CONTACT INFORMATION
Mining Records Curator
Arizona Geological Survey
416 W. Congress St., Suite 100
Tucson, Arizona 85701
602-771-1601
http://www.azgs.az.gov
inquiries@azgs.az.gov

The following file is part of the JABA, Inc. Tombstone Mining Records

ACCESS STATEMENT

These digitized collections are accessible for purposes of education and research. We have indicated what we know about copyright and rights of privacy, publicity, or trademark. Due to the nature of archival collections, we are not always able to identify this information. We are eager to hear from any rights owners, so that we may obtain accurate information. Upon request, we will remove material from public view while we address a rights issue.

CONSTRAINTS STATEMENT

The Arizona Geological Survey does not claim to control all rights for all materials in its collection. These rights include, but are not limited to: copyright, privacy rights, and cultural protection rights. The User hereby assumes all responsibility for obtaining any rights to use the material in excess of "fair use."

The Survey makes no intellectual property claims to the products created by individual authors in the manuscript collections, except when the author deeded those rights to the Survey or when those authors were employed by the State of Arizona and created intellectual products as a function of their official duties. The Survey does maintain property rights to the physical and digital representations of the works.

QUALITY STATEMENT

The Arizona Geological Survey is not responsible for the accuracy of the records, information, or opinions that may be contained in the files. The Survey collects, catalogs, and archives data on mineral properties regardless of its views of the veracity or accuracy of those data.

0008

Volume 2 ; Book 3

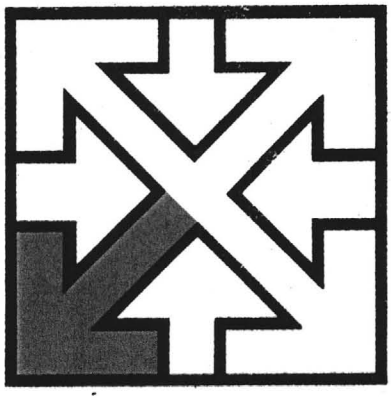
TOMBSTONE

Mining District

Cochise County

ARIZONA

Charleston Mine Area Reports
1938 to 1966



Southwestern Exploration Associates

Mineral Exploration & Natural Resource Consultants

Tucson, Arizona

Mary Jo Group (1933)

3. 138

MARY JO GROUP
OF
UNPATENTED MINING CLAIMS IN THE
TOMBSTONE MINING DISTRICT
COCHISE COUNTY, ARIZONA.

The Mary Jo group of mining claims, consists of twelve unpatented claims.

Said group of claims contains approximately 220 acres, two or three of said claims not containing full twenty acres.

These claims were located in 1928, and are on unsurveyed public domain. They are about eight miles south-westerly from Tombstone, and about two miles north-easterly from Charleston.

The main line of the El Paso & Southwestern, or Southern Pacific railroad runs through Charleston, and a spur line runs from Fairbanks to Tombstone.

The claims lie about half a mile from the County highway running from Tombstone to Charleston, thence to Fort Huachuca.

The claims lie on the northerly slope of a lone mountain, part of the claims running to the top of the mountain and others into the flat.

Most of the work done on the property, other than the location work on each claim, has been done on the Mary Jo claim.

What is designated as No. 1 shaft on the Mary Jo was put down on an incline to a depth of fifty feet. From the bottom of this shaft a drift was run south-westerly a distance of about 35 feet, and another drift about 15 feet to connect with No. 2 shaft.

What is designated as No. 2 shaft on the Mary Jo was put down an incline to a depth of 100 feet, and the white clay-like material was encountered at a depth of about 30 feet, and continued down the full depth of the shaft.

Shaft No. 3, on the Mary Jo, now referred to as the main working shaft, is 84 feet deep, on a 55 degree incline, and dips S 20 degrees E. A fifty-one foot drift easterly enters ore the full distance, and the face is still in ore, and a south cross cut at the end of the drift is still in ore at eight feet. An 85 foot drift running southwesterly from the bottom of the shaft enters ore the full distance, with the face still in ore. About 12 inches of the face is massive galena and zinc blended.

As no assay map is available, a record of the assays taken from time to time in the No. 3 shaft on the Mary Jo, after sinking of the shaft was started, to the present faces is herewith set forth. The dates of the assays show that they were taken at intervals as the operations progressed. Neither foot or hanging wall has been exposed, which tends to indicate a good width to the ore zone.

A test run of ore from the No. 3 shaft on the Mary Jo, was made at a nearby mill by gravity concentration, the assays of which are listed. A preliminary flotation test was made, the result of which is also listed. This test was merely to determine if a separation could be made and no attempt was made to secure maximum results, and so no doubt excellent results could be obtained with further experimentation.

In addition to the three shafts mentioned on the Mary Jo, another shaft has been sunk to a depth of ten feet; and an open cut run in a distance of about twenty feet.

Assay of ore encountered at a depth of about ten feet in No. 1 shaft on the Mary Jo ran as follows:

Sample No. 1	Au 0.38 oz.	Ag 49.2 oz.	Cu 20.7%	Pb 3.1%
Sample No. 2	0.12	7.0	9.8	1.0

On the Brother George Claim the discovery shaft was put down to a depth of ten feet. Shaft No. 2 was put down on an incline to a depth of fifty feet. Pockets of Galena and Lead-silver ore were encountered at different depths. Samples of ore taken at a depth of about 30 feet ran:

Sample, Composite	Au 0.09 oz	Ag 21.03 oz	Lead 35.1%
Grown with Galena	.07	14.3	11.33%

Other work on the Brother George consists of a ten foot shaft No. 3 up on the hill, at a contact of an iron vein with a quartz vein; an open cut, No. 4 toward the west end, and some trench work, No. 5 cutting some turquoise and lead stringers.

Assays from No. 3 shaft and drifts on Mary Jo claim:

Date	Oz. Au	Oz Ag	% Pb	% Cu	% Zn
9/25/33	.01	1.6	16.0		5.9
	.01	2.6	25.2		6.8
10/2/33	.01	1.4	10.1		5.5
	.02	4.0	12.5		1.3
10/9/33	.01	3.0	9.1		0.8
	.01	1.0	8.0		30.8
	.01	1.2	13.6		34.7
10/30/33	.01	1.6	13.8		6.2
	.01	1.0	5.0		4.8
11/13/33	.02	0.6	4.5		8.0
	.01	1.2	3.8		3.0
	.01	1.2	3.6		2.8
12/6/33	.01	1.1	5.0		10.1
	.02	2.6	17.1		5.0
12/18/33	.02	2.2	8.5		5.9
	.01	1.0	3.0		4.5
	.01	1.0	2.3		4.6
12/30/33	.02	9.0	4.2		---
2/19/34	.03	1.8	15.3	1.1	12.1
	.03	1.8	2.8	0.3	10.3
12/19/34					
Face, East Drift	.01	0.8	3.8	0.2	8.5
Face, West drift	.02	3.6	6.5	3.5	13.0

USGS PP 281, Plate 9 (1955)

Gordon Report (2-18-50)

(COPY)

1 122

REPORT ON THE CHARLESTON LEAD MINE, TOMBSTONE, ARIZONA

The Mary Jo Group of Mining Claims are situated in Section 25 and 36, Township 20 South, Range 21 East of the Gila and Salt River Base and Meridian, eight miles south-west of Tombstone, Arizona and two miles Northerly from Charleston, in the Tombstone Mining District, in Cochise County, Arizona at an elevation of 4100 feet above sea level.

The property is held by possesory title and consists of twelve (12) claims comprising 228 acres more or less.

The country here in general is a quartz-latite porphyry underlain by a quartz-monzonite. The latite in a short depth merges into the monzonite which in spots shows on the surface. The quartz-latite is the porphry phase of the quartz-monzonite.

A zone of shearing developed an east-west course and the minerals are found therein in veinlets, veins and lenses. The rotting and decomposition has caused a slumping and re-arrangement, the lines of shearing being almost obliterated, the veinlets and lenses twisting and crossing the main course of the lode in varying angles.

The reformed minerals arising from the decomposed felspars are sericite and kaolin; the matallic metals and minerals are the sulphides of lead, copper, zinc and iron. The lode also contains some hard ribs or lenses of ~~highly~~ highly siliceous rock oriented with the course of the lode.

Apparently under the footwall of the lode in the approach to No. 5 shaft, a basalt rib or dike is noted and to the north and resting on part of the basalt, a scab of andesite of a green color shows - a remnant of the flow rocks that covered this area at one time.

The metallic minerals - the sulphides of lead, copper, zinc and iron at 20 to 25 feet below the surface, do not show any oxidation effect, except a scarce red stain of iron oxide - this stain was not found on the 100 foot levelof No. 3 shaft; for this reason the sulphides will be readily amenable to selective flotation.

The principal workings are:

Mary Jo Claim - No. 1 shaft 50 ft slope depth at 66 degrees;
No. 2 shaft 100 ft slope depth at 66 degrees;
No. 3 shaft 104 ft slope depth at 65 degrees with an 80 ft crosscut to the south.

Brother George Claim - No. 2 shaft 52 ft slope depth at 66 degrees;
No. 5 shaft 72 ft slope depth with a winze of 20 ft, with 6 ft from collar to surface makes a total depth of 98 ft.

The results from sampling when balanced out, gave results as follows:

Samples 1 to 18 - Lead 6.29%; Copper 0.57%; Zinc 10.94%
19 - Lead 6.18%; Copper 0.52%; Zinc 10.90%

A block of ground extending from 50 ft east of No. 3 (Mary Jo) shaft westerly to a point 100 feet west of No. 7 shaft and depth equal to No. 3 shaft (104 ft) contains 206,000 tons of ore of an indicated value of Gold 0.01 oz; Silver 1.50 oz; Lead 6.18%; Copper 0.524%; Zinc 10.90%.

This block of ore through the owners mill, after freight and smelting charges will yield at present prices, $30.81 per ton of crude ore or $6,000,000.oo out of which to pay mining and milling costs.

However a sectionof the above mentioned ore in shaft No. 5 has somewhat over 5000 tons carrying : Gold 0.cloz; Silver 1.80 oz; Lead 12.78%; Copper 1.41% and Zinc 16.6% - this should yield at present prices, about $42.60 per ton of crude ore or $213,000.oo for the section quoted, increasing daily as the winze is being sunk in increasingly better ore.

As to the other constituents of the ore, the sericite and kaolin, I cannot say except they have considerable economic value and are well worth consideration.

It is highly probable that the mineralization will go to the depth of the quartz-monzonite sill and the mineralization will undoubtedly be there also, what the depth of this sill is I cannot state.

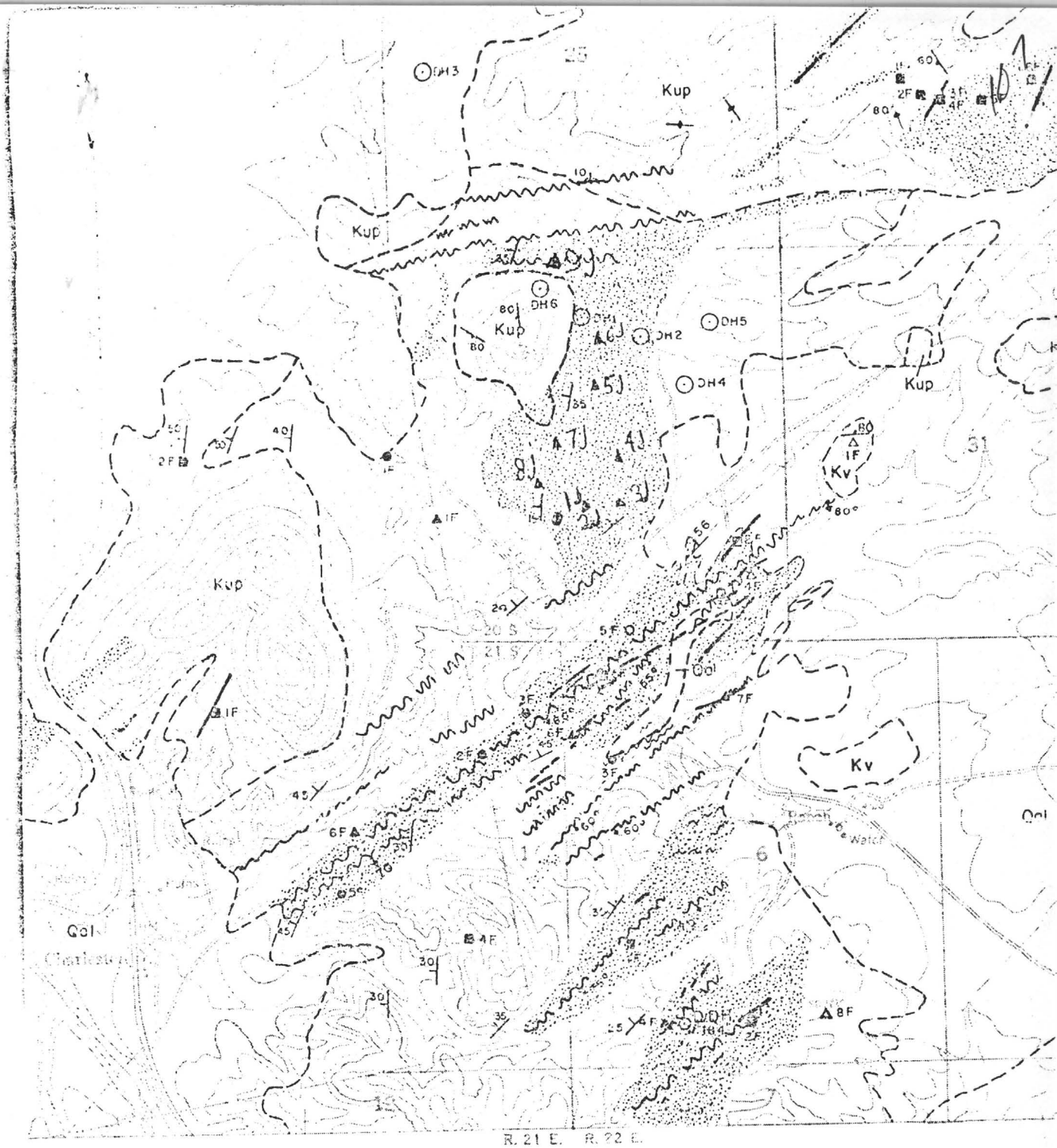
I consider this a very valuable property and improving on depth. I recommend it.

Respectfully,

Jonathan M. Gordon, Mining Engineer
Tombstone, Arizona

September 18 1950.

Original copy of this report on file at mine office.



Charleston Mine
Cochise County, Az
Howey Holdings Ltd

EXPLANATION

A-Geochemical sample

Charles H. Dunning (8-25-53)

8-25-55

2
169

REPORT ON CHARLESTON LEAD MINE.

Pursuant to request I have made an examination of the Charleston Lead Mine for the purpose of determining the feasibility of developing and equipping the property for production, and the expected economics when in production.

The property consists of twelve unpatented mining claims and is located 8 miles southwest of Tombstone, Arizona, and is owned by Mr. Charles H. Suiter of Tombstone.

General Geology.

The terrain consists of a series of volcanic flows, originally rhyolite, latite, monzonite, and allied phases, that have been highly sheared, altered and faulted. A main east-west fault exposes an old and once underlying granodiorite mass on the south which forms a definite hanging-wall for the sheared, altered, and mineralised beds immediately to the north.

A zone some 150 feet wide in these beds, paralleling this main fault, has been invaded by instrusions of mineralising porphyry causing minor faults, crushing and shearing, and intense hydrothermal action.

This hydrothermal action has been so intense that the rhyolite has been almost completely altered to sericite, and at the same time lead, zinc, copper, and iron sulphides were deposited, together with small amounts of gold and silver. Later volcanic flows of a basaltic type once covered this terrain but have been almost completely eroded away, exposing the above mentioned conditions which were originally formed deep in the earth. Necks or vents of some of these later extrusives appear underground and on the surface.

The hydrothermal actions exhibited here are the strongest I have ever observed anywhere. The sericitization is very complete and extensive.

An area in the above condition, 150 feet or more wide and 400 feet or more long, has been fairly well prospected by one churn drill hole, 340 feet deep, several shafts up to 100 feet, 400 feet of drifts and crosscuts, and best of all the actual mining of some 2600 tons from development work.

The mineralised area however, may be much larger than the dimensions assumed above. To the east the formation is capped but was encountered in a power pole hole. To the west it opens out again after being pinched down by the granite plug. The assumed footwall to the north, an andesite dyke, may only be a false wall, and the mineralization may recur further north where

it is covered with loose gravelly overburden.

A further interesting point is that the instrusive porphyry mineralizers are of the copper producing type, similar to Bisbee. While the copper content of the Charleston is only about .5% some of our best copper ore-bodies in Arizona have a capping or margin low in copper but higher in lead and zinc, and at some depth or location in the Charleston formation there could well be important copper ore-bodies.

History

The mine has been sporadically developed and operated for several years. Before the big drop in the prices of lead and zinc in 1952-3, Mr. Suiter had built a small washing plant and was profitably treating his ore by a very simple washing process, and shipping a crude, mixed, semi-concentrate to custom mills. This operation will be mentioned in more detail further on.

At that time he was obtaining his ore from underground development work. Because of the slick, greasy nature of the sericite, underground workings are difficult to hold and mining expensive. Underground mining should not again be attempted in the sericite zone. The combination of expensive mining and the drop in metal prices shut Mr. Suiter down. It has not been until the last few months that the price of lead and zinc has again risen to change the picture; and there also appears to be a strong and growing market for the sericite as a by-product.

However, the only feasible or economic way to mine the ore-body is by open pit from the surface and as there is some 30 feet of valueless overburden, such an operation requires financing.

Mining Facilities

A commercial high voltage power line crosses the property and ample power can be obtained at regular rates.

Mr. Suiter has obtained his milling water from a shallow dug well. No doubt drilled wells out on the flat would provide ample water for a larger mill.

Seven of the eight miles of road to Tombstone is a good county road, and the one mile of private road is sufficient.

Probable Tonnage

As stated above the possibilities of ore are practically unlimited; but from present development it seems reasonably certain to assume a block of ground 150 feet north and south, by 400 feet east and west, by 125 feet deep below the overburden, would make an open pit. This would amount to 625,000 tons. Deducting 20% for unmineralized "horses" and barren intrusives, some of which could be selectively shovelled and hauled to waste, would leave a net tonnage in such a block of 500,000 tons. It must be understood that such estimate, though reasonably certain because of existing development and nature of the ore occurrence, is still not technically "positive". This matter will be further discussed under the heading of "values".

Metallurgy

The sericite gangue completely disintergrates on contact with water, making a clay slurry with the mineral sulphides freed.

Mr. Suiter's plant consisted only of a drum with blades inside (like a cement mixer) followed by a small classifier. The underflow from the classifier carried 25-30 % combined metallic sulphides and was his shipping product. The overflow from classifier was run through a long trough with partitions and thence to tailing pond. The "heavies" caught by the riffles were added to the shipments.

This simple process achieved over 90% extraction but the sericite was not sufficiently cleaned of iron to be marketable as sericite, and the semi-concentrate still had to be sent to a custom mill for further concentration and the separation of lead and zinc. This was costly as a table below will show.

For a new mill the general flow sheet would be a grizzly but no crusher. A large blade or log washer, followed by an oversize classifier in open circuit. Overflow from classifier to an Humphries spiral and wet cyclones which would glean the last of the metallic sulphides. Underflow from classifier together with concentrate from spiral and cyclones to a small ball mill and thence to differential flotation cells, resulting in clean lead and zinc concentrates which are shipped to smelters.

Values and Economics

Three methods were used to determine an average assay value of the above estimated half million tons. None of these methods, in itself, could

be considered entirely accurate, but when all these methods check each other closely, the overall result should be quite reliable.

(1) The 8" churn drill hole which reached a depth of 340 feet where it cut the andesite footwall.

This hole showed ore from 30 feet of top to bottom, and as it was vertical whereas the orebody dips about 70 degrees, it cut across the ore as well as attaining depth. Log and samples of this hole were taken by Mr. Suiter while drilling, and log is available. I sampled the sump of cuttings.

(2) Sampling of all underground workings per assay map. (Copy of assay map available.)

