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PRINTED: 01/15/2003

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES AZMILS DATA

PRIMARY NAME: COCHISE

ALTERNATE NAMES:
DREADNAUGHT

COCHISE COUNTY MILS NUMBER: 619

LOCATION: TOWNSHIP 23 S RANGE 24 E SECTION 9 QUARTER SE
LATITUDE: N 31DEG 26MIN 29SEC LONGITUDE: W 109DEG 54MIN 26SEC
TOPO MAP NAME: BISBEE - 7.5 MIN

CURRENT STATUS: EXP PROSPECT

COMMODITY:
COPPER SULFIDE
COPPER OXIDE
SILVER
GOLD LODE

BIBLIOGRAPHY:
AZBM FILE DATA
COPPER HANDBOOK 1904
TENNY, J.B., 1927-29, HISTORY OF MINING IN ARIZONA
MINERALOGICAL RECORD, "BISBEE" ISSUE, ARIZONA III, P. 279, SEPT.-OCT. 1983
ADMMR COCHISE FILE
AGS 1988 FALL FIELD TRIP


BISBEE
Fire Sta No 2
Lincoln School
St Patrick School
Courthouse
Horace Mann School
Quality Hill
Castle Rock
Hosp
City Hall
PO
Copper Queen
School Hill HS
Central School
Observation Point
Red Hill
5896
Chihuahua Hill
Youngblood Hill
Jones Hill
Dubacher Canyon
Copper King Canyon
Cochise
Copper King
5751
Hill
Mural Hill
6502
Ruins
Brewery Gulch
Moon Canyon
Swimming Pools
Wildcat Canyon
BM 5954
6436
6174
6113
6374
6091
Bucky O'Neill Hill
Hendricks Gl
Quarry Canyon
Queen Hill
Sunrise
Flume
Sacramento Hill
Copper King
Sacramento Pit
LAVENDER PIT
5000
Conveyor
Tailing Thickeners
Tailings Dump
Uncle Sam
Cuprite Gulch
Spray
Shattuck
Water
Gardner
Irish Mag
Silver Bear Gl
Silver Bear Ridge
Oliver
Old Lowell Mine
Lowell
Hoatson
Tailings Dump
Powell
Congdon
Lucky Jack
Water
Evergreen Cemetery
Denn
Saginaw
Mule
Lowell
Fire Sta
Campbell
Tailings
Escalado
VABM Lime
Mount Reilly
6320
Wolverine Mines
Dallas
5610
Galena
Radio Tower
Bakerv
Oil
Greenwa School
FLUME
Briggs
Cole
Water
White Tail Deer
Night Hawk
South Bisbee
Water
Oil
Water
Galena
Tintown
Warren
Oil
Contact
Boras
Cole No 3
Wade Hampton Pit
VABM Don Luis
5540
Calumet & Cochise
Water Tanks
Cochise
17
16
15
10
20
21
22
92

~~[struck out in red]~~ (F) COCHISE CO. K ... COCHISE

74025184
Taylor
101 50 500

Office of State Mine Inspector

705 West Wing, Capitol Building
Phoenix, Arizona 85007
602-255-5971

STATE MINE INSPECTOR
SEP 28 1987

NOTICE TO ARIZONA STATE MINE INSPECTOR

In compliance with Arizona Revised Statute Section 27-303* we are submitting this written notice to the Arizona State Mine Inspector (705 West Wing, Capitol Building, Phoenix, Arizona 85007) of our intent to start/stop (please circle one) a mining operation.

COMPANY NAME LONGYEAR COMPANY

CHIEF OFFICER Allen Krause, Mgr. S/W Zone, Contract Drilling Div.

COMPANY ADDRESS 7773 W. Seldon Lane, Peoria, Az. 85345

COMPANY TELEPHONE NUMBER (602) 486-1881

MINE OR PLANT NAME Copper Queen Branch

MINE OR PLANT LOCATION (including county and nearest town, as well as directions for locating by vehicle)

Township 23S, Range 24E, Section 10, Bisbee, Ariz.

TYPE OF OPERATION Core drilling PRINCIPAL PRODUCT Copper

STARTING DATE 8-24-87 CLOSING DATE Unknown

DURATION OF OPERATION Unknown

PERSON SENDING THIS NOTICE Allen Krause

TITLE OF PERSON SENDING THIS NOTICE Mgr. S/W Zone, Contract Drilling Div.

DATE NOTICE SENT TO STATE MINE INSPECTOR 9-24-87

*A.R.S. Section 27-303 NOTIFICATION TO INSPECTOR OF BEGINNING OR SUSPENDING OPERATIONS: When mining operations are commenced in any mine or when operations therein are permanently suspended, the operator shall give written notice to the inspector at his office prior to commencement or suspension of operations.

2/80

COCHISE COCHISE COUNTY

MG WR 1/19/88: Learned that the 170-million ton copper deposit being drilled by Phelps Dodge in Bisbee (Cochise Development group - file)Cochise County is owned primarily by the company. Approximately 25 million tons are on the Muheim-Shattuck ground.

NJN WR 3/4/88: I contacted Steve Eady, geologist for Phelps Dodge, at their Bisbee Cochise project. Cochise is the name for the new reserve that they have drilled out over the last year and which they will continue to do fill-in drilling this year. Of interest, considering that the property is being considered as a leaching project, is the fact that the deposit is mostly copper sulfides, not oxides. Mr. Eady would not release additional data, referring us instead to press releases by Mr. Durham, president of Phelps Dodge.

Bisbee North ?

COCHISE DEVELOPMENT CO. CLAIMS COCHISE COUNTY

Mr. McCarthy (recently registered geologist) Bruce T. Amos and another man apparently owner or part owner of Bisbee property near Lavender Pit called re the property north of Lavender Pit. FPK 7-30-59

Cochise Development Co. claims

Silver Queen	Copper Wedge	Carolina
Bessie	Dreadnaught	Paragon
Red Hill	Helvetia	McGinty
Key to Situation	AIIH	Wec Vee Wee Wee ?
Leviathan		

Cochise Development Co.
Anderson - Newheim

Henry George	Dreadnaught	Pajaro
Jack of Clubs	Yo Tambien	
La Louise	Nancy Hawks	
Hill	Sulphide	

OCT36-N

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES

VERBAL INFORMATION SUMMARY

1. Mine file: COCHISE
2. Mine name if different from above:
3. County: Cochise
4. Information from: Steve Eady

   Company: Phelps Dodge Corp.

