consider it bad enough to be a serious obstacle or an expensive one, and may correct itself entirely with greater depth below the surface. It may be found advisable to leave pillars of low grade ore for support in the stopes and these "pulled" later.

I do not anticipate any trouble from underground waters. The mountain is drained to the level of Boulder Creek, a vertical distance of 650 feet, to the indicated ground water level. In the spring there will be some surface water to take care of but this will be of little consequence as the mine is almost at the top of the mountain.

Milling:

The milling would be comparatively simple. A combination of quartz, mica, pyrite, and wolframite can be easily separated by a simple process of concentration. Coarse grinding followed by jigs, classification finer grinding, followed by tables, I think will give a very good recovery. Perhaps some provision made for molybdenum, if found in paying quantities. However, it would be advisable to have a test run by a competent metallurgist before designing a mill.

In the milling operation, I believe it will be found advisable to sort out the coarse tungsten from a short sorting belt located between the bin and the crusher. Probably the man at the bin and crusher could do this.

It may also be practical to sort out some of the large high grade pieces underground as was done by the leasers.

Market for Tungsten:

Tungsten is used largely in the steel industry and molybdenum has taken its place as an alloy in certain steels. I saw a letter from the president of one of our large * steel companies stating that in his opinion nothing at present took the place of tungsten as an alloy for high speed tool steel.

The largest supply of Tungsten comes from China where it is cheaply mined by Chinese Coolies for export. If Japan should cut off this supply or if and when the source is exhausted, tungsten will command a high price in this country. During the World War it reached a little over $100 a unit or $5 a pound.