This sampling was not checked by me but was done by a reliable company, but workings and the visual qualities of the ore were examined by me.

(3) The result of Mr. Suiter's milling of all ore coming from underground work.

In this case I checked the tonnage that such work would have produced.- against the tonnage in the tailings pile - against the ratio of concentration- against the tons of concentrates and their metal content per settlement sheets, file of which is available. All three of these methods produce approximately the same result which is as follows:

Gold - trace; Silver 1.00 oz.; Copper .50%; Lead 4.00%; Zinc 5.50% .

At the present prices of lead (15¢) and zinc (12.5¢) these metals have a net value, FOB mine, after deducting freight, smelter charges, and other "deducts", per unit (1.0% or 20 lbs.) of $1.56 for lead, and $.86 for zinc. Copper would go with the lead and be paid for at about 20¢ per lb., unless there were sufficient quantity to make a separate copper concentrate.

The real value of the above ore, after being reduced to shippable concentrates would therefor be as follows:

Gold (Pay quantity possible)	0.00
Silver 1.00 oz. @ .75	.75
Lead 4% or units @ 1.56	6.24
Copper 10 lbs. @ 20¢	2.00
Zinc 5.50% or units @ .86	4.73
Total	13.72

From this average we should make an across-the-board deduction of 20% for unavoidable dilution and other contingencies, which leaves a value of $11.00 per ton.

While the milling process appears to extract almost 100% of the metals, a general deduction for mill losses of about 10% should be provided, leaving a final net value of $10.00 per ton at present metal prices.

To this should be added anything received for the sericite - see later.

Operating Costs

Operating costs (not including capital costs) will vary greatly according to the efficiency of the setup and the size of the operation. Below are given two tables: one representing the use of Mr. Suiter's past and present setup; and the other representing what should be done with a proper mill for 150 ton daily (24 hrs.) crude ore and 50 tons daily for regrind and flotation. Preliminary stripping is considered as a capital expense and not included in operating costs, but subsequent stripping, on a basis of 1.5 tons (waste) to 1.0 tons (ore) is included in operating costs.

Item	Suiter Mill (50 Tons)	Complete Mill (150 Tons)
Stripping, mining and delivery to mill	.50	.50
Milling	4.00	2.00
Overhead & Miscellaneous..	2.00	1.00
Shipping to custom mill and remilling (Basis: $9.00 per ton for semi-conc'ts.).....	3.00	0.00
Totals	9.50	3.50
Profit on $10.00 per ton crude ore.....	.50	6.50
	10.00	10.00

The above includes no royalty or participating interest to the owner.

It will be noted that in the item of stripping and mining the costs are the same regardless of daily tonnage. This is because I have considered in each case giving a contract to parties properly equipped to excavate and pile behind the mill a considerable tonnage at a time. This would avoid the purchase of much expensive equipment and permit the use of economic heavy equipment. Obviously, in either case, the cost would be approximately the same and

should be done within the figure mentioned.

The above figures show that an over-simplified mill is not practical under present metal prices. However, the present mill, with certain additions, would make an ideal test or pilot plant to obtain positive metallurgical data, before designing a final mill, and to obtain positive average values by mining large samples and milling them.

SERICITE. The sericite angle is intriguing and has extensive possibilities. It is not positive. Sericite is a microscopic sized muscavite mica, an aluminum silicate, with a silky, greasy feel, like talc. The analysis of the Charleston sericite, which corresponds closely with the theoretical (analysis available) is:

SiO_2 - 46.25%; Al_2O_3 - 38.5%; other oxides - 11/8%; Water 4.5%

Sericite has various uses in industry and is in increasing demand. For most uses it must be iron free and Mr. Suiter, with his crude mill, has never been able to remove all the iron. I am quite sure that it can be done.

The market for sericite is one of negotiation and contracts. It is a fact that no user will "talk business" until you have a consistent supply. Once such a supply is established, and a consistent quality proven, one may enter the field through direct sales or brokers. It seems certain that at least a considerable quantity of the sericite from the Charleston ore could be sold at good prices. Approximately 75% of the crude tonnage would be sericite, and such information as is available on prices indicates a value of $10.00 to $30.00 FOB railhead. Its value to the Charleston might surpass that of the metals, but because of some uncertainties I have not included it at all in profit estimates. The pilot plant test runs, recommended below, should definitely establish this feature.

Recommendations

Ordinarily, in a situation such as this, one would first drill a sufficient area to positively determine a tonnage and grade to warrant stripping and opening up a pit, and the building of a suitable mill. But drilling has been found to be difficult and unreliable at the Charleston. As stated above the ore practically dissolves in water; and it is too moist to drill dry. In putting down the above mentioned churn drill hole about 40 feet of the bottom of the hole would fill up over night. Not knowing where such "sloughing off" comes from makes samples unreliable. And the heavy part of cuttings have a way of working into the pores instead of being pumped out. Core drilling produces no core. Seemingly the only successful way to drill would be to follow the bit immediately, or even precede it, with casing - and such would be quite expensive.

It is fortunate in this case that the overburden could be removed from a pit sized area cheaper than same could be drilled.

It is my recommendation therefore that first the overburden be removed from such an area, as is shown on sketch, with a bulldozer. Secondly, that trenches be put across this stripped area with a slusher as deep as possible (probably 25 feet) and that the product from these trenches be used as samples and test material in a pilot plant. Some shallow drilling might be done from these trenches (say 25 feet) to further positively prove justifiable tonnage.

Mr. Suiter's present mill should be augmented by a larger water tank, a Humphries Spiral Classifier, and wet cyclones to obtain ultimate metal extraction and refine the cerussite. The product from the slusher trenches should be used as feed for such test work, each trench milled separately to constitute exact sampling.

On completion of such work one should be sure of a justifiable tonnage and detailed metallurgical requirements.

Financial Requirements

Financial plans should be divided into three stages: The first stage would include only the stripping mentioned above and appurtenant expenses. No heavy equipment would be purchased - the work would be contracted or equipment rented. Approximately 30,000 yards should be removed at an estimated cost of 25¢ per yard or $7,500.00; Miscellaneous expense $2,500.00; Total: $10,000.00.

The second stage would consist of the test trenches mentioned, improvement of the mill by the addition of the items mentioned to funaction as a pilot plant, and the test milling of the product from the trenches (approximately 4000 tons); Mining would cost 75¢ per ton ($3,000.00); Mill improvements: $4,000.00; Milling: $16,000.00; Miscellaneous: $2,000.00; or a total of $25,000.00. While the product from the test milling might be shipped and should nearly cover its cost, it would be better to hold it for differential flotation.

The third stage would consist of mining and steckpiling 10,000 tons and complete rebuilding the mill. This is estimated as follows: Mining by shovel: $5,000.00; Mill including flotation: $50,000.00; Miscellaneous: $10,000.00; or a total for stage 3 of $65,000.00. Grand total: $100,000.00.

Not included in the above estimates are any payments that must needs be made to the owner.

It will be noted that in the above plan the first stage which amounts to very little, entails all the risk, and is cheaper than a drilling program. Successive stages are predicated on the success of the preceding stage and would not be entered into unless same were successful.

Before the third stage is entered, which would require the bulk of the financing, all risk would be eliminated, except such risks as are dependent on long term economic changes and the price of metals.

It should be noted that in both operating profits and capital requirements no allowance has been included for payments to or participation by the owner. Mr. Suiter has spent considerable money and has created a very valuable property. We have discussed several types of "deal". I am sure that a reasonable one can be obtained, but the details might best be left open so they can be made to conform to the best interests of both parties.

Conclusion

The economics of the Charleston situation work out for a probable profit of some millions of dollars; and considering the very slight risk and modest financial requirements, the proposition appears to be one of unusual merit.

Respectfully submitted,

August 25, 1955

CHARLES H. DUNNING

CHARLES H. DUNNING
MINING ENGINEER

177

Record of Shipments of
SEMI-CONCENTRATES
from Charleston Lead Mine.

Lot No	Date	Dry tons	Ag oz.	Cu %	Pb %	Zn %	Mill Returns
1	10/47	125.50	1.30	0.70	7.40	12.7	$1855.70
2	5/48	44.32	1.32	.80	10.20	12.0	1348.97
3	6/48	82.16	1.20	.85	10.60	14.4	2283.18
4	7/48	51.57	1.00	.75	9.40	10.2	1438.91
5	8.48	47.15	1.20	.70	9.40	9.0	1328.24
6	9/48	38.97	1.05	.60	8.90	11.2	1059.33
7	9/48	44.64	1.20	.37	6.90	12.2	1108.00
8	10/48	49.65	1.80	.60	9.70	15.6	1863.74
9	11/48	33.51	1.60	.62	9.90	14.6	1431.90
10	12/48	42.95	1.20	.60	7.30	9.0	1085.61
11	12/48	37.62	1.30	.75	9.10	14.8	1472.74
12	2/49	33.06	1.20	.61	7.20	10.00	927.18
13	3/49	39.74	.80	.40	5.70	8.6	742.61
14	4/49	34.86	.80	.32	5.50	9.5	409.24
15	5/49	41.47	1.40	.55	7.80	12.9	873.15
16	6/49	55.01	3.40	1.25	15.50	22.3	2125.14
17	8/49	38.01	1.70	.75	7.30	11.5	546.93
18	9/49	40.13	1.70	1.06	10.40	15.2	915.28
19	9/50	58.10	1.20	1.05	11.00	15.9	2473.43
20	10/50	70.55	2.28	1.42	17.10	27.3	5326.52
21	10/50	28.90	1.32	.97	10.36	11.5	913.89
22	10/50	32.17	1.80	1.25	13.80	21.0	1854.19
23	6/51	122.04	1.56	.44	7.80	11.8	3825.87
Total		1190.08	33.33	17.41	21826	313.2	37209.75
Average (not weighted)			1.45	.76	9.60	13.7	

Mill extraction approx 90%.
Ratio of concentration about 2.4 into 1.0
Total crude tonnage run, approx 2600.
Average of crude .68 .35 4.50 6.3
(Calculated)

A map is available showing origin of lots. There has no doubt been some selection, but lots are scattered over large area.

Mill returns are after deduction of freight and milling (custom) charges. File of settlement sheets has been examined and is available.

Other methods of obtaining averages are somewhat higher in silver and copper, and lower in lead and zinc than above. Average as stated in report is compiled from all methods. Dollar average would be about the same by either method.

- - - - - - - - - - - - - - - - - -

To accompany report, Sept. 1955, by Chas. H. Dunning.

CHARLESTON LEAD MINE.
North-South section through proposed pit.

To accompany Report by Chas. H. Dunning.
Scale 1" = 300'
Sept 1855.

Lawrence Adie (5-2-57)

Inco Report?
5-2-57 160

REPORT ON THE CHARLESTON MINE

Tombstone, Arizona

INTRODUCTION

The Charleston property consists of 12 unpatented claims, comprising about 228 acres, situated in Sections 25 & 36 of T. 20 S., R. 21 E. The property lies about eight miles southwest of Tombstone and about one half mile north of the county highway between Tombstone and Charleston.

The claims were located in 1928 and exploration work in the form of sinking three shafts, the deepest to 104 feet, and drifting short distances from these headings, was carried out prior to acquisition of the property, in 1947, by the present major shareholder, C. H. Suiter. Mr. Suiter and several leasers further developed the property and have sporadically operated it, up to the present time.

None of the original shafts are accessible at present because last year a program of open pitting above these workings was abandoned before completion, leaving them buried under a substantial quantity of broken rock. A short distance to the west, however, two shafts about 75 feet apart, called the Brother George No. 2 and No. 5, are connected by a drift on the 70 foot level and a small amount of workings can be inspected on this level.

PRODUCTION

The total production to date from the Charleston property is approximately 3,000 tons, from which 1,340 tons of lead-zinc bulk sulphide concentrate were shipped to the smelter. The arithmetic average of the first 23 of 26 ore shipments which constitutes this tonnage is:

1.45 ozs. Ag. 0.76% Cu. 9.60% Pb. 13.7% Zn.

Neglecting milling losses, the calculated average ~~from~~ Run the mine run, based on a ratio of concentration of about 2.3 to 1 is:

0.6 ozs. Ag. Cu. 0.3% Pb. 4.2% Zn. 6.0%

It should be noted that the ore was mined somewhat selectively and the true average may be as little as half the above figures, although the ultimate grade will probably lie somewhere between these two extremes.

GEOLOGY

The Charleston mineralization lies in a strong east-west zone of faulting which, in the mine area, cuts through a formation of predominantly andesitic flows and flow-breccia. These rocks are correlated with the lower member of the Bronco formation of late Cretaceous or early Tertiary age. The upper member is variously termed a quartz latite tuff or, for identification in the field,

a rhyolite agglomerate. Outcrops of rhyolite may be found in many places on the property.

The quartz latite tuff member has been estimated from 900 to 2500 feet thick and the underlying andesitic member is considered to be at least 3500 feet thick.

In the Charleston area the Bronco formation has been intruded by a thick sill of quartz latite porphyry. This body, which is known as the Uncle Sam formation, outcrops continuously from about a thousand feet north of the mineralized area to the edge of the Tombstone hills, about four miles to the northeast. There are also numerous smaller irregular masses of this rock in the area, one of which outcrops on the Charleston mine hill, within 200 feet roughly to the south of the main showings.

The intrusion of the Uncle Sam prophyry is believed to have been controlled generally by a thrust fault which was formed during the period of major deformation of the Tombstone district. No additional movement along the thrust is known following the emplacement of the porphyry. The age of the Bronco formation with respect to this thrust faulting is indefinite because thesevolcanic rocks have not been found, as yet, in contact with the fault.

Although the large mass of Uncle Sam porphyry lying northeast of the Charleston mine is relatively flat lying, the contact between it and the Bronco andesite which lies a thousand feet north of the mine fault is steep dipping. Flow banding in the porphyry near the contact is almost vertical, and strikes west to northwest.

The prophyry lying on the hillimmediately south of the mine appears to be laccolithic, as the andesitic member outcrops in a nearly complete ring around it. The north contact of this body appears to be faulted and parallel in strike to the Charleston mine fault; if the contact dips 60 degrees south, as does the main fault 200 feet north, a wide zone of reverse faulting is suggested.

Within this zone of faulting intense hydrothermal alteration of the andesite has taken place, the strongest metamorphism occurring at wider zones of shearing, which are apparently related to zones of northsouth crossfaulting. High temperature solutions emanating along the faults have altered the andesite to clay minerals; this magmatic process is also an indication of lead zinc mineralization.

There appears to be a definite sequence to the wall rock alteration. From almost pure sericite in the centre of the hydrothermal vein the sequence changes from an illite clay (ie. a definite type of mica clay) to a predominantly Kaolin clay, thence in decreasing intensity through Kaolinized andesite, or rhyolite, to a comparatively fresh wall rock. The sericite is most significant because, while being a commercially important by-product, it is also an indicator

of fairly strong lead-zinc mineralization. Minor values in these metals also occur in the Kaolinized wallrock.

The main zone of sericite-lead-zinc mineralization can be traced on surface for a length of 300 feet. The average width along the zone is probably at least 12 feet, and it is likely that the widest portion is in excess of 25 feet. At present, the widest area, in the vicinity of the Mary Jo No. 3 shaft, is partly buried under a pile of broken waste rock and a determination of the width in this area is not possible at present.

On surface the metallic minerals are completely leached but, in the Brother George No. 5 shaft, sulphides are encountered at a depth of about 30 feet. The depth of leaching appears to be somewhat greater where the zone narrows down to a few feet.

The main shear is traceable for about 1200 feet to the west of the main zone of mineralization. There is some oxidation of the adjacent rocks along the fault but at only one other point is any sericite known. This showing is close to a small north-south draw which is believed to contain a cross fault; the mineralized zone is believed to be fairly small although further exposing would be necessary to determine its size. Other interesting zones, which are also believed to be small, lie in parallel zones on both sides of the main body of mineralization.

MINING AND METALLURGY

The original plan for mining the Charleston seemed to be based on the premise that there was a mineable body of ore 400 feet long and up to 150 feet wide. The writer believes, however, that the Kaolinized and weakly mineralized wall rock adjacent to the main sericite zone, which may contain small parallel shoots of ore, is generally of too low tenor for a large scale profitable open pit type of mining. At least this is suggested by the assay results on the churn drill samples which, as previously stated, are incomplete and not too reliable.

At present the property should be regarded as a potential small tonnage underground producer, although a small amount of work cleaning out the broken rock in the pit to verify this, and rule out the open pitting idea, is justified. The chief problem of underground mining would be ground support, especially on those workings below the water table. It is believed that a squareset-fill type of support would be necessary in the stopes and most of the development headings would require close timbering.

The metallurge appears relatively simple, the main uncertainty being the determination of the most suitable method of obtaining the highest possible grade of sericite concentrate. This process might involve using wet cyclones or an electrostatic method; it is understood that Gladding-McBean are separating minor quantities of sericite from Kaolinite with the use of Krebb cyclones.

The clay is easily separated from the sulphides on mixing with water. A clay slurry is formed very simply by agitation and, because the sericite is all minus 325 mesh, separation is easily effected by screening.

163

ECONOMIC CONSIDERATIONS

The churn drill hole which is collared 128 feet south of the Mary Jo No. 3 shaft was drilled to a depth of 340 feet; the results of this hole were either withheld from the owner or were carelessly kept, even though difficult drilling conditions prevented acquiring accurate data. Nevertheless, the assays shown on the attached cross section, which were run on the only remaining samples in Mr. Suiter's possession, indicate a zone of significant mineralization at least 12 feet in true width, at a depth of 300 feet below the collar. If the tonnage per vertical foot indicated at surface, ie. about 300 tons plus, is extended down to the horizon of mineralization in the churn drill hole, a total of approximately 100,000 tons is calculated, which can be classed as indicated or probable ore. By assuming that there is a 50 percent chance of this quantity being present, a total of 50,000 tons can be classed as assured ore.

A preliminary analysis of the economics of the Charleston is rather difficult to make for a number of reasons; the value of the sericite product is unknown, the cost of mining is difficult to estimate, the anticipated grade of Pb. Zn. is slightly uncertain, and water seepage or flows in the zone below the water table will undoubtedly affect the mining adverely, although to what degree, is unknown at present.

The following is a quesstimate of the net value of the ore, taking into consideration the mainy uncertainties associated with the calculations. The grade of ore mined in the past by selective mining ran:

0.6 ozs. Ag. 4.2% Pb. 6.0% Zn.

I believe that a 50% dilution factor of these grade should be made to allow for standard mining dilution and for mining the zone full width without any selection. Thus the calculated grade for the mill heads is:

0.4 ozs. Ag. 2.8% Pb. 4.0% Zn.

Allowing for milling losses, freight and smelter charges, the net value per ton of the base metals is calculated to be $10.50 from the following:

80%	of the gross silver value	@ 90¢/oz.	=	$0.30
60%	" " " lead "	@ 15½¢/lb.	=	5.10
50%	" " " zinc "	@ 13½¢/lb.	=	5.40
		TOTAL		$10.80

The by-product sericite from the former milling operation on the Charleston has been marketed through the Ari-Zonalite Co. of Phoenix for a reported price of $20 per ton. It is understood that this company can market 20 tons of sericite per day and may possibly be able to handle 1,000 tons per month. A 40 percent sericite content for the mineable zone is believed to be very conservative. Thus at $20 per ton for the cleaned sericite, the value of the crude ore per ton would be at least $8.

Thus the minimum value per ton is believed to be $18.80. The average sericite content could possibly run 60 percent or higher which would add materially to net value.

It sould be stated that some mining may be possible in the walls of the main zone as well as in parallel shoots, even though the prospect of mining the whole by open pitting does not appear too good. Any mining in the walls, of course would result in a lower grade mine run, and larger tonnage.

The cost of operating the Charleston is a little difficult to predict because the ground conditions are so abnormal. However, the following figures, arrived at after discussion with E. A. Scholz, are believed to be reasonably close.

Mining and Timbering	$9.00 per ton
Development	1.00
Milling	4.00
Overhead and Miscellaneous	2.00
	$16.00 per ton

Thus the profit margin works out at $2.80 per ton which, if anything, may be a little on the conservative side. The estimate is, however, entirely contingent upon the value of the sericite, which is arrived at by negotiation and contract. A cleaned sericite might command a price of $30 to $40 per ton, which could change the picture considerably, although there are no doubt many uncertainties associated with these prices. All calculations have been made on the basis that at least a 100 ton milling plant would be set up on the property, if feasible.