   Address: Hwy. 92

   Bisbee, AZ 85603

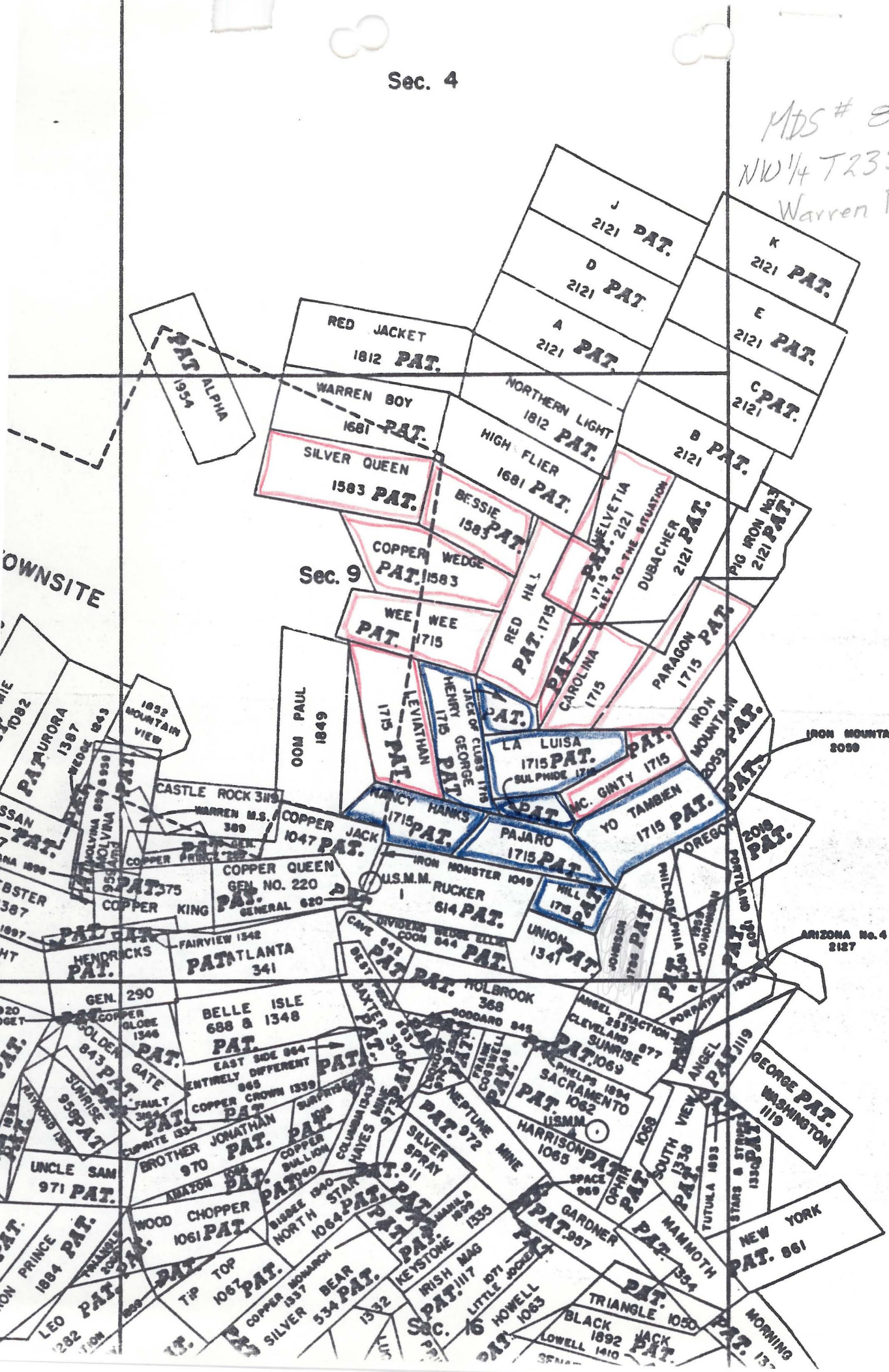
   Phone: 432-3621

5. Summary of information received, comments, etc.:

Phelps Dodge geologists and engineers are conducting a pre-feasibility study for management on the Cochise deposit at Bisbee. A production decision is expected to be made during the first quarter of 1989. This 170 million ton deposit's mineralization consists primarily of a chalcocite blanket. Exposures in drill roads often show only 15' or less of leached capping till reaching the ore zone.

Date: October 22, 1988

Nyal J. Niemuth, Mining Engineer


Sec. 4
MDS # 801
NW 1/4 T23S R24E
Warren District
J 2121 PAT.
D 2121 PAT.
A 2121 PAT.
K 2121 PAT.
E 2121 PAT.
C 2121 PAT.
B 2121 PAT.
RED JACKET 1812 PAT.
ALPHA 1954 PAT.
WARREN BOY 1681 PAT.
NORTHERN LIGHT 1812 PAT.
HIGH FLIER 1681 PAT.
SILVER QUEEN 1583 PAT.
BESSIE 1583 PAT.
COPPER WEDGE PAT. 1583
Sec. 9
HELVETIA 2121 PAT.
1715 KEY TO THE SITUATION
DUBACHER 2121 PAT.
PIG IRON No. 3 2121 PAT.
WEE WEE PAT. 1715
RED HILL PAT. 1715
CAROLINA 1715 PAT.
PARAGON 1715 PAT.
LEVIATHAN 1715 PAT.
HENRY 1715
JACK OF CLUBS 1715
GEORGE
PAT.
LA LUISA 1715 PAT.
SULPHIDE 1715
MC. GINTY 1715 PAT.
IRON MOUNTAIN PAT.
IRON MOUNTAIN No. 2 2059
NANCY HANKS 1715 PAT.
PAJARO 1715 PAT.
YO TAMBIEN 1715 PAT.
OREGON 2018 PAT.
CASTLE ROCK 3119
WARREN M.S. 389
COPPER JACK 1047 PAT.
COPPER QUEEN GEN. NO. 220
IRON MONSTER 1049
U.S.M.M. RUCKER 614 PAT.
HILL 1715 PAT.
COPPER KING PAT. 375
GENERAL 620
CAVE 642
DIVIDEND SIDEDE ELLEN COON 844 PAT.
UNION 1341 PAT.
ARIZONA No. 4 2127
FAIRVIEW 1342
HENDRICKS PAT.
ATLANTA 341 PAT.
HOLBROOK 368
GOODARD 848
GEN. 290
BELLE ISLE 688 & 1348 PAT.
GOLDEN GATE 843 PAT.
EAST SIDE 864 ENTIRELY DIFFERENT 865
COPPER CROWN 1339
SUNRISE 959 PAT.
FAULT 1334
BROTHER JONATHAN 970 PAT.
UNCLE SAM 971 PAT.
WOOD CHOPPER 1061 PAT.
TIP TOP 1067 PAT.
BEAR 534 PAT.
NEPTUNE 972 PAT.
SILVER SPRAY 911
PHELPS 1894 SACRAMENTO 1062 USMM
HARRISON PAT. 1065
SPACE 969
GARDNER PAT. 957
CLEVELAND SUNRISE 877 PAT. 1069
ANGEL FRACTION 2837
ANGEL PAT. 1119
GEORGE WASHINGTON PAT. 1119
SOUTH VIEW 1338 PAT.
MAMMOTH PAT. 1364
NEW YORK PAT. 861
TRIANGLE 1050 PAT.
BLACK JACK 1892 PAT.
LOWELL 1410
HOWELL 1063
IRISH MAG 1117 PAT.
KEYSTONE
MORNING
Sec. 16
OWNSITE

Document 1
Cochise County

DREADNAUGHT
FILE

Morenci, Ariz., December 11th, 1923.

Dr. Lewis R. Brown,
Brophy Building,
Douglas, Arizona.

Dear Sir:

Pursuant to your request, I have carefully examined the Dreadnaught Group of claims located in the Warren Mining District, Bisbee, Arizona, and, herewith respectfully submit my report thereon:

This group of patented claims, located as they are in one of the outstanding mining districts of the Southwest, with excellent values showing near the surface, and an ore-body encountered by the one drift on the Silver Queen claim, presents one of the most favorable prospects that I have reported on in the past several years.

Before going into this report from a technical standpoint, I further wish to advise that I have learned from reliable sources that Mr. Tenney Tinney, formerly Chief Geologist for the Copper Queen Mining Company, had made an examination of this group of claims and reported favorably on them.

This group of claims known as "The Dreadnaught Group", consisting of the Red Jacket, Warren Boy, Silver Queen, Northern Light, High Flier, Bessie, and Copper Wedge, is located in and adjoining the Bisbee townsite. They are approximately, fifteen-hundred (1500) feet in a northernly direction from the Czar Mine; one of the first and richest producers of the district. Several other properties which have been bonanzas, and which are still producing, are located in close proximity to the Dreadnaught claims and the Czar mine.

description

The country rock common to this particular group of claims is a pre-Cambrian schist with granite intrusives in the form of dikes. The ore deposits of the Bisbee district occur in the country rock which was intruded in pre-Cretaceous times by a large mass of granite porphyry. Dikes and reticulating fingers of the molten rock were forced into the invaded rock far from the intrusive center. It is to the hot solutions, from the same magmatic reservoir as the porphyry, which followed closely upon the intrusion that the mineralization of the district is attributed.

The mineralizing solutions rendered powerful by their high temperature and great pressure penetrated to great distances following the most available line of weakness, such as a fault, or a fractured zone. When the right conditions prevailed with respect to temperature and pressure, the minerals were deposited. As a general rule, the out-crops and surface showings in the district are not striking.

Traversing the Silver Queen and the Bessie claims are two dikes, standing out in bold relief from the country rock, and intersecting on the Silver Queen Claim.

Seventy-five (75) feet in a northernly direction from this intersection of the dikes, a small drift, approximately fifteen (15) feet in length, has been driven toward the intersection disclosing chalcopyrite mineral throughout its length.

From the West, a drift, two-hundred (200) feet long has been driven to the intersection, disclosing a chalcopyrite ore-body carrying good values in gold, silver and copper; assays of which appear below, as well as a settlement sheet return for ore shipped from the drift.