Using the minimum profit figure, the net operating profit on the indicated ore amounts to $280,000. This sum falls short of amortizing the property payments and capital expenditures. Payments call for $3500 down, $5,000 in three months, $2,000 in six months, and monthly payments of $2,000 thereafter during the remainder of the first year, with the total price being $300,000. A rough estimate of the capital expenditure necessary to put the property into production on a 100 ton basis is, say, $200,000. Thus using the minimum profit figure the ore in sight falls some $230,000 short of the break-even point. On a more optimistic basis, which assumes that the sericite could be marketed at an average price of $30 net per ton, the net profit is increased to $4.80 per ton and if, say, 60 percent of the mine run was sericite, instead of the 40 percent figure which was used, the profit would be increased further to a total of $12.80 per ton. In the first example of possible increased return the net operating profit would very closely pay for property payments and capital expenditures, while in the second example, a surplus of $780,000 would be accumulated from the handling of the 100,000 tons of indicated ore. In this latter case, a surplus would be obtained on the assured ore alone.

The above calculations, if northing else, serve to outline the risk of the venture, the difficulty of predicting the profit,

and the importance of knowing more about the value and the marketability of the sericite by-product; the first two of these considerations are more or less dependent on the third. It is likely that a market survey run on sericite would answer many of the questions, however, as an added expense, much testing would be required to ascertain the quality of the product and hence its true value.

Unless the profit margin is high, the property would be of little interest to a fairly large company, based on a 100 ton plant being the most feasible size. The chances of there being a good margin of profit are high enought to warrant investigating the sericite more thoroughly, I believe.

My reluctance to recommend exploration on the property and carry out a market survey is based on the high cost of the initial examination and the reported uncertainties associated with a sericite market as compared with size of the operation. A six month period would probably be necessary to accumulate sufficient date to give a realistic picture of the property's potential. During this period a total of about $35,000 would be required to complete preliminary exploration, as follows:

$3,500	option payment at outset
5,000	" " in three months
1,500	for cleaning out pit sufficient for sampling and estimating tonnage at surface more accurately
15,000	for drilling the zone, or if this is unfeasible, possible a greater sum for underground exploration
10,000	for conducting a market survey
$35,000	TOTAL

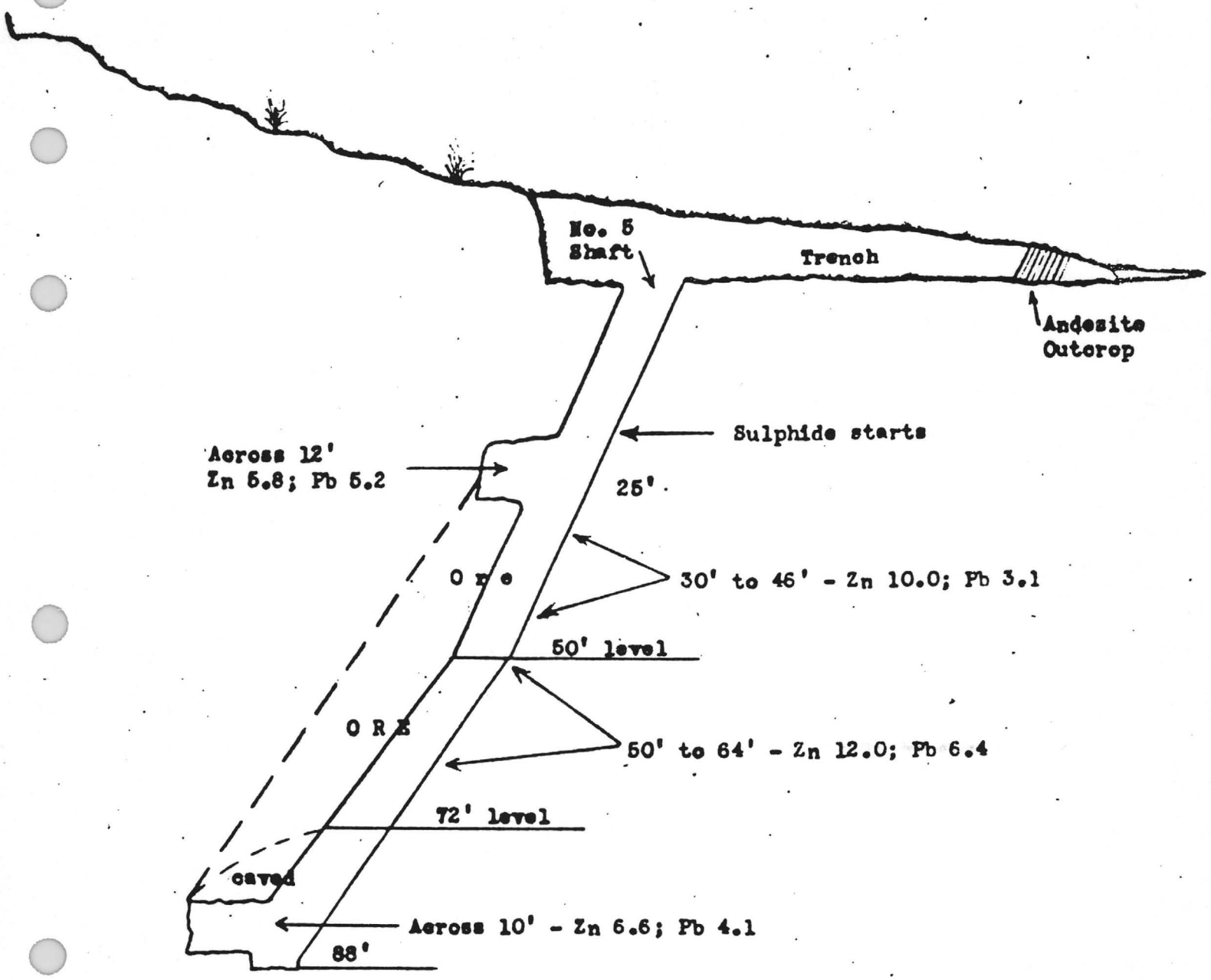
CONCLUSIONS

At present the Ari-Zonalite Company is interested in the property for its sericite content and apparently are able to market a small tonnage. In general their proposal looks better to the owner than what is reasonable for us to offer, because it is based on mining the near surface ore without regard to the development of the property. In withdrawing from a two-week free option period, negotiations were concluded on the note that we might be interested in entering the picture at a later date, perhaps in a sub-agreement with the Ari-Zonalite Co. to explore the larger possibilities while they, or some other small company, were operating on the immediate ore in sight. By this scheme our money would be spent on developing the property rather than being expended on option payments.

Respectfully submitted,

Lawrence Adie

May 2, 1957
Tucson, Arizona



Looking West - Section of No. 5 Shaft
Charleston Lead Mine, Tombstone, Ariz
Scale 1" - 20'0"

167

RFW

AMERICAN SMELTING AND REFINING COMPANY
SOUTHWESTERN ORE PURCHASING OFFICE
810 VALLEY BANK BUILDING
TUCSON, ARIZONA

REED F. WELCH
MANAGER

May 8, 1951

Mr. Charles H. Suiter, General Manager
Charleston Lead Mines Co.
Tombstone, Arizona

Dear Sir:

Enclosed is Deming mill schedule for ore you are producing at the Charleston Mine, assaying:

Gold oz	Silver oz	Lead %	Copper %	Zinc %
-	1.80	13.80	1.25	21.02

Cars should be consigned to American Smelting and Refining Company, Asarco Mill, New Mexico, with shipping advice and settlement instructions mailed to the Deming office (P.O. Box 998).

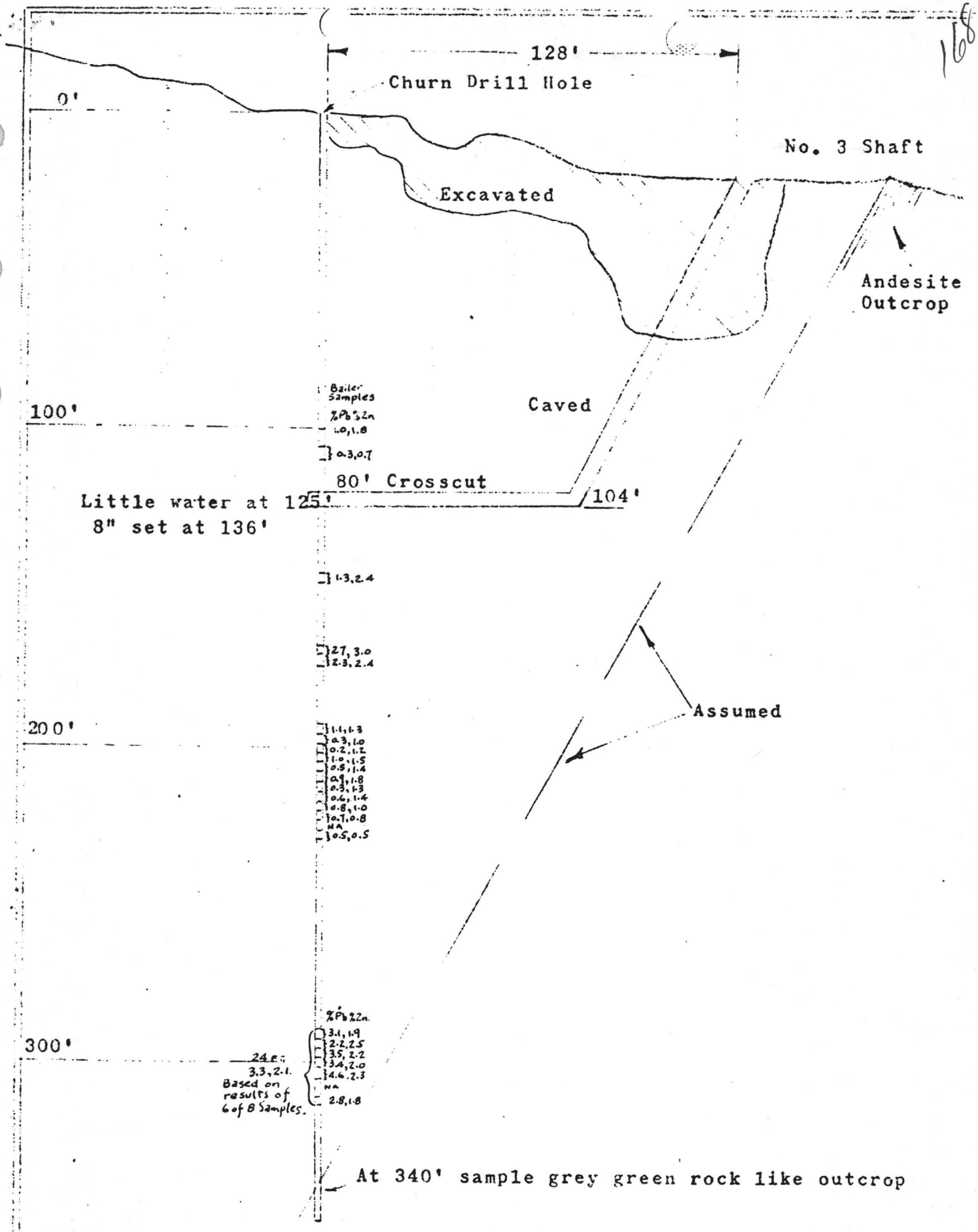
On present metal prices and above-quoted assays the net return after milling would be approximately $60.80 per ton. The freight charge from Tombstone to Asarco Mill on this grade of ore is about $3.50 per ton including tax.

Yours very truly,

Reed F. Welch

REED F. WELCH

Enclosure



American Exploration & Mining Co.
Section Looking West
of Churn Drill Hole and No. 3 shaft
Chance Land Mine, Tombstone, Ariz.
Scale 1" = 40' 0"

SERICITE @ PER.
3-24-58

Charleston Mine
Tombstone, Arizona

I. General Information
2. Sales and Merchandising Program
3. Proposed Operaring Budget
4. Expenditures to Date
March 24, I958

Charleston Lead Mine
Tombstone, Arizona

Geology--

Basic rock is a rhyolite cut by a major east-west shear zone with instrusive of andesite forming sericitized andesite and rhyolite. This major vein extends 3000 feet and varies in width from 5 feet to 45 feet on surface indications.

Secondary enrichment of the vein material (sericite) occurs in the form of lead, zinc and iron sulphides with small amounts of silver and copper.

The dip of this major vein is 65 to 68 degrees to the south and is seemingly constant.

Values of all recorded assays vary between 4% combined lead zinc to as high as 32% with copper from 0.I% to 2.40%. Our highest silver assay to date is a little over 2 oz.

History--

These mining claims have been operated intermittently over the past 20 years for the metal ores. In all cases, the procedure was to mine from small shafts and tunnels, hoist the ore and wash the clay for a gravity separation of sulphides.

It takes only a casual glance at the above values to show this could not be profitable. It is only by recovery of the hydrous mica, 39 to 43% of the vein material, that a profitable mine could be made.

Sericite--

Sericite is a hydrous mica material natural ground containing a majority of flat laminated plates.

Operations--

We obtained these claims inthe summer of I957 for the purchase price of $250,000, $2500 down with balance out of royalties and a guaranteed minimum of $I000 per month. The minimum effective after October I957. Royalties are $3.00 per ton of sericite shipped and I0% of net smelter returns on metallic content.

Stripping and cleaning the pit area for ore exposure involved the movement of approximately 35,000 tons waste, costing approximately $38,000.

Remodeling of the pilot plant for ore and construction of settling tanks cost $I8,500.

Locating sufficient water was a major problem. Three wells were drilled before locating sufficient water for the operation. Pipe lines, water tanks and pumps were installed.

Charleston Mine

Sales

We have a ready local market for our Fine Mica (bottom grade) for 250 tons a month at $25.00 a ton, F.O.B. the Minesite (Ed. Whipple and Associates.)

This sale has been sufficient to use our product through the early pilot stages of operation.

The White Eagle Stucco Corporation in Phoenix will be able to use 50 tons a month or more of Fine Mica beginning the 15th of May at $35.00 a ton, F.O.B. the Minesite.

The Mica will be used in very high quality cement finishes for swimming pools to provide opaque whiteness.

This sale is available if and when we want it.

Merchandising

Our merchandising program anticipates the near future date when we can produce at least four different grades of Tombstone Mica in volume.

We have circularized sixty companies, many of whom are sufficiently interested to request samples for testing.

The following were among the companies who showed interest:

U. S. Gypsum Company
Milwhite Company, Inc.
The Uvalde Rock Asphalt Company
H. C. Horn Co.
Fred H. Lenway and Co., Ltd.
La Habra Stucco Company
Deer-O Paints and Chemicals, Ltd.
Sherwin-Williams Paint Co.

Some sent specification with their inquiries. We are confident that we can meet their requirements.

The purchase price per ton ranges from $60 to $190, depending on fineness and volume.

Our correspondence and research indicate the need of four basic qualities:

1. Fine to be sold in bulk at $35.00 per ton.
2. Extra Fine to be sold in bags (100#) at $60 to $100 per ton.
3. Super Fine to be sold in bags (25-50-100#) at $200 per ton.
4. Supreme Fine to be sold in bags (25-50-100#) at $300 to $500 Per ton.

These products will be sold under the mane of "Tombstone Mica."

A commercial artist is now preparing the design of the bag label.

Our greatest problem has been the drying of the colloidal clay. Air drying as first advocated proved useless. Tests run by all major western filter manufacturers showed that filters could only bring the slurry to 67% solids from 40% settling tanks slurry.

Open fired drum type dryers have beenrejected because of contamination with carbon.

Steam coils on drying beds have been effective and are now in use. A new radiant heated slab will be put into use April 3.

Air separation from two steam jacket heated dryers is being used to obtain three grades of sericite based on size and purity. This product is blowndirect to loading bins by air pressure.

Our crude product bringing $25.00 per ton F.O.B. minesite bypasses this operation and is stockpiled direct from the steam coil dryers. This crudeproduct contains approximately 2% impurities and IO% moisture. Improvements in this will be obtained by the addition of another classifier in the mill cycle.

Samples of our higher grade products are scheduled for shipment to prospective customers in the week of March 26, I958. Anticipated prices rangefrom $40.00 per ton, stucco industry, to $500.00 per ton electronics industry.

Metallic sulphides have been stockpiled, waiting development of a flotation mill and increase in prices anticipated under pending price support program. This has not been pushed pending going operation in the clay. We do have the flotation cells, but need a ball mill, motor, reagent tanks, classifier etc.,$20,000 additional, minimum $34,000 maximum.

There is a good possibility of buying high grade crude lead ore from small mines in the area to extend the sulphide operation to a more profitableone. This is being explored and a more definite picture should be available in thirty days.

Research and Development--

We plan, pending available funds from profits, to diamond core drill our ore body to 600' depth, together with drilling the wide lens on the west end of the vein. We further plan the installation of a hoist and skip for removal of ore and waste in the immediate future. We must provide an enlarged ore bin and a waste bin.

New methods of drying to be tested include the use of solar heat.

I. Combine the concentrated, high temperature ray on the top of a revolving filter drum giving an explosive type drying;
2. Use of large reflectors to induce heat in our intermediate bed to speed up drying on the steam coils;
3. We plan to do some testing on water elutriation for fine separation.

Bags are being obtained from the manufacturers.

Experiments in depositing are now being conducted at the mill.

Our merchandising objective will be to obtain and service as few accounts as possible and still sell the total production of the mill.

It is expected that five big name customers will give us the most economic sales program and at the same time be able to use all four grades of Mica at the best market prices.