At the end of this drift, a winze has been driven to a depth of thirty (30) feet, and ore is encountered throughout its depth.

A few hundred feet to the west of the dike intersection, and, a considerable distance to one side of the dike, a bore hole has been drilled to a depth of one-hundred and ninety (190) feet. This bore hole also, shows copper values throughout. A few hundred feet to the south of the dike intersection on the Copper Wedge claim, a very promising outcrop of chlorides are showing.

From the general geology of the district, and the mineral showings at or near the dikes and dike intersections, I am reasonably certain that this particular ore deposit is closely associated, geologically, with the formation of the dikes, and I would expect the deposit to extend to a great vertical depth, possibly, a few hundred feet or more in width with values decreasing as the ore approaches the outer limits of the ore-body.

The topography is typical of the Bisbee district; towering hills, cut by deep ravines, and numerable washes affording good mill sites. The elevation of the claims varies from 5,300 feet to 6,000 feet. The vegetation is typical of the district, consisting for the most part of shrubs and semi-desert plants. There are but few trees on the claims, as nearly all the soil has been eroded, leaving the country rock exposed at some places, while at other places, the rock is covered by weathered rock fragments.

It would appear at first sight, that it would be difficult to handle transportation, but a more thorough examination reveals that a road or railroad could be constructed to the claims from the east. Possibly, coming in near the Shattuck-Denn mine, which is situated in a similar position from a geological standpoint. The climate of the district is very mild, as would be expected.

From the small amount of exploration work that has been done, it is impossible to attempt to calculate the amount of ore present. This can readily be ascertained by a thorough diamond drilling campaign, or, by further exploration work such as has been done.

During my examination of the property, I took a sample of the ore from the winze, which assayed, as follows:

		Value per Ton
GOLD	.14 oz.	2.80
SILVER	1.50 oz.	.87
COPPER	15.50 %	45.00
		$ 48.67 PER TON.

When the winze, described above, was driven in 1913, a shipment of 3,300 pounds of ore, taken from the winze, was made to the Phelps Dodge Smelter at Douglas, Arizona, which assayed, as follows:

GOLD	----------	Trace
SILVER	----------	1.70 oz.
COPPER	----------	17.58 %
IRON	----------	30 %
INSOLUBLE	----------	33.00 %

This netted the shipper, $35.06 per ton after the treatment, transportation and sampling charges were deducted.

This settlement sheet reveals, that the ore has a very low treatment charge, and, as the smelter at Douglas is only twenty-six (26) miles away, with good transportation facilities - the transportation charges are, also, very reasonable.

It is not expected that copper, under normal conditions, will ever again go under ten (10¢) cents, and, at present, one expects to approach twenty-five (25) cents in the next few years, and then fluctuate for the most part between fifteen and twenty-five cents; the minimum of which would net a very profitable return to even a small operator on this type of ore.

Skilled Mexican mine labor is plentiful in the Bisbee district at a nominal wage. Labor disturbances are practically unknown.

Due to the proximity of the property to Bisbee, power, water, timber, explosives and other necessary miscellaneous items can be secured at a minimum cost, and in any quantity desired.

In the further exploitation of this property, I would advise a thorough diamond drilling campaign to delineate the ore body, this, followed by a vertical or inclined shaft as the ore-body and topographical features indicate.

It would appear from the nature of the rock and mineral, that this ore would be susceptible to the incline top slicing or caving method, but this can be determined only by trial.

Along this line, I would further advise that a competent mining engineer be engaged at the beginning of operations to determine the exact location, size and kind of shaft best suited for the property and follow his suggestions in regards to development for the maximum returns on the capital invested on the exploitation of the property.

Until further exploration work has been done, it would be impossible to estimate the maximum size of mine that should be developed on the property. From the ores exposed, a mine with a capacity of one-hundred (100) tons per day should prove very profitable, particularly so if the ore is susceptible to caving. A mine of this size would, probably, require a three to four-hundred foot shaft with two or more levels of a hundred and fifty (150) feet each. This amount of development work, with preliminary diamond drilling, and the machinery necessary to operate the mine successfully would cost from sixty (60) or seventy-five (75) thousand dollars.

If diamond drilling warrants operations on a larger scale, the costs of development would be in the same proportion.

It is interesting to note that the Bisbee district has produced, todate, well over $500,000,000. worth of metals, and the total dividends paid approximate $150,000,000. It is further interesting to note that the ore area has produced 2,200,000 pounds of copper per acre.

This property, in my estimation, can well be considered as being inside the ore area due to its close proximity to other producing mines and the mineral showings. Why it has not been further developed todate, I am at a loss to account for, unless it is that the companies operating in the district have merely surrounded their ore-bodies by the purchase of un-developed ground, and their operations have not extended as far as these claims.

From the above figures of the number of pounds of copper produced per acre, one can readily understand why the companies operating there are, for the most part, carrying on their operation on a relatively small area.

The writer wishes to acknowledge his indebtedness to Mr. H. F. Brown and F. W. Giroux, of the Tejon Company, who have gone over the property with me, and have given me valuable information as to the limits of the property; the general geology of the district, and of the property in particular.

Respectfully submitted,

George E. Zeigler

GEORGE E. ZEIGLER, E. M.

GEZ/llb.

HARRISON SCHMITT
Mining Geologist
Cottage Sanatorium Road
Silver City, N. M.

August 20, 1956

Muheim and Shattuck
Box 807
Bisbee, Arizona

Subject: Evaluation of claims of the Cochise Development Group, and others at Bisbee, Arizona

Geography

The claims and area in question lie adjacent to the city of Bisbee on the east and actually include some of the city particularly along Mule and Brewery gulches. Most of the claims discussed lie north of Mule gulch and the Dividend fault. The area is cut by three nearly north-south gulches, Brewery, Dubacher and Jones. These flow south into the east-west Mule gulch.

The main group of claims is comprised of fifteen patented claims of fractional to full sizes. They are contiguous, but have an irregular outer boundary.

Geology

The southeast part of the group covers a part of a granite porphyry mass called the Bisbee Stock. The rest of the area of the claim to the west is largely a terrain of moderately to strongly altered schist. This according to Ransome (USGS Folio 112, p. 2, 1904) was probably originally arkosic sand or silt. It is now largely composed of quartz and sericite with minor amounts of tourmaline, garnet, chlorite, magnetite and sulphides. There is also minor feldspar. The dominant schistosity is reported to be around N25E with high angle dips.

This schist has been strongly sulphidized with the introduction of copper and possibly some iron although some or all of the iron seems to have been derived from the original magnetite. The most strongly mineralized areas are marked by quartz veins up to several inches in thickness but usually smaller.

The oxidation of the pyritized ground has been variable as to depth. The sulphides outcrop at a few places. Oxidation appears to be thorough as deep as 43 ft. in Muheim DDH No. 3. It extends only as deep as 16 ft. in Muheim DDH No. 4, but this hole started

in the bottom of Jones gulch. In general oxidation may be relatively shallow in this area north of the Dividend fault, but the sparce data from drill holes and shafts cannot rule out deeper oxidation where structural breaking is especially intense.

Mr. J. B. Tenney in his report of January 14, 1953, describes a central area in the claims in question that appears to be a core of pyritic ground with minor chalcopyrite. The basis used was predominate oxidized iron minerals largely hematite and jarosite. This "core" invades the porphyry as well as the schist. I have checked and agree with the outlines of this area in general and in places in detail. The enclosed map outlines this and other pertinent features of the geology.

Wrapped around the south and west contacts of this pyrite core is a band of oxidation in which a brown limonite mineral probably goethite predominates over hematite and jarosite. As is well known the brown limonite tends to form during the oxidation of the sulphides when copper minerals are present. The red and yellow iron oxides tend to form when pyrite dominates. This belt appears to be nearly continuous from the southwest end of the Yo Tambien claim westward through the Pajaro, Rucker and Nancy Hanks claims. Thence it includes the Copper Jack claim and extends northward along Brewery gulch and includes the west parts of the Leviathan and Wee Wee claims and on north to the Copper Wedge claim.

Within this belt there are three areas that form their surface appearance, and in one case from underground data, suggest the possibility of disseminated copper mineralization even enriched copper mineralization. The surface evidence includes copper stains, especially strong structural breaking, especially strong alteration and more abundant quartz veins. The country rock, furthermore, is softer in these areas and may contain clay as well as sericite. All three areas are marked by major to minor erosional depressions.