March 22, 1958

Charleston Mine

Forecast of Sericite mining operations; one year operation, five days per week:

Proposed Operating Budget:

1. Labor

	Superintendent	$10,800	
8 hrs./day	Mill man and helper	8,925	
8 hrs./day	Mining -4men	16,320	
24 hrs./day	Drying operation	25,000	
	Mechanic-Misc.	3,570	
		$ 64,615	
	Payroll Tax	$ 6,000	
		$ 70,615	$70,615

2. Materials and Supplies

Fuel Oil-92,000@ 14	$ 13,000	
Power 500 @ 12	6,000	
Powder and fuse	4,320	
Telephone	360	
Misc. Supplies	5,000	
Equipment Repair	6,000	
Oil and Gas	2,400	
Equipment rental	3,200	
	$ 40,280	
Taxes	800	
	$ 41,080	41,080
Total		$ 111,695

3. Development and Planning

Engineer	$ 6,000	
Drilling	3,000	
Misc, Supplies	6,000	
	$ 15,000	15,000

4. Plant Expansion

A. Sulphide Mill

Equipment

Ball Mill	4,500	
Reagent Tanks	2,800	
Conveyors	1,800	
Pumps	3,600	
Filter and Motor	2,600	
Ore Bins	4,000	
Motors	1,800	
Concrete and Misc.	3,000	
	$ 24,100	
Installation	10,000	
	$ 34,100	$ 34,000

Income -- Based on 36 tons Sericite per day of operation:
255 days @ 36 tons per day = 8,180 tons Sericite = 17,000 Tons Gross Ore;

1. Whipple Contract 5,000 tons @ $25.00	$ 125,000	
2. Stucco Product 600 tons @ $ 35.00	21,000	
3. Paint Products 2,500 tons @ $70.00	175,000	
4. Electronics 80 tons @ $200.00	16,000	
	337,000	
Royalty- 8,180 @ 3.00	24,540	
	$ 312,460	$ 312,460

Sulphides- Lead and Zinc

17,000 tons gross ore @ 4% = 1,360,000#
(4% combined lead zinc is a conservative value)

1,360,000# @ $.06 per pound	---	$ 81,600	
Royalty 10%	---	8,160	
		73,440	
Not included in (1) and (2)			
(Milling Costs)	---	18,000	
(Freight)	---	12,000	
		$ 43,440	43,440
Total			$ 355,900

Summary

Income			$ 355,900
Item 1. Labor	----	70,615	
2. Materials and Supplies	----	41,080	
3. Development and Planning	---	15,000	
4. Depreciation 110,000 @ 6%, 5 years	--	25,254	151,949
			203,951
Overhead Expense and Marketing	----		$ 30,000
Net Before Taxes			$ 173,951

25a

Charleston Mine

Expenditures to Date
March 24, 1958

	1957	1958	Totals
Expensed Items			
Payments to Mr. Charles Suiter	5,518.00	2,000.00	7,518.00
Equipment Depreciation	------	5,400.00	5,400.00
Supervision	4,093.90	2,005.10	6,099.00
Mine Foreman	2,086.00	1,504.00	3,590.00
Engineering Main Office Travel	-----	2,600.00	2,600.00
Main Office Travel	200.51	449.49	650.00
Claim Location	268.77	----	268.77
Assay & Consulting Fees	1,435.19	55.00	1,490.19
Well Drilling & Pumps	6,752.06	----	6,752.06
Tank	914.78	----	914.78
Stripping & Cleaning Pit	20,503.78	9,096.13	29,599.91
Mill Operation & Remodeling	9,919.58	1,240.00	11,159.58
Drying Operations	----	10,300.00	10,300.00
Pipe-Copper	-----	2,061.07	2,061.07
Concrete Slabs	----	3,200.00	3,200.00
Taxes, Insurance and Fees	1,476.30	703.12	2,179.42
Total Expensed Items	53,168.87	40,613.91	93,782.78
Capital Equipment			
1 Michigan 75A Tractor Shovel	12,750.00		
170 Pieces Pipe, etc.	6,358.94		
1 20-Gal. Water Tank	2,368.45		
1 34' Bucket Elevator	2,603.00		
1 Water Drilling 292' Casing	3,556.00		
1 Peerless Pump 7-½ HP	11,796.80		
6 44" Winco Std. Type A Fagugren Flotation Mach. Cells	6,387.00		
1 2" Flow Pump	1,283.00		
1 Boiler		4,034.83	
1 Air Hoist		487.50	
1 Blower and Motor		399.75	
1 Sieve-Snaker with Motor & Pestle		408.05	
Total Capital Equipment	37,103.19	5,330.13	42,433.32
Total Expenditures To Date	90,272.06	45,944.04	136,216.10

Charleston Misc Info (3-24-58)

CHARLESTON MINE
Tombstone, Arizona

1. General Information
2. Sales and Merchandising Program
3. Proposed Operating Budget
4. Expenditures to Date
   March 24, 1958

245

CHARLESTON LEAD MINE
Tombstone, Arizona

Geology

Basic rock is a rhyolite cut by a major east-west shear zone with instrusive dikes of andesite forming sericitized andesite and rhyolite. This major vein extends 3000 feet and varies in width from 5 feet to 45 feet on surface indications.

Secondary enrichment of the vein material (sericite) occurs in the form of lead, zinc and iron sulphides with small amounts of silver and copper.

The dip of this major vein is 65 to 68 degrees to the south and is seemingly constant.

Values of all recorded assays vary between 4% combined lead zinc to as high as 32% with copper from 0.1% to 2.40%. Our highest silver assay to date is a little over 2 oz.

History

These mining claims have been operated intermittently over the past 20 years for the metal ores. In all cases, the procedure was to mine from small shafts and tunnels, hoist the ore and wash the clay for a gravity separation of sulphides.

It takes only a casual glance at the above values to show this could not be profitable. It is only by recovery of the hydrous mica, 39 to 43% of the vein material, that a profitable mine could be made.

Sericite

Sericite is a hydrous mica material natural ground containing a majority of flat laminated plates.

Operations

We obtained these claims in the summer of 1957 for the purchase price of $250,000, $2500 down with balance out of royalties and a guaranteed minimum of $1000 per month. The minimum effective after October 1957. Royalties are $3.00 per ton of sericite shipped and 10% of net smelter returns on metallic content.

Stripping and cleaning the pit area for ore exposure involved the movement of approximately 35,000 tons waste, costing approximately $38,000.

Remodeling of the pilot plant for washing the ore and construction of settling tanks cost $18,500.

Locating sufficient water was a major problem. Three wells were drilled before locating sufficient water for the operation. Pipe lines, water tanks and pumps were installed.

246

Our greatest problem has been the drying of the colloidal clay. Air drying as first advocated proved useless. Tests run by all major western filter manufacturers showed that filters could only bring the slurry to 67% solids from 40% settling tanks slurry.

Open fired drum type dryers have been rejected because of contamination with carbon.

Steam coils on drying beds have been effective and are now in use. A new radiant heated slab will be put into use on April 3.

Air separation from two steam jacket heated dryers is being used to obtain three grades of sericite based on size and purity. This product is blown direct to loading bins by air pressure.

Our crude product bringing $25.00 per ton F.O.B. minesite bypasses this operation and is stockpiled direct from the steam coil dryers. This crude product contains approximately 2% impurities and 10% moisture. Improvements in this will be obtained by the addition of another classifier in the mill cycle.

Samples of our higher grade products are scheduled for shipment to prospective customers in the week of March 26, 1958. Anticipated prices range from $40.00 per ton, stucco industry, to $500,00 per ton electronics industry.

Metallic sulphides have been stockpiled, waiting development of a flotation mill and increase in prices anticipated under pending price support program. This has not been pushed pending going operations in the clay. We do have the flotation cells, but need a ball mill, motor, reagent tanks, classifier etc., $20,000 additional, minimum, $34,000 maximum.

There is a good possibility of buying high grade crude lead ore from small mines in the area to extend the sulphide operation to a more profitable one. This is being explored and a more definite picture should be available in thirty days.

Research and Development

We plan, pending available funds from profits, to diamond core drill our ore body to 600' depth, together with drilling the wide lens on the west end of the vein. We further plan the installation of a hoist and skip for removal of ore and waste in the immediate future. We must provide an enlarged ore bin and a waste bin.

New methods of drying to be tested include the use of solar heat.

1. Combine the concentrated, high temperature ray on the top of a revolving filter drum giving an explosive type drying;

2. Use of large reflectors to induce heat in our intermediate beds to speed up drying on the steam coils;

3. We plan to do some testing on water elutriation for fine separation.

March 22, 1958

247

CHARLESTON MINE

Forecast of Sericite mining operations; one year operation, five days per week:

Proposed operating budget:

1. **Labor**

	Superintendent	$ 10,800	
8 hrs. /day	Mill man and helper	8,925	
8 hrs. /day	Mining - 4 men	16,320	
24 hrs. /day	Drying operation	25,000	
	Mechanic - Misc.	3,570	
		$ 64,615	
	Payroll Tax	6,000	
		$ 70,615	$ 70,615

2. **Materials and Supplies**

Fuel Oil - 92,000 @ 14	$ 13,000	
Power 500 @ 12	6,000	
Powder and fuse	4,320	
Telephone	360	
Misc. Supplies	5,000	
Equipment Repair	6,000	
Oil and Gas	2,400	
Equipment rental	3,200	
	$ 40,280	
Taxes	800	
	$ 41,080	41,080
TOTAL		$ 111,695

3. **Development and Planning**

Engineer	$ 6,000	
Drilling	3,000	
Misc. Supplies	6,000	
	$ 15,000	15,000

4. **Plant Expansion**

A. **Sulphide Mill**

Equipment

Ball Mill	4,500	
Reagent Tanks	2,800	
Conveyors	1,800	
Pumps	3,600	
Filter and Motor	2,600	
Ore Bins	4,000	
Motors	1,800	
Concrete and Misc.	3,000	
	$ 24,100	
Installation	10,000	
	$ 34,100	34,100

Income - Based on 36 tons Sericite per day of operation;
255 days @ 36 tons per day = 8,180 tons Sericite = 17,000 Tons Gross Ore:

1. Whipple Contract		
5,000 tons @ $25.00	$ 125,000	
2. Stucco Product		
600 tons @ $35.00	21,000	
3. Paint Products		
2500 tons @ $70.00	175,000	
4. Electronics		
80 tons @ $200.00	16,000	
	337,000	
Royalty - 8,180 @ 3.00	24,540	
	$ 312,460	$ 312,460

Sulphides - Lead and Zinc

17,000 tons gross ore @ 4% = 1,360,000#
(4% combined lead zinc is a conservative value)

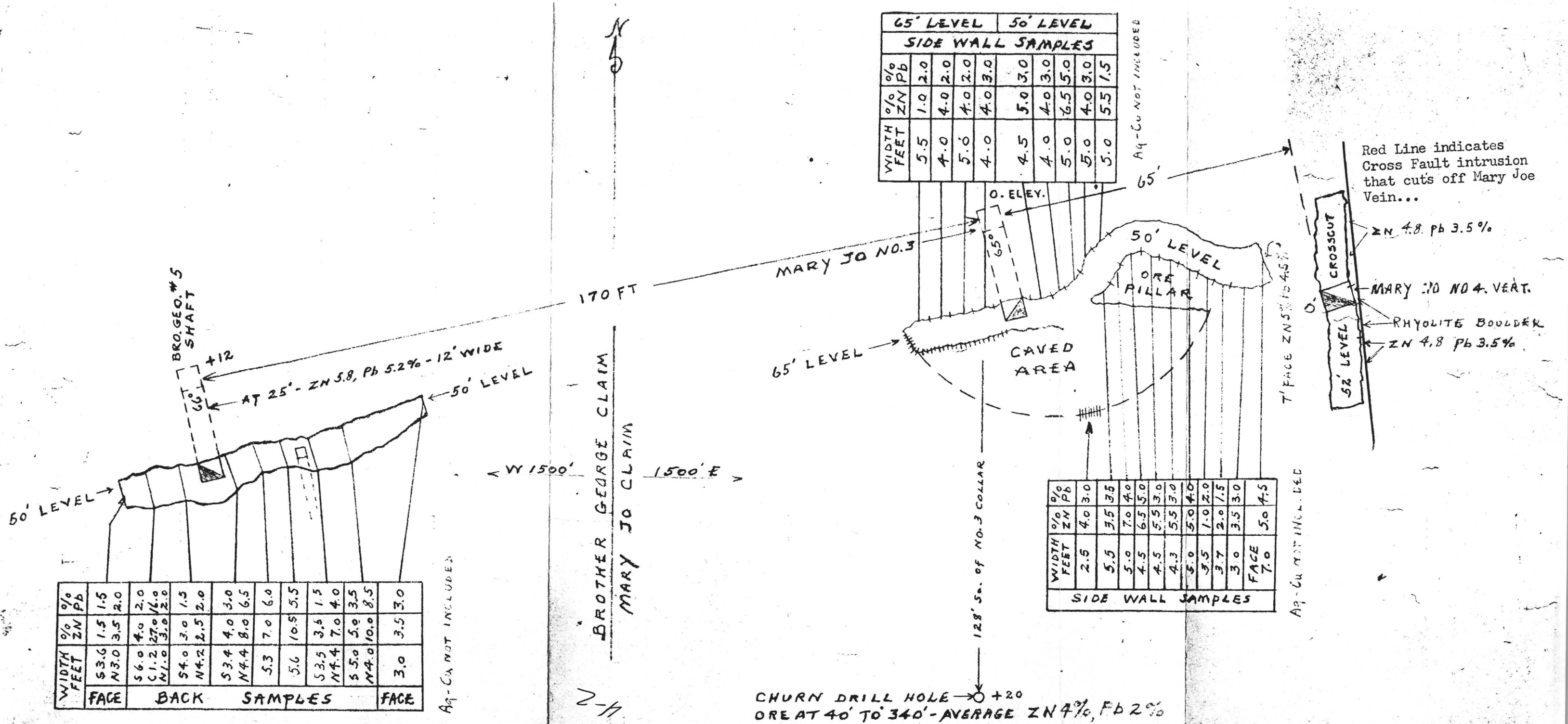
1,360,000# @ $.06 per pound	=	$ 81,600	
Royalty 10%	-	8,160	
		73,440	
Not included in (1) and (2)			
(Milling Costs)	-	18,000	
(Freight)	-	12,000	
		$ 43,440	43,440
TOTAL			$ 355,900

SUMMARY

Income			$ 355,900
Item 1. Labor	-	$ 70,615	
2. Materials and Supplies	-	41,080	
3. Development and Planning	-	15,000	
4. Depreciation			
110,000 @ 6%, 5 years	-	25,254	151,949
			$ 203,951
Overhead Expense and Marketing			30,000
NET BEFORE TAXES			$ 173,951

Chas H. Suiter (5-14-58)

5-14-58



	FACE	BACK SAMPLES									FACE
WIDTH FEET		S3.6 N3.0	S6.0 C1.2 N1.0	S4.0 N4.2	S3.4 N4.4	S.3	S.6	S3.5 N4.4	S 5.0 N4.0		3.0
% ZN	1.5 3.5	4.0 27.0 3.0	3.0 2.5	4.0 8.0	7.0	10.5	3.5 7.0	5.0	10.0		3.5
% Pb	1.5 2.0	2.0 4.0 2.0	1.5 2.0	3.0 6.5	6.0	5.5	1.5 4.0	3.5	8.5		3.0

	65' LEVEL	50' LEVEL								
	SIDE WALL SAMPLES									
WIDTH FEET	5.5	4.0	5.0	4.0	4.5	4.0	5.0	5.0	5.0	
% ZN	1.0	4.0	4.0	4.0	5.0	4.0	6.5	4.0	5.5	
% Pb	2.0	2.0	2.0	3.0	3.0	3.0	5.0	3.0	1.5	

	SIDE WALL SAMPLES										
WIDTH FEET	2.5	5.5	5.0	4.5	4.5	4.3	5.0	3.5	3.7	3.0	FACE 7.0
% ZN	4.0	3.5	7.0	6.5	5.5	5.5	5.0	1.0	2.0	3.5	5.0
% Pb	3.0	3.5	4.0	5.0	3.0	3.0	4.0	2.0	1.5	3.0	4.5

ASSAY MAP - PART OF WORKINGS OF CHARLESTON LEAD MINE - TOMBSTONE, ARIZ.

Scale 1" = 20'-0"

C.H.S.

K.L. Erickson (1-23-60)

F. G. McFARLAND
TOOELE, UTAH
PHONE---TOOELE 122

S. R. HULLINGER
TOOELE, UTAH
PHONE---TOOELE 1425

230

McFARLAND AND HULLINGER

MINING • ORE HAULING • CONTRACTING

PHONE 219
P. O. BOX 238
TOOELE, UTAH

Sahuarita Mill
Sahuarita, Arizona
January 23, 1960

Mr. M. S. Horne
411 North Central Avenue
Phoenix, Arizona

Re: Evaluation of Milling
Charleston Mine Sulphides

Dear Mr. Horne:

An evaluation based on assumed recoveries and grade of concentrates expected from milling the sulphide material at the Charleston Mine - is calculated as follows-

Sulphide Crude Ore - Assaying 4.5% Lead and 11.4% Zinc

Assumptions:
90% recovery of lead to lead concentrates
85% recovery of zinc to zinc concentrates
55% assay grade of Lead concentrates
54% assay grade of Zinc concentrates

On this basis from each 100 tons (dry) milled there would be produced 7.364 dry tons of lead concentrates, and 17.944 tons of Zinc concentrates.

The Smelter payment for the lead concentrates would be as follows-

55.0% Lead less 1.5% 53.5%, pay for 90% or 963# @ 12.0¢ less 2.06¢ or 963# @ 9.94¢	$95.72	124.61
Credit for lead above 30% @ 10¢/unit	2.35	2.35
Credit for Iron (est. 7%) @ 10¢/unit	.70	.70
	$98.77	127.66
Less Base Treatment Charge	14.57	14.57
	$84.20	113.09
Less R.R. Frt. Sahuarita-ElPaso $8.83/wet ton(10% moisture)	9.81	9.81
Net Smelter Value/ton Lead Concentrate	$74.39	$103.28

231

The Smelter payment for Zinc Concentrates would be as follows-

54.0% Zinc - pay for 85% or 918#, @ 13.0¢ less .37¢ or 12.63¢/#

918 lbs. @ 12.63¢	$ 115.94
Less Smelter Treatment Charge	48.20
Gross Smelter Amount	$ 67.74
Less R.R. Frt. Sahuarita-Bartleville, Okla. $14.76/wet ton (13.28 plus 10% moisture)	14.76
Net Smelter Value/ton Zinc Concentrate	$ 52.98

- - - - - - - - - - - - - -

SUMMARY

Value after milling 100 dry ton crude sulphides of 4.5% Lead 11.4% Zinc

7.364 dry ton lead concentrate @ $ 74.39	103.25	$ 547.81	760.55
17.944 dry ton zinc concentrate @ 52.98		950.67	950.67
		$1498.48	~~989.88~~ 1711.22
Smelter Value per 100 ton crude			
Less Milling Charge 100 ton @ $6.00		600.00	600
Net Value to Mine		$ 898.48	1111.72
Net Value to Mine per ton of Crude		8.98	11.11

The value of the material assaying 5.7% Lead and 6.5% Zinc, would return $6.38 per dry ton crude after smelting & milling charges.

- - - - - - - - - - - - - -

I have no assays or basis to calculate silver value. However, if you have silver assays it will be quite alright for you to add 60¢ per ton, per ounce assay, to the above figures.

232

Mr. Horne, I would like to point out that this is not a conservative estimated evaluation. Both the assumed percentage recoveries, and assay grade of concentrates approach the best work we have been able to accomplish on various lead-zinc ores treated in our plant here. It is very possible the actual milling results would not be as good as the assumptions. I have tried to show a reasonable maximum return, and for you to make allowances for assay grade either below or above the assays you phoned to me this morning.

Should you like to have the 150 ton mill test carried out, we would like two days notice in order to clear our receiving bins. It would be approximately one week after receiving the lot before we could give you the actual milling results.

I sincerely hope the foregoing information will be of help to you. Should you like any further information please feel free to ask.

Yours very truly,

K. L. Erickson

K. L. Erickson, Mill Superintendent

George Roseveare (2-26-60)

UNIVERSITY OF ARIZONA
ARIZONA BUREAU OF MINES
ORE TESTING SERVICE

compare & file mining Charleston 625

February 26, 1960

Mr. Seth Horn
James Steward Construction Company
411 N. Central Avenue
Phoenix, Arizona

Ore Test 1636

Dear Mr. Horn:

The sample of Charleston rejects from sericite operations was sampled by Mr. Hall and it assayed:

0.005	oz. gold per ton
0.4	oz silver per ton
0.39	per cent copper
4.1	per cent lead
6.2	per cent zinc

Three tests were made on the material to produce lead and zinc concentrates.

Test 2

A sample was ground in a ball mill and the pulp treated by flotation. The reagents used are given in Table 1 and the results in Table 2.

The lead concentrate amounted to 2.6 tons per 100 tons of feed and assayed 0.02 oz gold and 0.8 oz silver per ton, 4.02 per cent copper, 51.2 per cent lead and 3.9 per cent zinc. It contained 26.1, 38.2 and 1.7 per cents of the total copper, lead and zinc, respectively.

The lead cleaner tailing amounted to 5.9 tons per 100 tons feed and assayed 1.66 per cent copper, 28.8 per cent lead and 15.6 per cent lead and 15.6 per cent zinc. The cleaner tailing contained 24.3, 48.7 and 15.8 per cents of the total copper, lead, and zinc, respectively.

The zinc concentrate amounted to 4.9 tons per 100 tons of feed and assayed 1.6 per cent lead and 58.5 per cent zinc and contained 2.3 and 49.1 per cents of the total lead and zinc.

METALLURGICAL RESULTS OBTAINED ABOVE SHOULD BE CONSIDERED AS ONLY APPLICABLE TO MATERIAL CONFORMING TO THE CHARACTER OF THE SAMPLE UPON WHICH THE TESTS WERE MADE.

UNIVERSITY OF ARIZONA
ARIZONA BUREAU OF MINES
ORE TESTING SERVICE

The zinc cleaner tailing assayed 1.8 per cent lead and 4.4 per cent zinc and the zinc rougher tailing 0.4 per cent lead and 2.2 per cent zinc.

Test 3

Test 3 was the same as test 2, except Thiocarbanilide 130 was substituted for reagent 404 in the lead circuit and more sodium aerofloat in the later test than in Test 2.

The reagents used are given in Table 3 and the results in Table 4.