A favorable area, here called the "A", covers the east part of the Pajaro and the southwest part of the Yo Tambien claims and probably the north part of the Hill. This area is one of brecciated porphyry possibly more than 500 ft. in diameter and may be an extension of the contact porphyry found on the edge of the porphyry. I rate the possibilities of this area as good.

Another favorable area, the "B" area, includes most of the Rucker claim, the south and west parts of the Nancy Hanks claim, the north half of the Copper Jack claim and approximately 10 acres adjacent to and just north of the Copper Jack claim. This area presumably extends south to the Dividend fault and may, indeed, as suggested by Tenney, extend southeastward toward the old Sacramento pit area. I rate this area as one of excellent possibilities.

The third favorable area, the "C" area, is comprised of the western half of the Wee Wee claim and 10 or more acres adjacent to and just north of this area. The whole area is possibly more than 1000 ft. in diameter. It may connect with "B" through the west Leviathan and adjacent ground which displays copper staining and alteration. I rate area "C" as fair as to possibilities.

Area "A" unless it extends southeastward toward the Lavender pit or westward to join with area "B", is possibly too small to stand by itself unless there is relatively shallow enrichment such as has been described in the porphyry on the Oregon and adjacent claims. Tenney reports this "ore" to average 0.71% Cu. Whether or not it is ore depends on factors unknown to me, such as size and thickness, but with $0.30 copper and other things being equal this grade of material can be mined. At least one test hole should be drilled on area "A". A suggested location is shown on the map. This area might connect with the "ore" on the Oregon and even extend southeastward toward the Lavender pit.

Area "B" has been described by Tenney in his report of January 14, 1953. Copper mineralization in underground workings varying between .5 and 3.0% has been described by him to occur on the Nancy Hanks and the Rucker claims and extending south through Czar shaft workings to the Dividend fault. This mineralization, the value of which appears to be largely due to chalcocite enrichment, is known to occur as deep as El ±4975 in the Cochise mine workings and as shallow as -5190 in Muheim DDH No. 3. These exposures occur within an area of about 600 ft. in diameter and a height of around 215 ft. The final depth has not been established and the height is suggested only by the results in DDH 3. The "ore" in this hole falls in about the center of the Nancy Hanks claim. There is no proof available to me of the continuity of the copper mineralization between the described occurence. The outer limits of the mineralization also are not known, but good appearing limonite capping covers an area on the surface at least 1800 ft. long and 600 ft. wide (see map). About 25% of this area is on your ground mostly on the Nancy Hanks claim.

A feature of this mineralization suggested at least by the results in hole 3 is that there is only around 50 ft. of thorough oxidation and leaching below the surface and that around 260 ft. of low grade pyryitic ground intervene between this zone and the .78% copper mineralization in hole 3. A depth of 32 ft. of this material was penetrated but not passed through by the hole.

The occurrence of an enriched chalcocite zone, probably horizontal in attitude, with primary unenriched, unoxidized low grade material above is unusual but probably not an improbable occurrence. The secondary copper may have moved in from the side along a zone of

horizontal or roughly horizontal breaking. This area deserves further drilling to reveal the depth, thickness, grade and extent of the possible ore.

Presumably new drilling would be confined to the Nancy Hanks claim unless an owner consolidation of the area were made and/or unless ground west of the Nancy Hanks was acquired or leased. I should drill at first at least three vertical holes on an equilateral pattern with 250 ft. intervals between holes as shown on the enclosed map. If these tests were successful the pattern should be expended with more holes to the east and west so long as "ore" is found. It will not be ore until a large enough volume is developed or unless a grade greater than 3-4% is found.

Area "C" has been untested except for a blank hole (Muheim No. 2) at the northwest corner of the Leviathan claim. This hole cut gangue mineralization with pyrite but no chalcopyrite or enrichment by chalcocite. The hole appears to be at the south edge of the best ground and may be just beyond the possible copper mineralization. The surface at the head of OK street looks promising and to start with it would seem worth while to drill at least one vertical hole there. The "C" area is around 100 ft. in diameter and if the ground and thickness are good enough would be large enough for an open pit operation.

Magnitude of Possible Ore

At this tage it is not possible to say, of course, that there is a measured tonnage of ore on any one of the areas. With bulk or porphyry copper mineralization many factors contribute to the designation of ore. These include especially grade, tonnage, stripping ratio, metallurgical recovery, stripping and mining costs and, of course, the market price of the metal. In a case such as we are discussing we can only say that on the basis of what we know, area of good outcrops, a few drill holes and a small amount of underground penetration, there could be such and such a tonnage in such and such a volume of ground. It should be noted that on the basis of present costs and copper price open pit or block caving ore is being mined with a grade as low as .8% Cu and even .7% Cu. Responsible sources estimate the long pull price of copper at $.30 a pound barring a war, etc.

Area "A" is a raw prospect. The minimum area may be 500 ft. in diameter. This would be equivalent to 17,000 tons per vertical foot or 1,700,000 tons per lpp vertical feet. Such a thickness is not unreasonable here.

Area "B" is only partly covered by your ground. The part of the

area that looks favorable on the Nancy Hanks and Pajaro ground is comprised of around 250,000 sq. ft. or if all is underlain by "ore" would amount to 20,000 tons per vertical foot. The possible thickness is at least 215 ft. as discussed above. This would give roughly 4,000,000 tons. It would not be unreasonable to expect here a thickness up to 250 ft. This would give a volume equivalent to 5,000,000 tons.

If all of area "B" including the ground outside of your own is underlain by "ore" 250 ft. thick the tonnage per vertical foot would be around 86,000. This if 250 ft. thick would amount to around 21,000,000 tons. An extension across the Dividend fault toward the old Sacramento pit would, of course, greatly increase this tonnage.

Area "C" like "A" is a raw prospect. It is large enough to contain 60,000 tons per vertical foot or 6,000,000 per 1000 vertical feet. This thickness is not an unreasonable one.

Valuation

The valuation of this ground is faced with the usual difficulties where no material that can be called commercial ore has been blocked out. The problem has four aspects:

1. A value derived from an estimate of geologically prospective tonnage.

2. A value from the standpoint of nuisance and back slope excavation if Phelps Dodge or others develop or propose to develop an open pit for mining next to certain claims of group.

3. A doubtful value of some of the land for open pit dumping sites in case a pit is put near the claims.

4. A minor value is grazing land and city lots.

Items 1 and 2, of course, appear to hold the principal possibilities. The price put on the claims as a group would be different for (a) a cash sale or (b) a lease and option with a requirement for development or (c) one place on the property after you yourself had done some drilling. This might add to or subtract from the value.

In case (a), some idea of a "market" price for all the claims could be obtained by asking for bids without commitment for sale. I think $300,000 would be a fair cash sale price and one probably not impossible to obtain.

In case (b), the price should be based on the geological possibilities and nuisance and back slope excavation value should ore be developed. The average porphyry ore with a grade of .8% Cu has an average smelter value of around $3.50 on a $.30 per pound market. An average royalty is 5%. This would be $0.175 per ton. The geological potential for ore on the Nancy Hanks claim appears to be around 5,000,000 tons of, say, .8% Cu. Since, if ore were developed on this as well as neighboring ground, there would be a nuisance value to the claim I would raise the royalty to 7½%. This would be $0.26 per ton and would leave enough leeway for the buyer's costs and profit. This time 5,000,000 is $1,300,000 which would be the option price I would set on the Nancy Hanks and bordering claims where this sum is to be paid only by means of 7.5% royalty with option to buy out the balance at any time. Such an arrangement would be for consideration of, say, Phelps Dodge should they develop ore on their part of area "B". You would need to grant a considerably lower option price to an exploration group who would want to venture on the possibilities of developing enough ore to encourage Phelps Dodge to develop their own ground. They would expect to make a profit commensurate with the risk. They could be required, of course, to do a minimum of development work during the life of any contract. On such a basis some one might come in on area "B" with an option price of, say, $500,000.

Case (b) applied to area "A" would be on a less definite basis. It is a raw prospect and even the outline of the best capping is not definitely outlined. This area may connect with minable Phelps Dodge ground to the southwest and northeast and if so would have a nuisance and back slope value as well as a possible ore value. An option price of $200,000 to be paid out as royalties with the option d to anyone. It may have a larger extent than I first supposed. The presently available data are good enough, however, to spot a preliminary drill hole. This is hole "D" on the enclosed map.

Case (b) applied to the "C" area would also be on a less definite basis than on area "B". The ground to the North of the Wee Wee, the Copper Wedge claim, would need to be optioned and the results from Muheim DDH 1 although on the edge of the area are mildly discouraging because no enrichment was revealed. Furthermore, the area does not have the possible nuisance value of the other two. On an option basis to be paid out with royalties at 5% I suggest a price of $100,000 on this ground. Should you want to test this area yourself I have spotted one hole ("E") which is shown on the map.

As for dump sites where there is no chance for ore, full sized claims should be worth, say, $25,000 with the fractions of claims in proportion.

You may want to drill the five proposed preliminary diamond drill holes yourselves. In that case I should start with "AX" holes and maintain them at this size as far as possible. In emergency the holes could be finished with "EX". These holes would not be primarily for sampling. Geological information is needed and the sampling results will be usable. An adequate effort by means of cementing, casing and standard sludge settling boxes should be made to obtain most of the sludge and this should be properly cutdown with Jones splitters.

Once ore is found new holes should be spotted on equilateral triangular patterns 250 ft. on the side, that is, 250 ft. between holes.

Summary

1. The group of claims in question cover parts of three areas which border a pyritic core that have favorable capping outcrops. These are characterized by strong structural bedding and brecciation, strong alteration, brown limonite, copper stains and quartz veins. The Nancy Hanks area (area "B") is considered the best.

2. Two of the favorable areas, "A" and "B", may be extensions of disseminated ore on Phelps Dodge ground and so may have nuisance as well as mineral value.

3. The geologically prospective tonnage of copper mineralization of ore grade (.7% ±Cu) in area "A" can be at least 1,400,000 in area "B" on your ground 5,000,000 tons and area "C" 3,000,000 tons or 6,000,000 tons if the Copper Wedge claims is included.

4. The question of value is discussed and it is concluded that several different approaches measure a different possible price for all or parts of the group of claims.

5. The geological data on the Nancy Hanks claims suggest an enriched chalcocite blanket with unleached low grade primary pyrite ground above it. This seems difficult to explain except by horizontal movement of soluble copper possibly below a water table and along horizontally broken ground.

This area and the two others seem to lack cellular limonite such as results from the oxidation and leaching of chalcocite, but on all brown geothite (limonite) is exposed largely as crusts along fractures.

6. It would seem worthwhile on your own account to drill at least five preliminary vertical diamond drill holes although you can probably get someone to do a more complete job on a lease and option basis. The Nancy Hanks area is especially interesting and I would drill the first three holes there as marked on the map. The first should be drill location "A".

original signed

HARRISON SCHMITT.

(Typist's note: The report this was typed from contained many typographical errors.)

(COPY)

James B. Tenney
Mining Engineer and Geologist
2228 East 4th Street
Tucson, Arizona

SHORT GEOLOGIC REPORT

Warren Mining District in relation to the CARETTO GROUP

General Conclusions. At the time of the excellent geologic report on the district by the United States Geological Survey in 1902 under the direction of Dr. Frederic L. Ransome, the district had not been developed further than the Spray and Gardner mines. Some of Ransome's geologice conclusions have therefor had to be much revised to fit facts uncovered since his study. Ransom's conclusions were that the ore bodies were all associated with intrusion of the largest known porphyry mass, that of Sacramento Hill. He also concluded then, (1902) that the chief big fault, (Dividend Fault) and the other known faults were due to normal faulting. Deep work in the Gardner mine and a close study of the area East and Northwest of Gold Hill has shown that large overthrust faulting was very important. In order to fit all the now-known facts, I have come to the conclusion that the whole productive area from Quarry Fault to more than 3 miles East of Gold Hill was a part of a large, (very) compound overthrust fault which pushed the Paleozoic limestones, probably with considerable covering of Cretaceous sandstones over a much eroded surface predominently composed of Schist and lower Camerian quartzite cover. The greatest movement and the most severe pile-up of sediments took place about at the Denn shaft, and the least movement and pile-up at the Western and Southeastern ends marked by Quarry Fault and Gold Hill respectively. The result of the intensely thick pile-up of sediments caused:-(a) the sinking of the productive area, giving rise to the Dividend Fault, (b) the development in the direction of movement of deep-seated 'Tear' faults generally striking Northeast (Czar-Shattuck, Silverbear, Cole, Briggs, Mexican Canyon, Black Gap and Gold Gulch), followed by and accompanied by intrusions of porphyry (Shattuck dike and sills, Sacremento Hill porphyry mass, dikes accompaning the Briggs, Cole and Mexican canyon faults and probably accompaning the most Southeasterly of these "tear" faults, the Black Gap and Gold Gulch faults. Finally as these intrusive masses of porphyry cooled, strong vapors of super heated steam were ejected which carried in solution the sulphide ore minerals. The heart of the ore bodies formed were deposited around the largest intrusive mass, that of Sacramento Hill where the greatest pile-up of overthrust material took place. A great and thick semi-circular ring of ore bodies was formed extending from the Czar mine through the Holbrook, Spray, Irish Mag, Oliver, Lowell, Junction and Denn mine. When these ore bodies approached exhaustion, there were serious doublts in the minds of the local geologists who then followed the Ransom conclusions, as to the future possibilities of the camp. Then followed the discovery in rapid sequence of large ore bodies associated with the large "tear" faults and accompaning porphyry intrusions, starting with the discovery of the Shattuck-Uncle Sam ore bodies associated with the Czar-Shattuck "tear" fault and large porphyry dikes and sills, the Southwest Higgins ore bodies associated with the Escacado "tear" fault, and associated porphyry, the Briggs ore bodies associated with the Briggs series of "tear" faults and porphyry, the Cole "tear" faults and porphyry and finally the very rich Campbell ore body associated with the Mexican canyon "tear" fault and accompaning porphyry. Very little prospecting has been done east of the Mexican "tear" fault due to the extremely hazardous water condition. Yet to be prospected are the large "tear" faults of Black Gap which crosses through the town of Warren and the Gold Gulch "tear" fault which follows Gold Gulch. The first of these faults, the Black Gap crosses through the eastern end of the maximum pile-up of sediments where the subsequent sinking south of the Dividend fualt was the greatest (from 3500 to 5000 feet). The pile-up of sediments at the southeast end

of the overthrust was no great as shown by Gold Hill. As a consequence, the subsequent sinking where Gold Gulch fault intersects the Dividend fualt was much less than at the Denn Mine. The distance from the Denn Mine (Mexican Canyon "tear" fault to the intersection of the Gold Gulch "tear" fault is some 250 feet. The total distance from the Denn Mine to Gold Hill where the subsequent movement was zero is 19000 feet. The sinking of the new Dividend fault where Gold Gulch "tear" fault intersects the Dividend Fault should therefor be 7500/19000 multiplied by the maximum sinking at the Denn Mine (3500 to 5000 feet) which would give the probable sinking southwest of the Dividend Fault where it intersects the Gold Gulch "tear" fault as from 1100 to 1900 feet. This conclusion of shallow depth is born out by the out-crop near the intersection of these two faults of strong stringers of Copper Glance of Malachite, a small plug of andesite porphyry (such type of porphyry being elsewhere in the camp closely associated with the Sacramento Hill type of porphyry), and large and strong out-crops of heavily iron stained quartz. The prospecting by diamond drilling is well justified to determine whether ore bodies of commercial grade exist.

This favorable are to prospect in depth is covered by the following seven claims and fractions:
Greenleaf #3, Greenleaf #2, Mineral Farm #1, Wm. Penn, Stevenson, Bryan, Marconi.
In addition a large surrounding area is included, covered by the Cash Entry #2, Midway "2, Midway #1, Trilby, Bar Bullion, Mineral Farm #2, Victor, Uncle Sam, Gold Chief, and Greenleaf #1, Bell Mono, Gerabaldie, Little Maggie.
The center of the group is about three miles east of the residential town of Warren. The whole area covers 351.428 acres. This forms a compact group of 22 claims and fractions all patented.

I would strongly recommend the option of this group for total price agreed on as a very inviting adventure. It is on the eastern edge of the proven productive area from which over $1000,000,000 has been recovered in copper, lead, zink, gold and silver, the greater part in high grade copper ore.