The lead concentrate amounted to 6.0 tons per 100 tons of feed assayed, 59.3 per cent lead and 7.7 per cent zinc and contained 78.4 and 7.6 per cents of the total lead and zinc, respectively.

The lead cleaner tailing amounted to 3.3 tons per 100 tons of feed. It assayed 15.0 per cent lead and 17.0 per cent zinc and contained 10.9 and 9.3 per cents of the lead and zinc, respectively.

The zinc concentrate amounted to 6.9 tons per 100 tons of feed and assayed 2.6 per cent lead and 55.8 per cent zinc. It contained 4.0 and 63.3 per cents of the total lead and zinc, respectively.

The zinc cleaner tailing assayed 3.8 per cent lead and 9.0 per cent zinc. The rougher zinc tailing assayed 0.3 per cent lead and 1.3 per cent zinc.

Conclusions

1. Thiocarbanilide 130 was superior to 404 as a lead flotation reagent.
2. A recovery of 78 to 80 per cent of the lead in the ore could be expected.
3. The zinc recovery of 63 to 65 should be obtained.

METALLURGICAL RESULTS OBTAINED ABOVE SHOULD BE CONSIDERED AS ONLY APPLICABLE TO MATERIAL CONFORMING TO THE CHARACTER OF THE SAMPLE UPON WHICH THE TESTS WERE MADE.

UNIVERSITY OF ARIZONA
ARIZONA BUREAU OF MINES
ORE TESTING SERVICE

The sericite makes the pulp thick and the amount of frother may have to be varied. Reagent 404 would give more trouble because more talc would come over in the froth than with thiocarbanilide 130.

Yours very truly,

Geo H Roseveare

George H. Roseveare
Metallurgist

GHR:knh

cc: Sunrise Mining Co.,
Drawer 37 B
Sahuarita, Arizona

METALLURGICAL RESULTS OBTAINED ABOVE SHOULD BE CONSIDERED AS ONLY APPLICABLE TO MATERIAL CONFORMING TO THE CHARACTER OF THE SAMPLE UPON WHICH THE TESTS WERE MADE.

UNIVERSITY OF ARIZONA
ARIZONA BUREAU OF MINES
ORE TESTING SERVICE

Ore No...1636 Test No.....2....

Conditions and Reagents

Table 1

Point of Addition	Conditions			Reagents Pounds Per Ton									
	Time Mins.	% Solids	pH	SA	$ZnSO_4$	"B"	404	MIBC	CaO	$CuSO_4$	SP		
Ball Mill	7	60		0.5	0.7	0.5							
Conditioner	1	25	8.1				0.07	0.1					
Rougher	5						0.03						
Head Cleaner	2						0.03						
Conditioner	12		11.5					0.05	10.0	0.8	0.10		
Rougher	6		10.9								0.10		
Cleaner	2		10.9						1.5				

Remarks:
S. A. - Soda Ash
$ZnSo_4$ - Zinc Sulphate
"B" - Aero Brand Cyanide
404 - Reagent 404
MIBC - Methyl isobutyl carbonol
CaO - Lime
$CuSO_4$ - Copper Sulphate

Table 2

Metallurgical Products

Product	Tons in 100 Tons Feed	Assays						% of Total					
		Au	Ag	Cu	Pb	Zn		Cu	Pb	Zn			
Heads	100.0				3.49 x	5.84 x		100.0	100.0	100.0			
Lead Concentrate	2.6	0.02	0.8	4.02	51.2	3.9		26.1	38.2	1.7			
Lead Cleaner Tailing	5.9			1.66	28.8	15.6		24.3	48.7	15.8			
Zinc Concentrate	4.9				1.6	58.5			2.3	49.1			
Zinc Cleaner Tailing	2.3				1.8	4.4			1.2	1.7			
Rougher Tailing	84.3				0.4	2.2			9.6	31.7			
Assay Head		0.005	0.4	0.39	4.1	6.2							

Remarks: x Calculated

METALLURGICAL RESULTS OBTAINED ABOVE SHOULD BE CONSIDERED AS ONLY APPLICABLE TO MATERIAL CONFORMING TO THE CHARACTER OF THE SAMPLE UPON WHICH THE TESTS WERE MADE.

UNIVERSITY OF ARIZONA
ARIZONA BUREAU OF MINES
ORE TESTING SERVICE

Ore No.....1636 Test No.....3....

Conditions and Reagents

Table 3

Point of Addition	Conditions			Reagents Pounds Per Ton									
	Time Mins.	% Solids	pH	CaO	130	$ZnSO_2$	"A"	Misc	$CuSO_4$	S.A.			
Ball Mill	7	60		0.3	0.22	0.6	0.5						
Conditioner	3	25	7.0					0.08					
Lead Rougher	4												
Cleaner	2							0.05					
Conditioner	15		9.9	6.0				0.05	0.6	0.2			
Zinc Rougher	6		9.8										
Cleaner	3		9.9	1.0									

Remarks: CaO - Lime
130 - Thiocarbanilide
$ZnSO_4$ - Zinc Sulphate
"A" - Aero Brand Cyanide

MIBC - Methyl Isobutyl Carbinol
$CuSO_4$ - Copper Sulphate
S.A. - Sodium Aerofloat

Metallurgical Products

Table 4

Product	Tons in 100 Tons Feed	Assays						% of Total					
		Pb	Zn					Pb	Zn				
Heads	100.0	4.5*	6.1*					100.0	100.0				
Lead Concentrate	6.0	59.3	7.7					78.4	7.6				
Cleaner Tail.	3.3	15.0	17.0					10.9	9.2				
Zinc Concentrate	6.9	2.6	55.8					4.0	63.3				
Zinc CleanerTail	1.6	3.8	9.0					1.3	2.4				
Rougher Tailing	82.2	0.3	1.3					5.4	17.5				
Assay Head		4.1	6.2										

Remarks: * Calculated

grind 2 per cent on 100 mesh

METALLURGICAL RESULTS OBTAINED ABOVE SHOULD BE CONSIDERED AS ONLY APPLICABLE TO MATERIAL CONFORMING TO THE CHARACTER OF THE SAMPLE UPON WHICH THE TESTS WERE MADE.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
REGION III

257

TUCSON METALLURGY RESEARCH
LABORATORY

1724 NORTH VINE AVENUE
TUCSON, ARIZONA

March 2, 1960

Mr. P. G. Pearson
2247 E. 4th Street
Tucson, Arizona

Dear Mr. Pearson:

This has reference to the roasting tests made in our muffle furnace by you on March 3, 1960.

A sericite sample from the Tombstone, Arizona, area was heated at four different temperatures, 650°, 850°, 1,000° and 1,200°C. for one half hour. Each sample showed a slight change in color from white to light tan. The sample heated to 1,200°C. fused.

Insofar as could be determined by optical tests the sericite in the samples heated at 650°, 850° and 1,000°C. did not change except in color.

Mn 3.8814
3.33<1
ask Mona Davis

Sincerely yours,

LaMar G. Evans for
Carl Rampacek

C.A. Cosgrove (11-13-64)

November 13, 1964

Memorandum to File

Re: Charleston Mine

Information received yesterday, November 12, 1964, from Mr. G. D. Coppock, Jr. in a discussion relative to various operations which he was connected with both through Ed Whipple and Heron Mining Company:

1. A brief description of the Sericite separation plant as used by Ed Whipple for the refinement of Sericite cake:

   On receipt of the cake, the cake was introduced into a screw conveyor which was heated by direct fire heat to a temperature under 300° to avoid discoloration of the burning of the sulfides. This dried the cake to approximately 1/2% moisture. The cake was then introduced into a chopper similar to a Raymond Mill, which powdered the cake. This cake was then introduced to an air classifier of the design and construction by Ed Whipple and Mr. Coppock. This air classifier removed all sulfides and the fine product was then still in the air stream and was introduced into an air cyclone.

   This air cyclone trapped the greater portion of the product from the air stream and this product was introduced into a bagging machine for direct bagging. The remainder of the product was then fed into a chamber which fed into a bag house for final collection of the dust remaining in the air stream. The bag house needed only manual cleaning periodically. The value of the cyclone for recovery of the product from the air stream is to avoid the bag back pressures generated by the bag house which would have interferred with the air classification.

   Mr. Coppock advises that an air classifier, similar to the one used, could be built to handle approximately 20 tons per day for about $10,000.

2. During the last 12 months, Mr. de la Garca of the Heron Mining Company, has refused to advance funds other than to maintain the overhead and minimum royalty payments required to retain the property. Mr. Coppock advised that the reason for this was due to a large financial loss by de la Garca in the scheelite cleaning mill and scheelite tungsten operation in Mexico. This, together with the sizeable investment required for a proper mill, led de la Garca to call on the Dow Chemical people to participate in this venture at the Charleston property.

   The Dow Chemical group in Louisiana spent approximately six months analyzing the property, mill, marketing, etc. and forwarded an 80 page report to de la Garca. This report is in the hands of Mr. Coppock, but is considered by Dr. Gaines as privileged information for which he requires a payment for its release.

   This much information was obtained from Coppock as to the report:

COPY

The combined milling facilities required to establish a 50 ton per day production from the Charleston Mine would require an investment of approximately $500,000. Included in this $500,000 was a figure of $300,000 for a flash drier. A complete analysis of the metals ore was made for recommended milling procedure and the Dow Chemical people recommended using the Humphrey spiral wet concentrations in lieu of using flotation methods.

Mr. Coppock said the percentage of recovery with the Humphrey spiral was excellent including the separation of the lead-zinc concentrates. This would be considerably cheaper in operation than the flotation method. Mr. Coppock further advised that, in general, the Dow Chemical report was favorable and showed an economic return even based on this high plant cost but again recommended further mine exploration. Mr. Coppock further reported that the Dow Chemical people did this work strictly because of a friendship existing between the Dow Chemical principals and de la Garca.

3. A piece of equipment which would be of value, should a Sericite mill not be planned with a flash drier, would be a Sharples centrifuge batch plant. The Sharples people in Los Angeles have tested the material and can produce a batch centrifuge which will take the 90% slurry and reduce the moisture content of the sludge Sericite to below 30%.

This machine could be equipped with automatic charging and automatic discharging and would be used in conjunction with a process similar to that used by Whipple's operation, thus eliminating a flash drier.

The approximate cost for a Sharples batch centrifuge, producing about 1500 pounds per hour, would be in the neighborhood of $15,000.

CAC:da

C. A. Cosgrove

COPY

THE CHARLESTON [illegible] MINE

LOCATION:- Approximately 6 1/2 miles south west of Tombstone, Arizona, along a paved county highway.

PROPERTY:- 20 unpatented mining claims.

MINE WORKINGS:- Several shafts, the deepest of which is 104' with considerable footage of tunnels. These were developed during highgrading operation of Charles Suiter, 1949 to 1953. Surface open pit operations occurred later, exposing the vein to approximately the same depth. Prior to 1958, these semi-surface workings were dependent on metals, i.e. lead, zinc and copper.

GEOLOGY:- Core drilling by the Heron Mining Company in 1962 furnished the first true picture of the structure of the ore body, plus an approximation of the reserves over a very limited portion of the vein. This work was done under the direction of Dr. Richard V. Gaines. This was done in conjunction with a preliminary geophysical reconnaissance performed by Heinrichs Geoexploration Company of Tucson. We quote as follows from Dr. Gaines' report:

"Two types of igneous rock are revealed on the surface and through the diamond drilling. One is a porphyry, probably intrusive, known as the Uncle Sam Porphyry. This rock constitutes the hill immediately south of the mine, and the enclosing rock of the mine itself. The other rock is fine grained and dark green, and is probably an andesite. It constitutes the foot wall of the vein and is exposed on the surface north, east and west of the mine.

The porphyry, when fresh, is dark green with abundant phenocrysts of feldspar 1mm to 3mm across. Due to alteration and propylitization the appearance of the rock varies widely, ranging in color through grey-green to white, the lightest colored varieties being silicified and largely altered to sericite and probably other clay minerals. In this altered phase, the iron minerals are more or less completely converted to pyrite, which is finely disseminated through the rock.

In places in the drill core, the porphyry appears to have been brecciated and recemented. The contact with the andesite, as seen in the core, is not sharp, but appears to be gradational. Possibly this "andesite" is an intrusive dike into the porphyry, intruded prior to complete solidification of the porphyry. Its color is dark green, sometimes with reddish streaks, and it is uniformly fine grained.

Rocks which have been identified by other geologists as "rhyolite", are thought to be nothing more than light colored altered phases of the porphyry. Little or no original quartz was seen in any of the rocks at the mine, although there is some vein quartz associated with the sericite lenses.

Giluly has mapped a major East-West fault which passes through the Charleston mine area. This fault is supposed to be at least one mile long. It is doubtful if any of the holes drilled on the property penetrated this fault, and in the event the fault represents the footwall of the altered zone containing the sericite lenses, then it must be considered that this zone continues somewhat farther to the north, perhaps two or three hundred feet north of the present workings, to where the fault actually is.

Because of thick overburden and waste dumps in this area the underlying geology cannot be seen.

Within the zone of altered porphyry, which is at least 150 feet wide and possibly as much as 400 feet wide, is a narrower zone containing overlapping lenses of sericite. These lenses are scattered through a width of about 120' of the most intensely altered porphyry, and form a mineralized area which is continuous along the strike for at least 600', in which the total thickness of sericite lenses varies between about 10' feet and 30', and with mineable widths varying between 5' and 25', The individual lenses vary from a mere seam up to 17' in thickness, and with a maximum length probably around 150'. The zone of lenses dips about 60° to the south. Evidence from a churn drill hole shows that the sericite lenses continue to at least 305', and there is reason to believe that at this depth the width of the lens zone and the number of lenses within it are increasing.

The lenses themselves show a sharp contact with the altered porphyry. They consist in pure white fine grained sericite, which by weight constitutes from 25% to 60% of the mass, impregnated with a fine dissemination of minute euhedral pyrite.crystals, and often, in addition, galena and sphalerite, which is coarser than the pyrite and may reach a grain size of one inch. Individual samples may assay 30% - 40% combined lead and zinc, and mineable widths of sericite assayed up to 15% combined metals. However, some sericite zones showed no lead and zinc at all. In addition to sericite, pyrite, galena and sphalerite, the sericite lenses contain some fragments of incompletely altered silicate minerals or quartz.

One of the characteristics of the high grade sericite is that when a piece of it is placed in a glass of water, it will quickly disintegrate to a fine slurry, the heavier minerals settling to the bottom.

The altered rock enclosing the sericite lenses also contains much disseminated pyrite and a few percent (8.5% in one sample) of sericite. It may contain some lead and zinc, too - the richest sample of this material assayed contained .62% lead and 2.90% zinc. In general, however, the altered wall rock is barren of lead and zinc, and the only commercial concentrations of these metals are confined to the sericite lenses.

Silver is present in some of the ore, but apparently is limited to one or two lenses within any series across the vein. Silver values of 2.4 and 2.8 ounces per ton were found in two lenses having relatively high lead values, but other lenses containing comparable values of lead showed no silver at all."

PROBABLE RESERVES:- Dr. Gaines' calculations of probable reserves cover only the area covered by 4 diamond drill holes. This he computes as 86,300 tons broken down as follows:

Block #	Tons	Lead Tons	Zinc Tons	Sericite Tons
7	35,000	1,040	714	14,400
8	27,100	740	1,425	8,350
9	5,100	236	364	2,990
10	19,100	573	710	6,870
Total	86,300	2,589	3,213	32,610

(No calculation on the copper or silver)

All evidence points to considerable higher metal content at increasing depths, as well as wider sericite veins in the overall vein structure. Probable total tonnages could be very large.

ENCLOSURE :-

~~Plat of mineral survey #4599, showing 12 of the 20 claims.~~

Charleston - Sericite (9-29-67)

Interoffice to Mr Horne 9-29-1967

Charleston Mine - Sericite
Potential & Proposed Operation

Ore Reserves Indicated:

Ore reserves previously indicated by Exploitory work accomplished by Herron Mining Company, under the direction of Dr Gaines, totaled 86,300 Tons sericitic ~~contained~~ ore.

Net ~~Materials~~ Contained ~~was reported~~ as:

Sericite 32610 Tons
~~Pb~~ Lead 2589 Tons
Zinc 3213 Tons.

Recent Drilling to a depth of 2100 feet together with Geological exploration has raised the indicated sericite ore reserves to a figure in excess of 1,000,000 Tons. This figure is conservative based on indicated volumes, however more extentive drilling will be required to prove or 'Block out' this quantity.

In view of the fact that sufficient ore reserves have been blocked out to provide substanical reserves for many years operations in the sericite field, ~~I would propose~~ the time is now right for proceeding with an operational program in combination with, or ~~assigned~~ sold to, a mining-milling Company with satisfactory experience record & Capital. During this operation more Drilling & exploration work can be accomplished to Complete determine the limits of sericite ore, (This report

is not designed to cover any operations or forcast for the possible Copped-Silver orebody to be encountered at depth.) Sericite operations with its allied lead-zinc process as a by product could proceed independent of the Copper-Silver and nickel operation, if so desired.

A reasonably Designed program ~~to start~~ would be a 50 Ton per day operation requiring on the mining end a shaft of 500 foot dept and some 200 feet of development tunnel work.

Milling should be designed around an early expanded operation using the dry separation methods to eliminate, as far as possible the very costly drying process. It is felt from the experience and work done on our pilot plant, as well as the investigations of the Whipple & Coppock operations, that all of the necessary separation can be effected in this manner. Certain Successes have also been reported for the ~~mobile optics~~ ~~lead zinc~~ Humphrey spiral wet concentration for the lead zinc operation and should be considered in view of economy, over flotation. Also to be considered on this selection is the negating the sliming problem.

A realistic budget to effect the above operation would be $600,000 broken down as follows:

Mining Development	$150000
Mill Design —	25,000
Mill Construction	300,000
Operating Capital	65,000
Contingency - Reserve - Financing & Overhead	60 000
	600,000

A proforma operating Budget based on the above plant and investment is as follows:

One: Mining Required For 17000 Ton Sericite per ~~Day~~ Year Net Production - (This is Based on 50 Tons per day production with A 2 week shut down For Maintenance) Amounts To 48,000 Tons Annual.

Lead - Zinc Anticipated Recovery:

55% Lead Concentrate -
90% Recovery - 6% Ore = 4700 Tons

54% Zinc Concentrate
85% recovery - 9% Ore = 6800 Tons.

Estimated Operating Costs

Milling Charges

Crude Ore - Crude Separation
48,000 Tons @ $4.00 = 192,000

Metals - Circuit
31,000 Tons @ 6.00 186,000

Sericite Circuit
17,000 Tons @ 20.00 340,000

Sub - Total 718,000

(Includes Amortization)

Mining Charges
48000 Tons @ 12.00 = 576000

Development -
48000 Tons @ 1% 48,000

Reserve for Contingency
48000 Tons @ 1% 48,000

Overhead - & Legal - Accounting 75,000

Marketing 75,000

Royalties. - (17,000 @ 3%) Sericite 51,000
(850,000 @ 5%) Metals 42500

Sub Total 915,500

Total $1,633,500

Estimated Income

Sericite - $100.00 FOB Plant Exclusive of Brokerage Charges -

17,000 Tons @ 100.00 = 1,700,000 →

Metals

Lead Concentrate - 55%

(Smelter Pay @ 963# x .145 Less .02 or .125) = 120.37

Credit - Pb over 30% = 2.35

Less Treatment Charges 15.00

107.72

Less Freight - Allow 10.00

Net 97.72

4700 @ 97.72 = 459,284 →

Zinc Concentrate - 54%

(Smelter Pay @ 918# @ 13¢ - 037¢)

918 Lbs @ 12.63 = 115.94

Smelter charges 48.20

Gross 67.74

Allow Freight Charges 14.76

Net Return 52.98

6800 Tons @ 52.98 = 360,026 →

Silver @ 2oz/Ton Crude

48,000 @ 90% @ 2 oz

= 86400 oz @ 1.60 = 138,240

Allow 40% Smelter Charge -55 000

Net 83,240

Total Income	2,602,550
Estimated Costs -	1 633 500
Estimated Gross Profit	969,050

Although this estimate and proforma were ~~prepared~~ based on best available information, no actual cost data could be formalized prior to the complete design of the mill and a basic estimate of its performance prepared. It has been attempted to have this estimate on the conservative side. Verification of the ore limits and grade should be accomplished concurrently with the design of the mill. It must be noted here that $200,000 added to the cost of the mill over that shown (~~which~~ The new total would exceed the mill cost reported by Dow Chemical analysis) would have a ~~negligible~~ negligeable effect on the Estimated gross profit. Hence the best possible mill should be designed to effect savings in operational costs

Tucs
2-25-52

Rare Substance Will Be Mined Near Tombstone

PHOENIX, Feb. 24 (AP)—An official of the James Stewart Co. said Monday his firm will begin mining sericite in about a week at a five-million-dollar property about nine miles west of Tombstone.