Favorable croppings occur indicative of shallow depths well above the water level of the camp.

Presented by,

/s/ James B. Tenney
JAMES B. TENNEY E. M.
2228 East Fourth Street
Tucson, Arizona

September 23, 1952

ANALYSIS

of

COCHISE DEVELOPMENT

POSSIBLE ORE

by

James B. Tenney
Mining Engineer and Geologist

Bisbee, Arizona

September 24, 1956

Assuming the depth of 200 feet below the 300-ft. level, corresponding to the depth of the Dividend stope, and 100 feet height of ore developed by the two raises, a volume of 300 by 500 by 350, equals 52,500,000 Cu. Ft. or at 10 Cu. Ft. of ore to the ton, 5,250,000 tons, can be said to be reasonably blocked, North of the Dividend fault of 1.5% to 2.00% copper. This ore is overlain by heavily limnite stained brecciated silica. This breccia extends North from the Dividend fault a distance of 3600 feet, on the West side of the B-Mountain ridge. The width of the silica varies from 300 feet at its southern end at the Dividend fault, increases gradually to a width of 1000 feet west of the B on B-Mountain ridge and again decreases gradually to a width at its Northern end of 500 feet. Here, it turns sharply to the right to a strike of about South 45 degrees East. Silification continues with the new course a distance of 700 feet down the East slope of B-Mountain ridge toward Dubaker canyon. On the West slope of the ridge, copper stain is quite common. On the East slope, East of the silicified zone more copper stain is in evidence, especially in the bottom of the canyon.

Copper stain continues in evidence across Dubaker canyon towards Paragon ridge, a distance of about 1200 feet where intense silification starts again and can be followed a distance of about 800 feet and again ceases where the zone crosses Johnson Canyon in Yo Tambien ground. Intense silification again starts Southeast of the Yo Tambien side line and continues in the Oregon and Iron Gap claim s of P. D. Corp., a total distance of 1300 feet. The zone can be followed weakly near the junction of the Porphyry-Scist with the Glance conglomerate of the Cretaceous tract which extends Northeastwards to the Mural limestone outcrops at the top of the range. The zone is covered by the Arizona No. 3, Arizona No. 2, Miller, Little Chino, and York State into East end of the Lavendar pit. A little copper stain is found in the Glance conglomerate and base of the Morita formation in the Gulch claim of the Winwood group of claims. The intensely silicified zone in the Oregon and Iron Gap claims was thoroughly churn drilled in 1909 by the Copper Queen Cons. Mining Co., the predecessors of the P.D. Corp. This drilling yielded a shallow low grade ore body assaying 0.7% copper.

The more or less eliptical shaped ring zone occurs in both schist and porphyry around a core of intensely pyritized material which oxidizes bright red as contrasted with the more or less silicified ring which generally oxidizes to a browner color. To recapitulate - the ring can be followed clockwise starting at the East end of the Lavendar pit westward into the old West pit, and thence Northward as Contact Breccia in the old Neptune Country to the Dividend fault at the old Dividend stope of the Copper Queen Cons. Company. The zone can then be followed North to the intensely silicified zone on the West side of the B-Mountain ridge in schist and thence Southeasterly across Dubaker canyon in schist to Paragon

ridge in schist and thence in porphyry across Johnson canyon and Arizona ridge into schist with intrusions of porphyry to the Dividend fault. South of the fault the zone again passes into porphyry into the East end of Lavendar pit.

All the ore indicated above is disseminated chalcocite except the Neptune ore which was characterized by small rich plums of chalcopyrite-pyrite ore mined from the 500-ft. level, Holbrook to 200-ft. level to the surface. This zone is now covered by a long man-made hill of waste material from the Lavendar pit. This hill extends from the old West pit which it fills up to the old Dividend stope South of the Dividend fault, a total distance of 1900 feet. The contact breccia zone extends prominently North of the Dividend fault where it outcrops strongly in a northeasterly direction through the Rucker claim of the P.D. Corp. and the Pajaro, Sulphide, La Luisaand McGinty claims of the Cochise Development group. It has been prospected in only one spot starting in the Northeast corner of the Rucker claim as a steeply pitching diamond drill hole into the Pajaro claim. Typical contact breccia ore was cut of small Chalcopyrite-pyrite ore surrounded by silious gangue. The total length of this contact breccia zone North of the fault is about 2900 feet. It ends in the Iron Mountain claim of P. D. Corp.

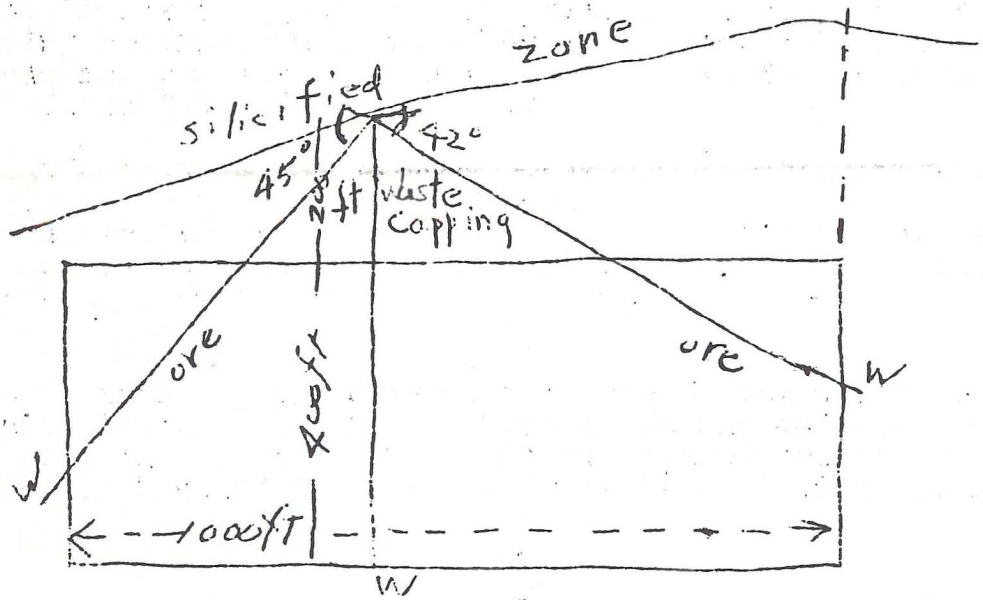
DEVELOPMENT In the whole ring of ore surrounding the pyritized core, the greatest amount of work done in the camp was in the two connecting pits of P. D. Corp. In the earlier mined West pit, the ore was capped by much silicified porphyry, much copper stained, especially at the old summit of Sacramento Hill which formed the contact of the pyritized core to the North with the silicified brecciated porphyry to the South. The ore was here very high grade, assaying 2.5% copper. After this ore was exhausted, a rich extension was mined underground from the old Sacramento shaft which passed through ore itself. This ore body was known as the Southeast Extension of Sacramento Hill. It was mined a distance of 2400 feet South, the ore replacing a prominent dike of porphyry known as the Sacramento dike. At the same time, the ground to the East of the West pit was drilled and a large low grade ore body was blocked, which averaged 1.28% copper, somewhat deeper than the West pit ore body. This ore body remained idle for many years and was known as the Northeast Extension of Sacramento Hill. During the strong copper market of the late fourties it was decided to mine this ore body. More drilling was done and the Lavendar pit was started. The Douglas road between Bisbee and Lowell, through which the Northeast part of the pit passed near Johnson Addition, had to be realigned to take care of maximum flood waters from Tombstone Canyon. Brewery Gulch Dubaker canyon and Johnson Canyon. The old Northeast extension ore body was much expanded by drilling.

As a result the ore body gained much in tonnage and lost in grade. The ore body is now being mined by open pit methods and is known as the Lavendar pit with an average grade of about 1% copper. The eastern end of the pit is in lower grade ore and what drilling has been done shows still lower grade ore to the East and Northeast. Not enough drilling has been done to the North of the Dividend fault to prove up the ring through the Eastern part of the Arizona group of claims of P. D. Corp. In the Iron Cap and Oregon claims of this group, a high, shallow low grade ore body was developed by drilling from 1909 to 1910 at Arizona ridge under much silicified breccia replacing the Northeast edge of the main mass of the Sacramento hill porphyry. Little work was done between the Arizona ridge ore and the highly silicified Paragon ridge of the Cochise Development ground. The Arizona ridge ore body averages 0.7% copper. It is readily amenable to open pit mining methods.