C. A. Cosgrove, vice president of the firm, said sericite is a powdery substance used as a base in paints, agricultural poisons, in rubber and ceramics. He said the only other sericite mine in this country is near Los Angeles, and he termed the Tombstone product "finer than flour."

He said the Stewart Co. is buying the property from Charleston Mines, Inc., headed by Charles H. Suiter Sr. of Tombstone.

Sample Tests (1-20-60)

Sample (test)		Pb .12¢	Zn .13¢	100% recovery Pb	Zn	= total
+20	= 47%	12.5	16	30.00	41.60	= $71.60
+48 −20	= 26.5%	4.2	8.	10.08	20.80	$30.88
−48 + 1000	= 9.5%	5.1	1.6	12.24	4.16	$16.40
−100 med	6.5 (11.3)	2.0	1.1	4.80	2.86	$7.66
Waste	18%					
				10.80	29.64	= 40.44
#1 large pile of conc. (sulfer)		4.5	11.4			
#2 Conc. from cyclones		5.7	6.5	13.68	16.90	30.50
#3 clinker area in wash		2.0	2.7	4.80	7.02	11.82

Screening

One ton Basis

47% = $33.65

26% $8.33

9.5% 1.64

$43.62 total per ton 100% recovery

Waste −$1.37 — 2.37 loss

30 So. Main St.
P. O. Box 1889

Jacobs Assay Office

Registered Assayers

PHONE Main 2-0813

DUPLICATE

Certificate No. 54242

Tucson, Arizona, Jan 20th 1960

Sample Submitted by Mr. Clyde Davis

SAMPLE MARKED	GOLD Ozs. per ton ore	GOLD Value per ton ore *	SILVER Ozs. per ton ore	COPPER Per cent Wet Assay	LEAD Per cent Wet Assay	Zinc Per cent Wet Assay	Per cent Wet Assay
		$					
+ 20 mesh					12 5/10	16 9/10	
- 20 " Elutriated					2 0/10	1 4/10	
- 20 + 48					4 2/10	8 01/10	
- 48 + 100					5 1/10	1 6/10	
James Stewart 1					4 5/10	11 4/10	
2					5 2/10	6 4/10	
3					2 0/10	2 7/10	

* Gold Figured $35.00 per oz. Troy

Charges $ 22.75

Very respectfully,

Ben D. Jacobs

K. L. Erickson (1-23-60)

F. G. McFARLAND
TOOELE, UTAH
PHONE---TOOELE 122

S. R. HULLINGER
TOOELE, UTAH
PHONE---TOOELE 1425

195

McFARLAND AND HULLINGER

MINING • ORE HAULING • CONTRACTING

PHONE 219
P. O. BOX 238
TOOELE, UTAH

Sahuarita Mill
Sahuarita, Arizona
January 23, 1960

Mr. M. S. Horne
411 North Central Avenue
Phoenix, Arizona

Re: Evaluation of Milling
Charleston Mine Sulphides

Dear Mr. Horne:

An evaluation based on assumed recoveries and grade of concentrates expected from milling the sulphide material at the Charleston Mine - is calculated as follows-

Sulphide Crude Ore - Assaying 4.5% Lead and 11.4% Zinc

Assumptions: 90% recovery of lead to lead concentrates
85% recovery of zinc to zinc concentrates
55% assay grade of Lead concentrates
54% assay grade of Zinc concentrates

On this basis from each 100 tons (dry) milled there would be produced 7.364 dry tons of lead concentrates, and 17.944 tons of Zinc concentrates.

The Smelter payment for the lead concentrates would be as follows-

55.0% Lead less 1.5% 53.5%, pay for 90% or 963# @ 12.0¢ less 2.06¢ or 963# @ 9.94¢	$95.72
Credit for lead above 30% @ 10¢/unit	2.35
Credit for Iron (est. 7%) @ 10¢/unit	.70
	$98.77
Less Base Treatment Charge	14.57
	$84.20
Less R.R. Frt. Sahuarita-ElPaso $8.83/wet ton(10% moisture)	9.81
Net Smelter Value/ton Lead Concentrate	$74.39

146

The Smelter payment for Zinc Concentrates would be as follows-

54.0% Zinc - pay for 85% or 918#, @ 13.0¢ less .37¢ or 12.63¢/#

918 lbs. @ 12.63¢	$ 115.94
Less Smelter Treatment Charge	48.20
Gross Smelter Amount	$ 67.74
Less R.R. Frt. Sahuarita-Bartleville,Okla. $14.76/wet ton $13.28 plus 10% moisture)	14.76
Net Smelter Value/ton Zinc Concentrate	$ 52.98

- - - - - - - - - - - - - - -

SUMMARY

Value after milling 100 dry ton crude sulphides of 4.5% Lead 11.4% Zinc

7.364 dry ton lead concentrate	@	$ 74.39	$ 547.81
17.944 dry ton zinc concentrate	@	52.98	950.67
			$1498.48
Smelter Value per 100 ton crude			
Less Milling Charge 100 ton @ $6.00			600.00
Net Value to Mine			$ 898.48
Net Value to Mine per ton of Crude			8.98

The value of the material assaying 5.7% Lead and 6.5% Zinc, would return $6.38 per dry ton crude after smelting & milling charges.

- - - - - - - - - - - - - - -

I have no assays or basis to calculate silver value. However, if you have silver assays it will be quite alright for you to add 60¢ per ton, per ounce assay,to the above figures.

Mr. Horne, I would like to point out that this is not a conservative estimated evaluation. Both the assumed percentage recoveries, and assay grade of concentrates approach the best work we have been able to accomplish on various lead-zinc ores treated in our plant here. It is very possible the actual milling results would not be as good as the assumptions. I have tried to show a reasonable maximum return, and for you to make allowances for assay grade either below or above the assays you phoned to me this morning.

Should you like to have the 150 ton mill test carried out, we would like two days notice in order to clear our receiving bins. It would be approximately one week after receiving the lot before we could give you the actual milling results.

I sincerely hope the foregoing information will be of help to you. Should you like any further information please feel free to ask.

Yours very truly,

K. L. Erickson

K. L. Erickson, Mill Superintendent

H. Clyde Davis (1-2560)

LELAND J. DAVIS
OFFICE ELGIN 5-0493
HOME HUNTER 5-1863
2532 LAMBOURNE AVE.
SALT LAKE CITY, UTAH

164

DAVIS & DAVIS

CONSULTING GEOLOGISTS

H. CLYDE DAVIS
TUCSON OFFICE MA 3-0371
HOME MA 3-8814

1000 NORTH MOUNTAIN
TUCSON, ARIZONA

January 25, 1960

Seth Horne
James Stewart Company
411 North Central
Phoenix, Arizona

Dear Seth:

It was good talking with you on the phone, and since our discussion I have contacted Kenneth Erickson, mill manager for the Sahuarita Mill. Mr. Erickson has promised to take 150 tons of your concentrates as a test run. He states that at the present time they are having about a 92% recovery of lead and an 85% recovery in zinc. Erickson indicates you would have a freight charge of $8.00 to El Paso and a smelting charge of about $14.50 per ton for lead and a little more than this for zinc. They would charge $6.00 a ton for milling it. You would also have your ~~hold~~ hauling ~~ing~~ cost on top of this. To me it looks like this may be a poor time to move in this direction. I can see that of your $40,000 of concentrates you would realize only about $10,000 or less. In fact, Erickson said he would be glad to sit down and show you that it is difficult for them to make money on lead less than 7%. He felt like you may just be changing dollars. I talked this problem over with Ben and he feels the wise thing to do would be to try to use the Charlie Stein mill in Tombstone or investigate the mill in Patagonia owned by MacFarland and Nash. There was a possibility of sending this material to Deming but I understand that the American Smelting and Refining Company has closed their mill. I think it would be very wise for you to talk with Mr. Erickson at the mill personally as you suggested before any move was made.

Ben indicates a lot more of the material in the dump would be milled if you could obtain rights to use the Tombstone mill. Enclosed is a copy of the assay results from Jacobs Assay Company.

I sure hope the concentrates can be moved where you will be benefited the most. If you would like, send a check directly to the Jacobs Assay office for $22.75. My expense for getting this material would just be my gasoline (car)--$15.00 which is 9¢ a mile.

Sincerely,

H. Clyde Davis
Consulting Geologist

Voucher 1-26-60

RECEIVED
JAN 26 1960
JAMES STEWART COMPANY
PHOENIX, ARIZONA

HCD:jm

H. Clyde Davis (1-30-60)

LELAND J. DAVIS
OFFICE ELGIN 5-0493
HOME HUNTER 5-1863
2532 LAMBOURNE AVE.
SALT LAKE CITY, UTAH

193

DAVIS & DAVIS

CONSULTING GEOLOGISTS

H. CLYDE DAVIS
TUCSON OFFICE MA 3-0371
HOME MA 3-8814

1000 NORTH MOUNTAIN
TUCSON, ARIZONA

January 30, 1960

Seth Horne
James Stewart Co.
411 North Central
Phoenix, Arizona

Dear Seth:

The results for gold assaying of sample Nos. 1 and 2 are as follows:

Sample No. 1 -- large pile concentrates 2.6 in silver
Sample No. 2 -- small pile concentrates 1.6 in silver

Sincerely,

H. Clyde Davis
Geologist

HCD:jm

H. Clyde Davis (2-5-60)

CLM

LELAND J. DAVIS
OFFICE ELGIN 5-0493
HOME HUNTER 5-1863
2532 LAMBOURNE AVE.
SALT LAKE CITY, UTAH

192

DAVIS & DAVIS

CONSULTING GEOLOGISTS

H. CLYDE DAVIS
TUCSON OFFICE MA 3-0371
HOME MA 3-8814

1000 NORTH MOUNTAIN
TUCSON, ARIZONA

February 5, 1960

James Stewart Company
411 North Central
Phoenix, Arizona

Attention: Seth Horne

Dear Seth:

Enclosed is Jacob's Assay statement. Also enclosed are the assays of the number 1 and 2 sample for silver. If you have already paid the former bill of $42.75, just send Mr. Jacob the additional $3.00 for his assay.

I have written some letters to southern California pertaining to drilling.

If Dunlap from Salt Lake City drops the option on the property, I think we should immediately drill it. We could be ready to move. Would you please send me the information as to when our option is to be terminated and what you would like me to do further on this drilling.

I received another card from Roger. I suppose he is having a wonderful trip and I know it will be a great reunion when he arrives home.

Best wishes,

H. Clyde Davis
jm

H. Clyde Davis
Consulting Geologist

HCD:jm

Dr. Graines Report (9-10-62)

148

Dr Gaines Report
Perforador A Latina
= Heron Mining Co.
9-10-62

THE CHARLESTON MINE

TOMBSTONE, ARIZONA

LOCATION:- The Charleston mine is about 6½ miles soutwest of Tombstone, Cochise County, Arizona. It is reached from Tombstone by 6.7 miles of graded county road and .75 miles of mine road.

OWNERSHIP:- This mine is owned by Charles Suiter of Phoenix. It has been under lease for several years to the James Stewart Co. The Heron Mining Company has an option to purchase from the James Stewart Co., which also involves taking over the remainder of their obligation to Charles Suiter.

PROPERTY:- There are twelve unpatented mining claims in the Charleston group, located by Suiter, and eight additional claims are included in the contract which were leased by the James Stewart Co. and are on Arizona State lands adjacent to the Suiter group, in section 36, Township 20 South, Range 21 East, Cochise County, Arizona.

HISTORY:- Suiter's twelve original claims were located in 1928. Sporadic attempts to work the lead and zinc ores were made in the thirties, but the first serious mining was done by Suiter in 1949. He had a crude mill and shipped mixed lead and zinc concentrates. He leased the property or gave it under option to several companies, among whom were Nash and Vogel, in 1950, and Ryan Oil Co., in 1952. Both of these companies diamond drilled the property, and Nash and Vogel in addition put down two churn drill holes. The records kept on Ryan Oil's holeswere so poor as to be of little value, but the Nash and Vogel records were well kept and

of considerable value.

Suiter had worked the mine by underground methods but his costs were high due to the soft, slippery nature of the ore, resulting in heavy ground and much timber consumption. He had six shafts, the deepest being 104 feet deep on a 55º incline, and several hundred feet of levels. The writer visited the Charleston Mine in 1955, but even then many of the workings were inaccessible or dangerous due to caving. In 1953, with the decline in price of lead and zinc, Suiter discontinued his efforts.

In 1956 a Mr. Spencer undertook to develop the property, and started an open pit, removing about 60,000 tons of overburden, exposing the orebody in the bottom of the pit. He only tried to recover the lead and zinc, but due to the low grade of the ore and difficulties he experienced milling it, he abandoned the operation.

In 1957 the James Stewart Company took over the property, and have been trying to operate, at intervals, ever since. They cleaned out the pit and operated the mill, and built and rebuilt several times a plant to recover the sericite. Their operation has been unsuccessful due to technical difficulties and poor management, and they were never able to produce a saleable sericite on a commercial scale.

In 1958 Consolidated Minerals, Inc., purchased several hundred tons of sericite tailings from the tailings pond resulting from the Suiter operation. These tailings were cleaned and purified, producing a very fine white natural sericite, for which a market was developed at prices around $ 100.00 per ton. Cleaning of the sericite was carried out using dry processes, but these processes

150

have not been available to any subsequent operator of the property. In 1962 Heron Mining Company core drilled the property, and due to using a larger diameter drill and special precautions to ensure good core recovery, a good idea was obtained for the first time of the structure of the deposit, plus an approximation of the reserves over a limited stretch of the vein.

GEOLOGY:- Two types of igneous rock are revealed on the surface and through the diamond drilling. One is a porphyry, probably intrusive, known as the Uncle Sam Porphyry. This rock constitutes the hill immediately south of the mine, and the enclosing rock of the mine itself. The other rock is fine grained and dark green, and is probably an andesite. It constitutes the foot wall of the vein and is exposed on the surface north, east and west of the mine.

The porphyry, when fresh, is dark green with abundant phenocrysts of feldspar 1mm to 3mm across. Due to alteration and propylitization the appearance of the rock varies widely, ranging in color through grey-green to white, the lightest colored varieties being silicified and largely altered to sericite and probably other clay minerals. In this altered phase, the iron minerals are more or less completely converted to pyrite, which is finely disseminated through the rock.

In places in the drill core, the porphyry appears to have been brecciated and recemented. The contact with the andesite, as seen in the core, is not sharp, but appears to be gradational. Possibly this "andesite" is an intrusive dike into the porphyry, intruded prior to complete solidification of the porphyry. Its color is dark green, sometimes with reddish streaks, and it is

uniformly fine grained.

Rocks which have been identified by other geologists as "rhyolite", are thought to be nothing more than light colored altered phases of the porphyry. Little or no original quartz was seen in any of the rocks at the mine, although there is some vein quartz associated with the sericite lenses.

Giluly has mapped a major East-West fault which passes through the Charleston mine area. This fault is supposed to be at least one mile long. It is doubtful if any of the holes drilled on the property penetrated this fault, and in the event the fault represents the footwall of the altered zone containing the sericite lenses, then it must be considered that this zone continues somewhat farther to the north, perhaps two or three hundred feet north of the present workings, to where the fault actually is. - Because of thick overburden and wastedumps in this area the underlying geology cannot be seen.

Within the zone of altered porphyry, which is at least 150 feet wide and possibly as much as 400 feet wide, is a narrower zone containing overlapping lenses of sericite. These lenses are scattered through a width of about 120' of the most intensely altered porphyry, and form a mineralized area which is continuous along the strike for al least 600', in which the total thickness of sericite lenses varies between about 10' feet and 30', and with mineable widths varying between 5' and 25', The individual lenses vary from a mere seam up to 17' in thickness, and with a maximum length probably around 150'. The zone of lenses dips about 60° to the south. Evidence from a churn drill hole shows that the sericite lenses continue to al least 305', and there is

reason to believe that at this depth the width of the lens zone and the number of lenses within it are increasing.

The lenses themselves show a sharp contact with the altered porphyry. They consist in pure white fine grained sericite, which by weight constitutes from 25% to 60% of the mass, impregnated with a fine dissemination of minute euhedral pyrite crystals, and often, in addition, galena and sphalerite, which is coarser than the pyrite and may reach a grain size of one inch. Individual samples may assay 30% - 40% combined lead and zinc, and mineable widths of sericite assayed up to 15% combined metals. However, some sericite zones showed no lead and zinc at all. In addition to sericite, pyrite, galena and sphalerite, the sericite lenses contain some fragments of incompletely altered silicate minerals or quartz.

One of the characteristics of the high grade sericite is that when a piece of it is placed in a glass of water, it will quickly disintegrate to a fine slurry, the heavier minerals settling to the bottom.

The altered rock enclosing the sericite lenses also contains much disseminated pyrite and e few percent (8.5% in one sample) of sericite. Iy may contain some lead and zinc, too - the richest sample of this material assayed contained .62% lead and 2.90% zinc. In general, however, the altered wall rock is barren of lead and zinc, and the only commercial concentrations of these metals are confined to the sericite lenses.

Silver is present in some of the ore, but apparently is limited to one or two lenses within any series across the vein. Silver values of 2.4 and 2.8 ounces per ton were found in two lenses having relatively high lead values, but other lenses containing

comparable values of lead showed no silver al all.

EXPLORATION:- Of the holes that produced useful information about the orebody, Nash and Vogel drilled five diamond drill holes and one churn drill hole, and Heron Mining drilled five diamond drill holes.

Nash and Vogel's holes suffered in that they were all vertical, which is a poor angle to investigate a structure dipping 60°. Moreover, since they were seeking only lead and zinc, the sericite, which was the principal object of Heron's exploration, was mentioned only in passing. No assays were made of the sericite, and core recovery was poor precisely in the portions of the holes containing sericite. Robert Teten, their geologist, did an apparently competent job of logging the core they did recover.

Heron Mining's drill holes were all drilled at a dip of 45° to the north, thus intersecting the structure only 15° away from a line normal to it. This means that intersected widths differed by only 3.4% from the true widths. Hole size was mostly NX, although it was necessary to reduce to BX near the bottoms of holes 7 and 10. Drilling mud was used throughout the ore zone, and when it was discovered in hole # 7 that superior recovery of the sericite itself could be accomplished by using diesel oil as a drilling fluid, this procedure was followed whenever sericite was intersected. As a result, the core recovery in sericite was around 90%, and in the altered rock at least 98%.

The experience of the drillers was that after penetrating a sericite lens, when the rods were removed from the hole for a few hours or overnight, the sericite would swell up and squeeze into the hole, filling it. This sericite would have to be -

154

rilled out of the hole again in order to get the rods back down to the bottom of the hole.

The location of the holes drilled is shown on the accompanying map. Nash and Vogel's holes are numbered 1 - 5, and Churn Drill Holes # 1 and # 2. Churn Drill Hole # 1 was abandoned before reaching the ore zone. Heron Mining's holes are numbered # 6 to # 10. Sections of all the holes are also shown, although in the case of # 1 - # 5 the information was rather vague and the results are inferred.

ASSAYING:- Representative pieces of the sericite core were dried and their specific gravity determined, in order to establish the tonnage factor for the sericite. All sericite core was then dried, crushed, quartered, and assayed for lead, zinc and silver. Then portions of each crushed sample were dissolved in water, and the resulting slurry decanted, diluting the remaining sludge and decanting repeatedly until no easily soluble sericite remained in the sample. The resulting sericite suspension was allowed to settle dried, and weighed, giving the percentage sericite content of each core sample.

ORE RESERVE CALCULATION:- In determining which of the sericite intersections constituted mineable ore, the arbitrary factor was used of $ 25.00 per ton combined gross values of the sericite, lead and zinc, over a width of 3 feet, as a minimum. Lead was calculated at 9½ cents per pound, zinc at 11½ cents per pound, and sericite at $ 100.00 per ton, the price at which this product was sold by Consolidated Minerals.

It was assumed that all the blocks of ore extend to a depth of 305 feet, the greatest depth at which a lens of sericite was found in Nash and Vogel's churn drill hole No. 2. The height of the several

155

blocks varies according to the amounts removed in the open pit and by underground mining. The orebody was assumed to extend 40' each East and West beyond holes # 7 and # 10 respectively. Since assay data on No. 10 hole was not available at the time of writing this report, a grade of 3% lead, 3.7% zinc, and 36% sericite was assumed, which is the weighted average grade of the other three holes.

RESERVES OF PROBABLE ORE:- Intersection by one drill hole, under these conditions, will not result in a blocked out body of positive ore. However, it is reasonable to call the ore thus blocked as "probable".

Only ore was considered probable which was intersected by the four Heron drill holes which hit sericite. Using as average specific gravity factor of 2.35, equal to 13.7 cubic feet per ton, the following table shows the grade and tonnage blocked out by each of the four holes:

Block No.	Tons	Lead %	Lead Tons	Zinc %	Zinc Tons	Sericite %	Sericite Tons	Gross Value
7	35,000	2.98	1,040	2.04	714	41.25	14,400	$ 1.801,700.00
8	27,100	2.73	740	5.26	1,425	30.8	8,350	1.303,300.00
9	5,100	4.63	236	7.14	364	58.6	2,990	427,500.00
10	19,100	3.00	573	3.70	710	36.0	6,870	959,200.00
	86,300		2,589		3,213		32,610	$ 4.491,700.00

MINING:- Because of the narrowness of the lenses the only feasible way of mining this orebody is by underground methods. The ore itself has no strength, but the wall rock will stand up well for a reasonable period of time. Probably a variation of horizontal cut and fill with timber support, or else of square set stoping, would

work well. The ore is so soft that drilling and blasting in the stopes will be practically negligible, although development headings will require drilling and explosives. Timber costs and filling costs will be high, more than balancing the savings in dynamite. It is thought that mining can be accomplished for around $ 10.00 per ton of ore extracted.

MILLING:- Experience by Consolidated Minerals shows that the sericite can be readily recovered and purified from a cake resulting from the settling and drying of a sericite slurry. This suggests the following flowsheet.

The ore is crushed to minus ¼ inch and agitated with water. The suspended sericite is decanted and sent to dewaterning. The heavy sludge containing all the sulfides is grownd in a ball mill and selectively floated to recover lead and zinc.

The dewatered sericite is dried, pulverized, and treated in the air classifier to remove the very fine particles of pyrite and other grit that may still remain, resulting in a pure, white, fluffly, highly saleable sericite.

Although this sounds simple, the matter of dewatering and drying the sericite is not simple. It passes through or clogs filters, settles with extreme slowness, and does not respond to treatment in cyclones. Batch centrifugal precipitation works well but the apparatus is very expensive. Other methods may work better such as spray drying in a hot air tower. This aspect needs to be investigated.

It is thought that the separation of the lead and zinc concentrates should cost about $ 5.00 per ton of feed, and the treatment of the sericite might cost as much as $ 20.00 per ton of

sericite, but since this constitutes only 36% of the feed, the overall milling cost works out at $ 12.20 per ton.

ECONOMICS:- With mining costing $ 10.00 per ton and milling - $ 12.20, the overall costs are $ 22.20 per ton of ore. Thus, the treatment cost works out to be $ 1,915,000.00 for the - 86,300 tons of ore. Considering the gross value to be - - - $ 4.490,000.00, if recovery in the mill es 85% the net recovered value is $ 3.820,000.00. After deducting mining and milling costs, $1.905,000.00 remains. About $ 400,000.00 should be deducted, representing the cost of freight and smelting on the lead and zinc (this is a very rough approximation, based on a gross value of $ 1.050,000.00 for the recovered lead and zinc). This leaves a gross profit before taxes of $ 1.500.000.00. The depletion allowance of 15% will allow $ 600,000.00 of the profit to be put aside. If the remainder is taxed at 50%, there would still remain $ 450,000.00, for a total net profit of - - $ 1.050,000.00.

POSSIBLE ORE:- The above computation only takes into account the ore present in a strech of the mineralized zone 285' long and 305' deep. There is every reason to expect that this same formation should continue in depth, to double or more the 305'. In addition, it is known that Nash and Vogel intersected 18 feet of sericite (9' true width) in their hole # 2, 340' west of Heron's hole #10. Sericite also visible in an outcrop on the Connecting Links claim, over 1,100' N 75° E of the pit. Obviously, there is plenty of room for exploration, with the promise of multiplying the present reserves by several fold.

158

ECOMMENDATIONS:- On the basis of the presently established values and the already developed techniques of treatment, the following steps are recommended for additional exploration and development, prior to constructing a mill and putting the mine into production:

1.- At least three holes should be drilled from the south, designed to test for the continuation of the orebody al a depth of 320' nelow the surface, below the ore already indicated in holes 7, 8, 9, and 10.

2.- Five more holes should be drilled westward along the strike, toward Nash and Vogel's Hole # 2, designed to intersect the ore 150' below the surface.
The total cost of this additional drilling would be about $ 20,000.00.

3.- Test work should be carried out on the sericite, to determine the optimum method of recovery. This should include study of settling rates and methods of drying, and cleaning of test batches of dried sericite with the air classifier. It is believed that $ 5,000.00 would cover sufficient experimental work to lead to a final mill design.

México, D. F., septiembre 10 de 1962.

ASSAY RESULTS - CHARLESTON MINE

HERON MINING CO. DRILL HOLES - 1962

Hole No.	Footage	% Pb	% Zn	% Sericite
7	115-117	.11	Trace	29.5
	120.4-125.8	.02	0.0	59.5
	171-173	1.57	2.94	35.9
	196-197.5	5.15	7.32	25.0
	203-220	3.89	2.12	37.5
8	111-113	.03	0.0	27.0
	154-165	2.15	2.96	31.5
	169-172	2.11	6.50	22.5
	201-206	3.88	10.93	34.5
	206-213	.62	2.90	8.5
	213.4-218	3.27	3.78	30.4
9	138-143	4.63	7.14	58.6
10	156-159			
	165.5-170			
	179-185	(Hit old mine opening. Thickness assumed from old underground data).		

Harold E. Richard (8-14-62)

10

HAWLEY & HAWLEY
ASSAYERS AND CHEMISTS, INC.
1802 WEST GRANT ROAD - TELEPHONE MAIN 2-4836 - POST OFFICE BOX 5934
TUCSON, ARIZONA
Registered Assayers

August 14, 1962
Our 48th Year

Mr. Charles Suiter
President, Charleston Mines
5008 West Weldon Avenue
Phoenix 31, Arizona

Dear Mr. Suiter:

In response to your request of August 4, we have made a search of our records and are enclosing copies of the assay report made on your sample received July 28, 1951.

There was an entry for only one L.P.W. sample.

Sincerely,

Harold E. Richard

Harold E. Richard
President

enclosure

Kind personal regards.

100

ASSAYERS
CHEMISTS

EL PASO, TEXAS
Box 4

HAWLEY & HAWLEY

W. E. HAWLEY, MANAGER
DOUGLAS, ARIZONA
537 TWELFTH STREET
Box 1060

SHIPPERS REPRESENTATIVES
BULLION BUYERS
ORE BUYERS

WE HEREBY CERTIFY THAT THE FOLLOWING RESULTS WERE OBTAINED FROM SAMPLES OF Charleston Lead Mines Co.

OFFICE NO.	MARKED	GOLD OZS.	SILVER OZS.	LEAD PER CENT	COPPER PER CENT	ZINC PER CENT	IRON PER CENT			
246810	#2- L.P.W.	3.90	81.3	13.0						

METAL QUOTATIONS:

[illegible] $35.00 PER OZ. COPPER ____C PER LB. CHARGES: $ 2.50

SILVER ____ PER OZ. ____ PER LB. DATE 7/28/51

HAWLEY & HAWLEY

PER W E Hawley ASSAYER.

Maynard F. Ayler (1964)

1964+ 300

MINERAL RESOURCES AT CHARLESTON RESERVOIR SITE, SAN PEDRO PROJECT, COCHISE COUNTY, ARIZ.

by

Maynard F. Ayler[1/]

CONTENTS

1/ Mining engineer and consultant, Bureau of Mines, Denver, Colo.

SUMMARY

Charleston Damsite is in the N½NE¼ sec. 2, T. 21 S., R. 21 E., Cochise County, Ariz. The reservoir would extend about 8 miles southward.

Much of the reservoir basin is patented ground now being used as cattle range. Except for areas near the San Pedro River where grass is subirrigated, vegetative cover is limited to catsclaw and other desert plants.

The Charleston mining district is just east of the reservoir site near the right abutment of the proposed dam. The southwestern edge of this district would be flooded, and most if not all of the remaining area would be adversely affected by seepage from the reservoir. Because the district is a potential source of commercial lead, zinc, and vanadium ore, building a short dike to protect the claims is recommended.

Any future mining in the Charleston district depends upon development of a nearby milling facility, which would require water in quantities consistent with daily milling capacity. Reservoir plans should be elastic enough to provide for such potential water requirements.

Federal oil and gas leases have been issued for lands in and near the reservoir site. The predominantly marine sedimentary section could be favorable to oil and gas accumulation if some type of structural or stratigraphic trap exists. To date there is no evidence that such traps do exist locally. No exploratory drilling for oil has been done near the reservoir site. Should any operator wish to drill exploration holes in the future, adequate tests probably can be drilled directionally from shore areas.

Sufficient sand and gravel to meet Bureau of Reclamation construction requirements probably can be developed from local deposits. The deposits are too far from markets to have any other commercial value.

INTRODUCTION

At the request of the Bureau of Reclamation, Region 3, Boulder City, Nev., a reconnaissance was made of the mineral resources in and near the Charleston Dam and Reservoir sites, San Pedro project, Cochise County, Ariz. (fig. 1). The San Pedro project is a part of the proposed broader Central Arizona project.

The field study was made during January and February, 1964. Mineral resources were appraised by examining all available data, by extensive inquiry, and by personal reconnaissance of the area. Data sources studied included published reports by the Geological Survey and Bureau of Reclamation, and unpublished reports in files of the Tucson office of the

Federal Bureau of Mines. Records of the Bureau of Land Management and Cochise County Assessor also were examined.

Persons questioned concerning private, corporate, and governmental interests in the area included:

J. E. Frost, chief geologist, Duval Corp., Tucson, Ariz.
Walter Hemrichs, president, Hemrichs Geoexploration Co., Tucson, Ariz.
M. S. Horne, president, James Stewart Co., Phoenix, Ariz.
Wayne K. Wallace, geologist, Kern County Land Co., Tucson, Ariz.
Eldred Wilson, Arizona Bureau of Mines, Tucson, Ariz.
M. H. Salsbury, Federal Bureau of Mines, Tucson, Ariz.
Local residents of the Charleston mining district

LOCATION AND PHYSICAL FEATURES

Charleston Damsite is in the N½NE¼ sec. 2, T. 21 S., R. 21 E., Cochise County, Ariz. The reservoir created would flood all or parts of secs. 1-4, 10-15, 24-25, T. 21 S., R. 21 E.; secs. 6-7, 17-20, 29-32, T. 21 S., R. 22 E.; and secs. 5, 6, 8, 17, T. 22 S., R. 22 E. (fig. 2).

The damsite is about ½ mile north of the Charleston post office and is accessible from there over ¼ mile of dirt road that ends at the Southern Pacific Railroad track. It is necessary to walk the remaining ¼ mile down the track to the damsite.

Charleston is 9 miles southwest of Tombstone by way of an unnumbered, graded, gravel-surfaced road. Tombstone is 73 miles southeast of Tucson, Ariz., on U.S. Highway 80.

The damsite is a gap between two rounded hills that rise about 500 feet above the river (fig. 3). For the first 4 miles upstream along the east side of the valley there are low hills sloping to the river (fig. 4). Farther south on the east, and for the full length of the reservoir on the west, the valley sides rise very gently from river level (fig. 5).

Most of the valley is covered with catsclaw, a low, thorny bush. Some of the valley floor has been cleared and now supports a thick stand of grass. The entire area is used as cattle range.

LAND OWNERSHIP

The Charleston Damsite and approximately 1 mile of reservoir area is on the south end of the San Juan de las Boquillas y Nogales land grant. The upper 3½ miles of the reservoir would be on lands of the San Rafael del Valle grant. Both grants are owned by the Kern County Land Co., 600 California Street, San Francisco 8, Calif.

Surface rights between the two land grants are controlled by several cattle companies, but most, if not all, mineral rights are retained by the Federal Government. No attempt was made to detail the ownership of the various tracts.

Patented mining claims are located in sec. 1, T. 21 S., R. 21 E.; sec. 6, T. 21 S., R. 22 E.; secs. 25 and 36, T. 20 S., R. 21 E.; and secs. 30 and 31, T. 20 S., R. 22 E. (fig. 6). Unpatented claims were found within the reservoir site in sec. 1, R. 21 E., and sec. 6, R. 22 E., T. 21 S.

DESCRIPTION OF DAM AND RESERVOIR

Charleston Dam would be a rolled-earth and rockfill structure across the San Pedro River. Present design data are as follows:

Height of dam	192 ft
Spillway capacity	113,300 cu ft per sec
Maximum water-surface elevation	4,096 ft
Irrigation storage capacity	94,000 acre ft
Flood control capacity	116,000 acre ft
Sediment capacity, 100-year period	80,000 acre ft
Total capacity	290,000 acre ft

Charleston Dam and Reservoir would be integral parts of the Central Arizona project. They would be used to regulate San Pedro River flow, provide municipal and industrial water for the city of Tucson, provide conservation and flood control for the San Pedro River valley, and provide recreation and fish and wildlife benefits.

GEOLOGY

Rocks of the Charleston area include a thick sedimentary sequence, a series of volcanic flows, and a laccolithic intrusive. This sequence is described in the following table:

TABLE 1. - Formations of the Charleston District[1/ 2/]

Name and rock type	Age	Description	Thickness, ft
Alluvium	Quaternary	Relatively thin, surface dirt and gravel	0-50
Gila conglomerate	Pliocene	Poorly consolidated gravel, sand, and silt deposits normally consisting of angular fragments from neighboring hills. In some areas fragments are finely held by calcium carbonate cement.	0-500
Uncle Sam porphyry and rhyolite porphyry	Early Tertiary	The Uncle Sam porphyry is a quartz-poor latite porphyry, roughly laccolithic in form, that has been intruded into associated rocks. It is distinguished by its light-gray to pinkish-gray color and fine-grained, vitrophyric groundmass. Rhyolite porphyry occurs as intruded dikes.	0-?
Bronco volcanic rocks	Cretaceous or early Tertiary	Quartz latite flows and tuffs form the upper 1/3 of this sequence. The lower 2/3 consists of andesite flows and flow breccias.	0-6,000
Bisbee formation	Lower Cretaceous	Varicolored shales are interbedded with sandstone and limestone beds. The two basal members, the Blue limestone 20-40 ft thick, and the underlying "novaculite" bed 55-70 ft thick, were preferred hosts for ore deposits in the Tombstone district.	3,100
Naco limestone	Pennsylvanian	The Naco formation can be subdivided into at least five members. The upper 800 ft is composed of predominantly pinkish dolomites interbedded with thin red shales and some limestone. This is underlain by 650 ft of black limestone that lies on top of 700 ft of orange dolomite and some interbedded shale and limestone. Below this is 60 ft of black limestone underlain by 1,100 ft of dense, light-gray limestone. Extensive ore deposits have been found in the Tombstone district in the top dolomitic member and in the black limestone below the orange dolomite.	3,300-4,000

See footnotes at end of table.

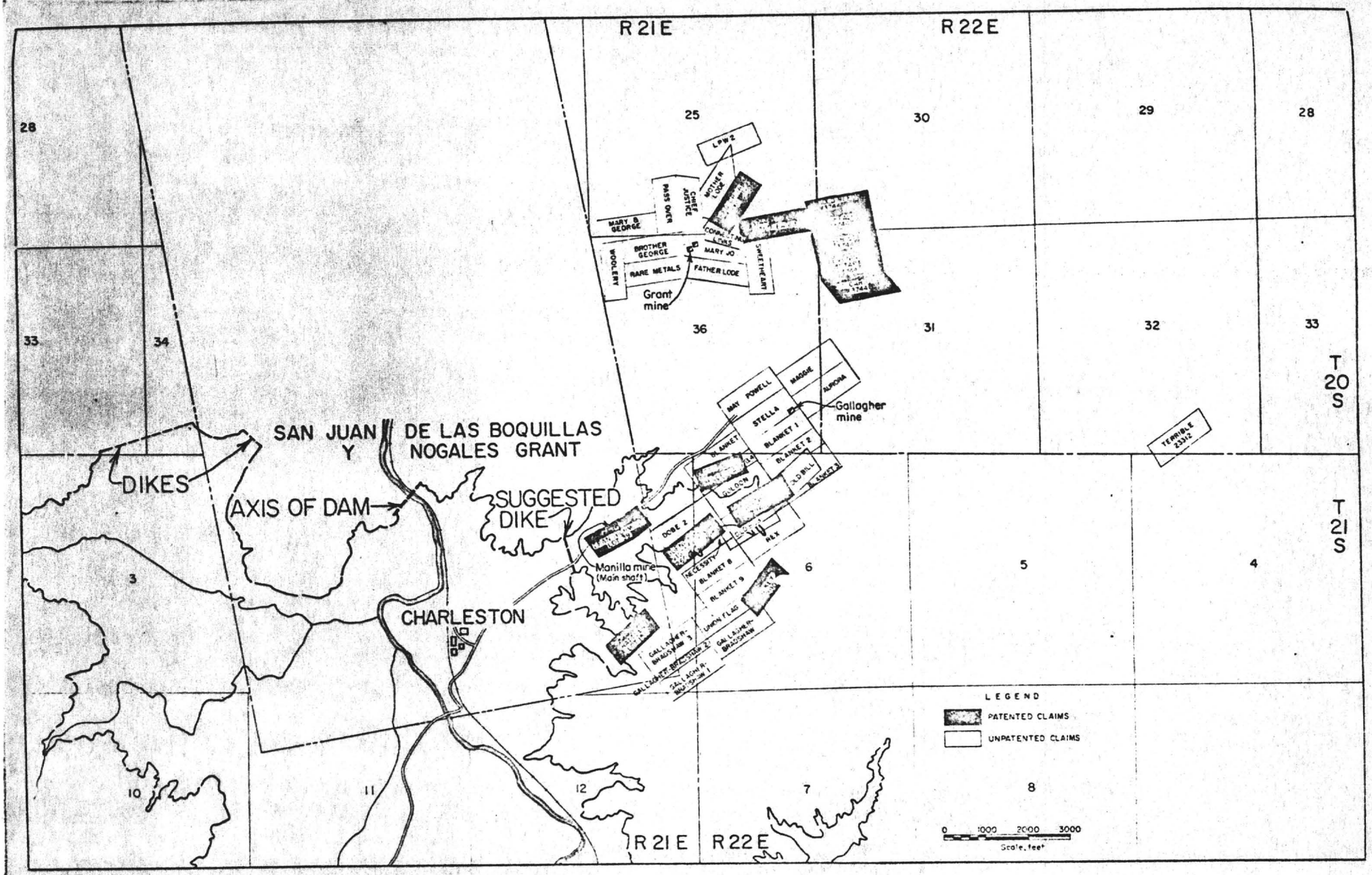


FIGURE 6. - Mining claims of Charleston district as related to reservoir limits and suggested dike.