The old Neptune Country area, Northwest of the old West pit was being extensively mined from 1906 to 1909 from the Holbrook shaft of P. D. Corp. and rich small ore bodies were mined from the 500-ft. level to the 200-ft. level, and outcrops of oxide ore occured. On the start of mining the West pit, all mining in this area was stopped and has never been resumed. This old area which extends from the Gardner shaft to the Dividend stope just South of the fault, is now covered by waste from the Lavendar pit. The contact breccia was here wider and more mineralized than anywhere else in the camp. The only part of the zone now accessible is that in the Rucker claim and the claims of the Cochise Development group from the Pajaro to the McGinty. This type of ore does not lend itself to large scale mining and treatment in a concentrator for the reason that the ore is largely composed of chalcopyrite-pyrite which would not result, after mixing with surrounding gangue as a material with a high ratio of concentration. It would be much more profitably mined underground. To accomplish this, the old Cochise shaft would be best reopened at least down to the 600-ft. level on the ground under the strong outcrops of contact breccia prospected and the ore carefully mined clean and shipped direct to the smelter.

To develop the disseminated ore partly blocked by underground work from the Cochise and Holbrook shafts, presents difficulties, as the best indications point to prospecting under the very strong iron stained silicified outcrops occuring on the rugged West slope of B-Mountain ridge. No roads exist and only the most meager trails. Fortunately, the existence of ore to the North of that partly blocked by the 300-ft. (?) drift of the Nancy Hanks is confirmed by the Nancy Hanks inclined hole North of the North end line of the Iron Monster claim of P. D. Corp. The bottom of this hole, which cut 40 feet of low grade ore, but which was not completed, showed that the ore coincides with the

West edge of the silicified zone on the surface. This ore plots as being at the 200-ft. level, 100 feet above the 300-ft. level of the proved ore developed. It is 300 feet North of this underground work. The East-West cross ridge extending West of the B on B-Mountain ridge is 900 feet North of the ore in the Nancy Hanks drill hole. The Western edge of this cross ridge can be reached fairly easily from the long steps, 900 feet North of the start of OK street. A diamond drill rig could be dragged up these steps and a rough trail 200 feet further up the ridge would reach the edge of silicification. Water for drilling could be obtained by connecting a line to the water line of the highest house, the McGregor house, 25 feet higher than the top of the steps. This water line could then be laid to the site for drilling. Either the No. 9 hole site near the West edge of the silicified zone could be used or better the No. 12 site near the center of silicified zone. The No. 12 site would cost about $1000 more to reach than the No. 9 hole site. Assuming the more desirable No. 12 hole is used, a vertical hole which cut an appreciable amount of ore would confirm the Northward extension of ore a distance of 1100 feet from the ore developed in the Nancy Hanks 300-ft. level. The cost of this hole would be about $6000. If no ore or very little ore were cut, no further work would be advisable. The chance against this happening are small, as the silicification, iron staining and copper staining are the strongest of any other part of the ring around the pyritized core except that over the West pit, certainly stronger than that over the Lavendar pit and much stronger than that at Arizona ridge. There, silicification is equally strong but iron staining is much weaker and copper staining nearly absent. After drilling and cutting appreciable ore in the Vertical hole, 2 inclined holes would be drilled, one to the East and one to the West. The degree of inclination would depend on the depth of ore cut by the vertical hole. To illustrate, suppose the vertical depth of ore were 400 feet, as shown in the sketch, the two inclines would be at 42 and 45 degrees inclination.



The area of section would be 400,000 sq. ft. If the area of one of contiguous sections such as that at No. 8 were 180,000 sq. ft. and the distance between sections were 500 feet, the volume of ore between sections would be ½(400,000 plus 180,000)500 or 145,000,000 cu. ft. At 10 cu. ft. to the ton would give a weight of 14,500,000 tons.

After the vertical hole at No. 12 has proved up, further drilling would justifiably facilitated by starting road building from the end of OK street to reach the 5600 ft. level and this road should be completed to the South to the site of No. 7 hole just North of the developed ore in the Nancy Hanks. When road building has reached this point, trucks can handle both rig and supplies (water, gasoline, samples, etc.) much simplifying operations. The next hole to drill would be No. 8 vertical and two inclines followed by No. 7 and one incline. At this point a road should be run to the top of B-Mountain ridge and down the hill on the East side of the ridge to Dubaker canyon; also a connecting road to the site of No. 2 hole. Then should follow Hole site No. 10 with one vertical and two inclines, No. 1 with one vertical and one incline and lastly No. 2 with one incline. With any luck, these six verticals and eleven inclines, a total of seventeen holes, would develop at least 25,000,000 tons of ore and possibly as much as 50,000,000 tons. No further drilling should be done toward Dubaker canyon until flood prevention work is undertaken.

WATER SUPPLY AND FLOOD PREVENTION DAMS The most likely supply of water probably exists in the Cretaceous Tract where the basal coglomerate, the Glance Coglomerate should be a very likely aquafer (water bearer). By extending the road up Dubaker canyon nearly to the top of the divide between the Dixie canyon drainage and the drainage of Mule gulch, and sinking one or more deep holes should tap the Glance conglomerate and possibly other aquafers in the overlying Morita formation. This water should be independent of the Junction pumps which drains only the Paleozoic limestones South of the Dividend fault.

To protect the possible extension of the pit from Dubaker floods, one or more high dams should be built near the well or wells. These reservoirs resulting from the dams might in wet years supply enough water to help in the supply, or at any rate might help to regenerate the wells.

MINING Mining of the disseminated ore bodies would be done best by open pit mining. The ratio of waste capping and approaches to ore would be about 2½ to 1. The cost per ton of ore if the cost per ton of material handled is $0.40 would be 3½ by 0.40 or $1.40. Stripping

of waste capping down to ore would take about 2 years. By extending a road to the North, more or less following B-Mountain ridge to the divide between Dixie canyon drainage and Mule gulch drainage, ample space for waste piles would be found on both sides of the divide.

CONCENTRATOR A concentrator site could be located North of the pit, and an arrangement like that of the present P. D. Corp. pit and concentrator with the crusher on one of the upper benches, and a conveyor to the concentrator could be used. The size of the concentrator would have to depend on the water supply developed in Dubaker canyon wells. A road down OK street could be built, partly within the pit itself to a site rail head near the start of OK street. Such a road would run North of the present Douglas road, a total distance of about a mile and would not be costly.

To handle tailing would involve driving an 8-ft. by 6-ft. size tunnel from the nearest tributary of Dixie canyon to the site of the concentrator. No reliable map exists of this area but one could be made without undue cost. A tunnel would probably be not longer than 2,000 feet and would cost about $30 a foot or a total of about $60,000. Space for tailing piles could be found readily by locating a series of millsites in tributaries of Dixie canyon. Tailing could be handled through a large conduit similar to the conduit used by P. D. Corp. for handling tailing from the present concentrator of P. D. Corp. down to Warren and through Black Gap to the piles between Black Gap and Naco.

WORTH OF ORE Assuming the development of 25,000,000 tons of ore of 1½% copper, and assuming a price of 30¢ a pound for copper:-

1.5% copper equals 30 pounds, at 90% recovery equals 27 pounds or $8.10 per ton

Costs:-				
Mining	3.5 by 40¢	$1.40		
Milling		0.50		
Smelting		0.30		
		Gross worth before taxes		$2.20
				$5.90 per ton
Gross value for 25 million tons would be				$147,500,000
Less 33-1/3% taxes, assumed				49,300,000
Net worth after taxes				$ 98,200,000
Less discount or approximately 70%				$ 68,600,000
Less Capital Expenses				
Preliminary Drilling		$ 80,000		
Road building		20,000		
Tailins tunnel		60,000		
Water development		15,000		
5000 ton concentrator 5000 by 2000		10,000,000		
Pit equipment		1,000,000		12,705,000
				$55,895,000
Less cost of property (assumed)				10,000,000
Net worth				$45,895,000

At rate of 5000 tons mined a day or 5000 days equals 14 years
Time to strip capping and approaches down to ore 2 years
Total 16 years life

Profit per year equals $318 million for a capital of $22,705,000, a return of better than 20% a year for 14 years after a two years wait to strip overburden down to ore.

Cost of property would be paid as follows:-S.S. Shattuck, members of the Joe Muheim Estate, George Henshaw for the Dreadnaught and commission to James B. Tenney.

Presented by
James B. Tenney
Mining Engineer and Geologist

/s/ JAMES B. TENNEY

(Typist's note: The report this was typed from had many typographical errors.)

(COPY)

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Tucson, Arizona

SHORT GEOLOGIC REPORT

Warren Mining District in relation to the CARETTO GROUP

General Conclusions. At the time of the excellent geologic report on the district by the United States Geological Survey in 1902 under the direction of Dr. Frederic L. Ransome, the district had not been developed further than the Spray and Gardner mines. Some of Ransome's geologice conclusions have therefor had to be much revised to fit facts uncovered since his study. Ransome's conclusions were that the ore bodies were all associated with intrusion of the largest known porphyry mass, that of Sacramento Hill. He also concluded then, (1902) that the chief big fault, (Dividend Fault) and the other known faults were due to normal faulting. Deep work in the Gardner mine and a close study of the area East and Northwest of Gold Hill has shown that large overthrust faulting was very important. In order to fit all the now-known facts, I have come to the conclusion that the whole productive area from Quarry Fault to more than 3 miles East of Gold Hill was a part of a large, (very) compound overthrust fault which pushed the Paleozoic limestones, probably with considerable covering of Cretaceous sandstones over a much eroded surface predominently composed of Schist and lower Camcrian quartzite cover. The greatest movement and the most severe pile-up of sediments took place about at the Denn shaft, and the least movement and pile-up at the Western and Southeastern ends marked by Quarry Fault and Gold Hill respectively. The resutl of the intensely thick pile-up of sediments caused:-(a) the sinking of the productive area, giving rise to the Dividend Fault, (b) the development in the direction of movement of deep-seated 'Tear' faults generally striking Northeast (Czar-Shattuck, Silverbear, Cole, Briggs, Mexican Canyon, Black Gap and Gold Gulch), followed by and accompanied by intrusions of porphyry (Shattuck dike and sills, Sacremento Hill porphyry mass, dikes accompaning the Briggs, Cole and Mexican canyon faults and probably accompaning the most Southeasterly of these "tear" faults, the Black Gap and Gold Gulch faults. Finally as these intrusive masses of porphyry cooled, strong vapors of super heated steam were ejected which carried in solution the sulphide ore minerals. The heart of the ore bodies formed were deposited around the largest intrusive mass, that of Sacramento Hill where the greatest pile-up of overthrust material took place. A great and thick semi-circular ring of ore bodies was formed extending from the Czar mine through the Holbrook, Spray, Irish Mag, Oliver, Lowell, Junction and Denn mine. When these ore bodies approached exhaustion, there were serious doublts in the minds of the local geologists who then followed the Ransom conclusions, as to the future possibilities of the camp. Then followed the discovery in rapid sequence of large ore bodies associated with the large "tear" faults and accompaning porphyry intrusions, starting with the discovery of the Shattuck-Uncle Sam ore bodies associated with the Czar-Shattuck "tear" fault and large porphyry dikes and sills, the Southwest Higgins ore bodies associated with the Escacado "tear" fault, and associated porphyry, the Briggs ore bodies associated with the Briggs series of "tear" faults and porphyry, the Cole "tear" faults and porphyry and ~~fian~~- finally the very rich Campbell ore body associated with the Mexican canyon "tear" fault and accompaning porphyry. Very little prospecting has been done east of the Mexican "tear" fault due to the extremely hazardous water condition. Yet to be prospected are the large "tear" faults of Black Gap which crosses through the town of Warren and the Gold Gulch "tear" fault which follows Gold Gulch. The first of these faults, the Black Gap crosses through the eastern end of the maximum pile-up of sediments where the subsequent sinking south of the Dividend fualt was the greatest (from 3500 to 5000 feet). The pile-up of sedements at the southeast end

of the overthrust was not great as shown by Gold Hill. As a consequence, the subsequent sinking where Gold Gulch fault intersects the Dividend fualt was much less than at the Denn Mine. The distance from the Denn Mine (Mexican Canyon "tear" fault to the intersection of the Gold Gulch "tear" fault is somel250 feet. The total distance from the Denn Mine to Gold Hill where the subsequent movement was zero is 19000 feet. The sinking of the new Dividend fault where Gold Gulch "tear" fault intersects the Dividend Fault should therefor be 7500/19000 multiplied by the maximum sinking at the Denn Mine (3500 to 5000 feet) which would give the probable sinking southwest of the Dividend Fault where it intersects the Gold Gulch "tear" fault as from 1400 to 1900 feet. This conclusion of shallow depth is born out by the out-crop near the intersection of these two faults of strong stringers of Copper Glance of Malachile, a small plug of andesite porphyry (such type of porphyry being elsewhere in the camp closely associated with the Sacramento Hill type of porphyry), and large and strong out-crops of heavily iron stained quartz. The prospecting by diamond drilling is well justified to detirmine whether ore bodies of commercial grade exist.

This favorable are to prospect in depth is covered by the following seven claims and fractions:
Greenleaf #3, Greenleaf #2, Mineral Farm #1, Wm. Penn, Stevenson, Bryan, Marconi.
In addition a large surrounding area is included, covered by the Cash Entry #2, Midway "2, Midway #1, Trilby, Bar Bullion, Mineral Farm #2, Victor, Uncle Sam, Gold Chief, and Greenleaf #1, Bell Mone, Gerabaldie, Little Maggie.
The center of the group is about three miles east of the residential town of Warren. The whole area covers 351.428 acres. This forms a compact group of 22 claims and fractions all patented.

I would strongly recommend the option of this group for total price agreed on as a very inviting adventure. It is on the eastern edge of the proven productive area from which over $1000,000,000 has been recovered in copper, lead, zink, gold and silver, the greater part in high grade copper ore.

Favorable croppings occur indicative of shallow depths well above the water level of the camp.

Presented by,

/s/ James B. Tenney
JAMES B. TENNEY E. M.
2228 East Fourth Street
Tucson, Arizona

September 23, 1952

circulate then return to me

LAW OFFICES
W. T. ELSING
34 WEST MONROE, SUITE 712
PHOENIX, ARIZONA 85003

G. W. SHUTE
(1876-1962)

TELEPHONE 253-2191
AREA CODE 602

February 6, 1978

John H. Jett, Director
Mineral Resources
Mineral Building, Fairgrounds
Phoenix, Arizona
85007

Dear John:

Enclosed are three copies of reports relating to the Warren Mining District.

You may want to keep them for your files.

With kind personal regards, I am

Yours sincerely,

WTE:dh
encls.

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W. T. ELSING

S. JOHN DOWNS
Agent
DREADNAUGHT MINING CLAIMS
Bisbee-Warren District

2027 LA ROSA DRIVE, TEMPE, ARIZONA, 85282
Business Phone: 257-3673
Home : 967-5827

May 9, 1978

Mr. J. M. Langton, Manager
SUPERIOR OIL COMPANY
Minerals Division
P.O. Box 12487
6245 E. Broadway
Tucson, Arizona 85732

Dear Mr. Langton:

This letter is to ascertain if your company might be interested in three groups of patented mining claims which are located to the north of the Lavender Pit in Bisbee, Arizona and are contiguous to each other and to the pit.

As you probably know, OCCIDENTAL MINERALS, has blocked out 20,000,000 tons of .85 copper ore on the Muheim-Anderson Claims. None of the other two groups were drilled.

I am agent for the George R. Henshaw family which owns the DREADNAUGHT GROUP. Mrs. Evelyn Muheim, Warren, Arizona owns the Muheim-Anderson Group. She also has a one-half undivided interest in the Cochise Group.

Mrs. Muheim is a friend of mine and the Henshaw family. She recently told me that the Cochise Group which has been held in trust by the Chase Manhattan Bank, New York will be disbursed by the trust officers during 1978.

The enclosed reports are copies of originals done by Harrison Ashley Schmidt, J. B. Tinney for the Phelps Dodge Corporation and George Ziegler for the DREADNAUGHT GROUP. The map was prepared by Mr. Tinney and revised by Mr. Schmidt.

I am well acquainted with the area and the claims. If you are interested in these properties, you can contact me at my home telephone: 967-5827 or until June 1, 257-3673.

Sincerely,

Copy to: Mrs. Muheim

SJD/cd