TABLE 1. - Formations of the Charleston District[1/ 2/] --Continued

Name and rock type	Age	Description	Thickness, ft
Escabrosa limestone	Mississippian	The formation consists of thick-bedded, light-gray limestone. No recognizable separation exists between the Escabrosa and overlying Naco formations.	500-800
Martin limestone	Devonian	A sequence of gray limestone is interbedded with soft, gray shale.	320
Abrigo limestone	Cambrian	The Abrigo formation consists of thin-bedded, impure, and in part very cherty limestone containing some beds of sandstone and shale. Sandy beds are more abundant in the upper part. The top of the formation is marked by a vitreous white quartzite.	700
Bolsa quartzite	Cambrian	The formation consists of hard, crossbedded, fine-grained to pebbly quartzite in beds up to 6 ft thick, containing throughout small, well-rounded pebbles up to the size of a pea. It is generally rusty-brown on weathered surfaces.	440
Pinal schist	Precambrian	The Pinal schist is gray, fine-grained, brittle, and moderately fissile.	very great

1/ Butler, B. S., E. D. Wilson, and C. A. Rasor. Geology and Ore Deposits of the Tombstone District, Arizona. Univ. of Arizona Bull., Arizona Bur. of Mines, v. IX, No. 1, 1938.

2/ Gilluly, James. Emplacement of the Uncle Sam Porphyry, Tombstone District, Arizona. Amer. J. Sci. v. 243, 1945, pp. 643-666.

The San Pedro River has eroded through a relatively large outcrop of the Uncle Sam porphyry to form the Charleston Damsite.

CHARLESTON MINING DISTRICT

The Charleston mining district (fig. 7) centers about 1 mile east of the Charleston Damsite. The western end of the district would extend into the proposed reservoir; much of the rest would be close enough that mining would be adversely affected. All mines of this district are located in a badly fractured, highly altered area of Bronco volcanic rocks. In some cases, intruded andesite porphyry dikes have been mineralized. Data as to the local thickness of the volcanic rocks are unavailable.

In the Tombstone district, 7 miles northeast, some relatively small vein deposits were found in the Bronco volcanic rocks; the main production was derived from deposits in the lower Bisbee and upper Naco formations. The Bisbee and Naco formations are expectable below the mineralized volcanic rocks of the Charleston district. There is no indication, however, that individuals conducting past exploration programs considered or tested their potential.

Minerals containing gold, silver, lead, zinc, copper, molybdenum, and vanadium were found in discontinuous, vuggular veins in the Bronco volcanic rocks. Quartz is the normal gangue mineral, although a good showing of barite was found in one dump near the western edge of the district. Sericite, a fine mica, and kaolin, both resulting from hydrothermal alteration, are common, though probably noncommercial constituents. Virtually parallel fractures containing these minerals may range from a few feet to several hundred feet apart.

Some data were available on three properties of the Charleston district, and the pertinent information is presented here in summary form:

Grant Mine

The Grant mine, also known as the Woolery or the Charleston, is in the N½ sec. 36 and S½ sec. 25, T. 20 S., R. 21 E., outside the reservoir site. The property, consisting of 12 unpatented claims, was located in 1928[2]. Veins strike east-west and dip 65° south. Mineralization is described as "independent crystals of galena, sphalerite, and pyrite in a highly kaolinized zone between a birdseye porphyry hanging wall and greenish diorite footwall"[3].

McMillan[4] stated that mineralization consists of sphalerite and galena, plus minor amounts of pyrite and chalcopyrite, in small veins or fractures and as aggregates in rhyolite porphyry dikes intruded into andesite porphyry lavas. Two such dikes, on the Mary Jo and Brother George claims, are 60 and 100 feet wide, respectively. Assays of samples and mill returns indicate an average lead-zinc content of more than 5 percent. The following reserve data were given in the McMillan report, together with a statement that open-pit mining was considered feasible.

2/ McMillan, W. D. Grant (Woolery) Zinc-Lead Mine, Cochise County, Ariz. Part II, Supplement to Arizona No. 10. File report, Tucson field office, BuMines.

3/ Voelzel, Gustave W. Letter report in files of Tucson field office, BuMines, May 23, 1942.

4/ Work cited in footnote 2.

TABLE 2. - Estimated reserves, Grant mine

Classification	Description	Lead, pct	Zinc, pct	Tons
Measured				none
Indicated	Brother George No. 5 shaft	3.5	6.0	6,000
Inferred	Rhyolite porphyry dikes on Brother George and Mary Jo claims. Area 200 ft long, 160 ft wide, and 200 ft deep	2.5	4.0	500,000

In a letter dated July 24, 1950, to James P. Nash, McMillan[5] states:

"This property, which is known also as the Grant or Woolery mine, was investigated by engineers and geologists of Anaconda (Copper Co.) in the early part of 1949 and reportedly they were intensely interested but could not make satisfactory terms with the owners.

"After my examination, the property was also examined by August Merz, Jr., geologist for the New Jersey Zinc Co. I have talked with Merz and he also was favorably impressed with the property and recommended it to his company.

"Mr. O'Brien is correct in stating that the Grant mine could be operated by open-pit methods to a considerable depth, with recovery of zinc, lead, some copper, and some use may be made of the gangue, which is principally sericite, a talc-like hydrous mica."[6]

Limited mine development and the drilling of one churn-drill hole was completed prior to 1951. From information gained at that time, an estimate was made by Charles H. Dunning,[7] consulting mining engineer, of 500,000 tons of indicated ore with a grade of: 4.0 percent lead, 5.5 percent zinc, 0.5 percent copper, 1.00 ounce silver, per ton. Open-pit mining methods were advocated in the report.

The property now is leased by the James Stewart Co., 3033 North Central Avenue, Phoenix, Ariz., to the Heron Mining Co. Subsequent

5/ McMillan, W. D. Letter to James P. Nash in files of Tucson field office, BuMines, July 24, 1950.

6/ Sericite is a variety of muscovite that occurs in small scales and forms sericitic schist. It often is spoken of by prospectors as talcose schist, but this latter term properly applies to schists composed largely of talc, which are much rarer.

7/ Dunning, Charles H. Report on Charleston Lead Mine. August 25, 1955.

exploration work has been completed by the Heron Mining Co., and is described in a letter from M. S. Horne, president, James Stewart Co.[8/]

Mr. Horne, quoting from a report of the Heron Mining Co., states:

> "A geophysical survey of the property was made using both high sensitivity magnetic and self potential surveys. This work was done in May, 1962.
>
> "A diamond drilling program was carried out from July, 1962, through September, 1962. Five holes were drilled for a total depth of 1202.2 feet. Four of these holes intersected a total of 15 veins or lenses of ore for an aggregate distance of 79.0 feet, or an average of 5' 3" per intersection.
>
> "We calculated a total of 86,300 tons (based presumably on the new drilling only--editor's note) of indicated ore to a depth of 300 feet, with an average grade of 3.0% lead, 3.7% zinc, and 36% sericite. The ore body continued in depth and is open on the west."

Present plans of the Heron Mining Co. are to sink a two-compartment shaft immediately north of the vein system and to open levels and mine by the top-slice method.

The collar of the shaft would be at an altitude of approximately 4,140 feet--44 feet above the maximum water level of Charleston Reservoir. Ore 300 feet in depth would be 256 feet below the maximum water level.

The company plans the construction of a selective flotation mill for the production of lead and zinc concentrates. Additional equipment is proposed for the recovery of sericite.

The capacity of the proposed mill is not known, but reserves indicated by Heron Mining Co. do not justify construction of a mill having a capacity in excess of 100 tons per day. Additional exploration, of course, may change this conclusion, as would confirmation of the Dunning ore estimate.

Water requirements for a 100-ton-per-day flotation mill would approximate 300 to 400 tons per 24-hour period, assuming no recovery. With proper provision, a minimum recovery and reusage of 50 percent should be expected. This indicates a maximum new-water consumption of 150 tons to 200 tons per 24 hours, i.e., 0.110 acre-feet to 0.150 acre-feet per 24 hours. Yearly consumption would approximate 33 acre-feet to 45 acre-feet.

8/ Horne, M. S. Letter in files of Area V Mineral Resource Office, BuMines, Denver, Colo. May 8, 1964.

The mine workings of the proposed development would be within 4,600 feet of the shoreline of Charleston Reservoir. Construction of the suggested dike would increase this distance to 7,000 feet.

Manilla Mine[9/]

The Manilla mine, which would be inundated, is in sec. 6, T. 21 S., R. 22 E. The property includes the Dean Richmond patented claim and an unknown number of unpatented locations. The main shaft, the deepest in the area, is 515 feet deep. The shaft collar is at 4,200 feet altitude, 104 feet above the expected maximum water level of Charleston Reservoir.

A memorandum report, written during an active period of exploration,[10/] describes the mineralized zone, an altered belt 200 feet or more wide, as being characterized by conspicuously strong bleaching and alteration. The main fissure of the mine, ranging from 1 to 5 feet wide, is located more or less centrally in the belt of altered rock. Additional small fissures are common throughout the remainder of the belt. The best mineralization was found in a rhyolite dike and along the borders between the dike and intruded andesite.

The main fissure generally dips 80° or more toward the southeast but may locally roll over to a northwest dip. The principal metallic constituents are lead and minor amounts of vanadium. Specimens containing varying quantities of gold, silver, zinc, copper, and molybdenum have been found. Vein quartz is the main gangue mineral. Mineralization continues for approximately 2,000 feet along the strike.

Weak enrichment was apparent to a depth of 25 feet. Virtually all sulfide minerals to a depth of 80 feet, the approximate present water table, have been oxidized. Below this level, the rock contained much pyrite but few ore minerals. Little, if any, of the rock could be profitably mined under 1964 economic conditions.

The following Bureau of Mines assays[11/] illustrate the quality of mineralization in the Manilla vein system:

9/ Chapman, Thomas L. Manilla Mine, Cochise County, Arizona. War Minerals memorandum in files of Tucson field office, BuMines, 1943.

10/ Batler, B. S. Memorandum on the Manila Mine, Cochise County, Arizona. Files of Tucson field office, BuMines, July 5, 1943.

11/ Work cited in footnote 9.

TABLE 3. - Assays of samples collected at the Manilla mine, Cochise County, Ariz.

Sample No.	Description	Width, ft	Vanadium pentoxide, pct	Lead, pct	Copper, pct
1260	Open cut about 650 ft southwest of Manilla shaft	5	0.16	--	2.48
1261	Open cut, 30 ft N. 55° E. of No. 1260	3½	0.11	--	--
1262	Grab sample of dump from open cut 30 ft long and 30 ft deep	--	0.03	--	--
1263	8-ft shaft, 27 ft N. 55° E. of No. 1262	3½	0.55	--	--
1264	20-ft shaft, 22 ft N. 55° E. of No. 1263, sample 3 ft down	4	0.11	--	--
1265	Small open cut, 123 ft N. 55° E. of No. 1264	3	0.03	--	--
1266	Open cut, 36 ft N. 55° E. of No. 1265, 10 ft deep	4	0.03	--	--
1267	6-ft shaft, 21 ft N. 55° E. of No. 1266, 12 ft southeast	5	0.07	--	--
1268	Long open cut, 10 ft N. 55° E. of No. 1266, 10 ft deep	3	0.03	--	--
1269	Northeast end of above trench, 63 ft N. 45° E. of No. 1268, 3 ft deep	2½	0.16	--	--
1270	Shallow cut, 15 ft N. 50° E. of No. 1269	3	0.07	--	--
1271	Shallow cut, 21 ft N. 50° E. of No. 1270	4	0.07	--	--

TABLE 3. - Assays of samples collected at the Manilla mine, Cochise County, Ariz.--Continued

Sample No.	Description	Width, ft	Vanadium pentoxide, pct	Lead, pct	Copper, pct
1272	Southwest end of long stope, open cut, 12 ft N. 55° E. of No. 1271, 10 ft deep	4	0.41	--	--
1273	Same open stope as above, 60 ft N. 60° E. of No. 1272, 20 ft deep	5	0.26	1.6	--
1274	Same open stope as above, 12 ft N. 60° E. of No. 1273, 20 ft deep	2½	0.41	10.0	--
1275	Same open stope as above, 15 ft S. 60° W. of No. 1273, 10 ft deep	2½	1.03	4.9	--
1276	Cut, 15 ft N. 60° E. of 50-ft shaft, which is 66 ft S. 57° W. of Manilla shaft	4	0.16	0.7	--
1277	Grab sample from dump of above 50-ft shaft	--	0.20	2.8	--
1278	Picked sulphides from dump of Manilla shaft	--	0.07	--	--
1279	10-ft incline, 111 ft N. 83° E. of Manilla shaft	5	0.03	--	--
1280	Grab of ore on dump of 45-ft shaft, 69 ft N. 57° E. of No. 1279	--	0.07	--	--
1281	Open cut, 117 ft N. 78° E. of No. 1280; open cut across vein	10	0.03	--	--
1282	Open cut across arroyo, 150 ft N. 43° E. of No. 1281, 4 ft deep	3	0.03	--	--

TABLE 3. - Assays of samples collected at the Manilla mine, Cochise County, Ariz.--Continued

Sample No.	Description	Width, ft	Vanadium pentoxide, pct	Lead, pct	Copper, pct
1283	Open cut, 127 ft N. 40° E. of N. 1281, 3 ft deep	6	--	--	--
1284	Grab of dump of 50-ft shaft, 18 ft N. 40° E. of No. 1283	--	0.03	--	--
1285	8-ft shaft, 87 ft N. 32° E. of No. 1284	3	0.02	--	--
1286	Open cut, 50 ft S. 55° E. of No. 1285, 4 ft deep	4	0.02	--	--
1287	45-ft shaft, same as at No. 1280; 25-ft crosscut, southeast to hanging wall, northwest from hanging wall	8	0.02	--	--
1288	Next to No. 1287 to northwest	8	0.02	--	--
1289	Same shaft as above, 45-ft level, to footwall 10 ft northwest	6	0.02	--	--
1290	Open cut, 54 ft N. 32° E. of No. 1286, 3 ft deep	4	0.02	--	--
1291	6-ft shaft, 85 ft N. 50° E. of No. 1290	4	0.02	--	--
1292	10-ft shaft, 30 ft west of No. 1291	4	0.04	--	--
1293	Open pit 5 ft deep, 25 ft east of No. 1292	4	0.02	--	--
1294	Grab of dump at 20-ft shaft, 27 ft S. 75° E. of No. 1293	--	0.02	--	--

TABLE 3. - Assays of samples collected at the Manilla mine, Cochise County, Ariz.--Continued

Sample No.	Description	Width, ft	Vanadium pentoxide, pct	Lead, pct	Copper, pct
1295	Grab of dump at 30-ft shaft, 225 ft N. 70° E. of No. 1294	--	0.02	--	--
1296	4-ft pit, 150 ft N. 57° E. of No. 1295	4	0.02	--	--
1297	8-ft shaft, 60 ft N. 30° E. of No. 1296	4	0.02	--	--
1298	6-ft shaft, 20 ft east of No. 1297	4	0.02	--	--

The conclusion of the authors quoted was that enrichment near the surface has been too weak to develop commercial deposits. Primary mineralization is predominantly pyrite and is definitely of subore grade.

Gallagher Mine

The Gallagher mine is outside the inundation zone in the SE¼ sec. 36, T. 20 S., R. 21 E., and NW¼ sec. 6, T. 21 S., R. 22 E. The property includes 24 claims, four of which are patented, the remainder being lode locations. Several claims are in conflict with others; some claims are small, covering fractions only.

Mineralization occurs in a series of subparallel fractures in andesite breccia[12/]. The total mineralized zone is at least 1,500 feet wide. There are at least 10 veins 2 to 6 feet wide through the central portion of this zone. Average width of veins is 2½ feet. Veins are discontinuous, few extending for more than 200 feet. Mineralization tends to occur as short overlapping lenses. In general, all the veins strike southeast and dip 40° to 90° southeast. west

Although individual veins are quite short, the overall zone extends for about 3,000 feet along the strike. In general, the veins are associated

12/ Farnham, L. L. Supplemental Examination Report, the Gallagher Lead-Vanadium Claims, Tombstone Mining District, Cochise County, Ariz. Project 324, files of Tucson field office, BuMines.

with rhyolite dikes cutting the andesite breccia. Possible ores include the lead minerals, cerussite, anglesite, and galena; the copper minerals, chalcopyrite and chrysocolla; and the vanadium mineral, vanadinite, and associated wulfenite. A small amount of zinc oxide has been found. Gangue minerals include quartz and calcite.

A number of samples were taken by Bureau of Mines engineers while this property was being operated. The following assay data were taken from earlier reports:

TABLE 4. - Gallagher mine lead assays, 1942 1/

Sample No.	Description	Width, ft	Lead, pct
11901	Stella shaft, 30-ft level, southwest side	5.0	1.20
11902	Stella shaft, 30-ft level, northeast side, footwall	1.5	15.90
11903	Stella shaft, 30-ft level, northeast side, center	1.5	1.23
11904	Stella shaft, 30-ft level, northeast side, hanging wall	1.5	1.75
11905	Pit at Blanket No. 1 shaft	2.5	0.25
11906	Dump at Blanket No. 1 shaft	Grab	0.55
11907	Pit on Blanket claim	3.0	0.40
11908	Bottom incline shaft - location E	3.0	0.72
10497	San Antonio Shaft - NE wall	3.0	0.90
10498	San Antonio Shaft - face NE drift	3.0	0.60
10499	Location D - ore on dump	Grab	4.70
10500	McClellan shaft - NE side of bottom	5.0	0.90

1/ McMillan, W. D. Supplemental Examination Report, Gallagher Vanadium and Rare Minerals Mine, Cochise County, Ariz. Files of Tucson field office, BuMines, 1942.

TABLE 5. - Gallagher mine vanadium assays, 1942 [1/]

Sample No.	Description	Width, inches	V_2O_5, pct Hawley & Hawley assays	V_2O_5, pct BuMines assays
738	Stella shaft, 35 ft deep, SW end drift, 10 ft from center shaft, footwall	36	0.06	0.03
739	Stella shaft, next to No. 738, hanging wall	34	0.18	0.15
740	Stella shaft, hanging wall at center shaft	30	0.12	0.07
741	Stella shaft, 5 ft NW center shaft	54	0.08	0.04
742	Stella shaft, end NE drift, 7 ft in from No. 741	26	0.09	0.06
743	Stella shaft, 15 ft up from bottom, SW end	28	0.05	0.03
744	Stella shaft, 20 ft up from bottom, NE end	36	0.07	0.02
745	310 ft NE Stella shaft, 10-ft shaft, NE end	36	0.11	0.05
746	24 ft SW Stella shaft, cut 6 ft deep, SW end	16	0.16	0.04
747	Aurora shaft, 357 ft NE Stella shaft, 24 ft deep, NE end	48	0.08	0.05
748	231 ft N. 60° E. from Stella shaft, 8-ft shaft	48	0.16	0.12
749	42 ft NE Stella shaft, trench 15 ft deep, NE end	48	0.07	0.04
750	Same trench as 749, SW end, 15 ft SW of No. 749	54	0.10	0.06
151	San Antonio shaft, 27 ft deep, face drift 10 ft NE of NE end of shaft	36	0.12	0.04

See footnote at end of table.

TABLE 5. - Gallagher mine vanadium assays, 1942 [1/] --Continued

Sample No.	Description	Width, inches	V_2O_5, pct Hawley & Hawley assays	V_2O_5, pct Bu Mines assays
152	San Antonio shaft, SW end, 19 ft SW of No. 151	66	0.07	0.02
153	No. 1 shaft on E side Blanket No. 1 claim, 22 ft deep, NE end	36	0.13	0.08
154	Shaft 18 ft NE No. 1 shaft, 6 ft deep, footwall vein	34	0.31	0.27
155	Incline 30 ft deep, S. 15° E. 60 ft to SW corner Stella claim, SW end	28	0.07	0.02
156	No. 4 shaft, 50-ft incline, face drift 10 ft SW from center shaft footwall to middle wall	30	0.12	0.05
157	No. 4 shaft, NE end, 14 ft NE No. 156	72	0.11	0.07
158	No. 4 shaft, 12 ft above bottom, SW end	45	0.05	0.02
159	No. 4 shaft, 17 ft above bottom, NE end	36	0.04	0.02
160	No. 4 shaft, 22 ft above bottom, SW end	45	0.05	0.04
161	No. 4 shaft, 27 ft above bottom, NE end	36	0.06	0.02
162	No. 4 shaft, 32 ft above bottom, SW end	56	0.12	0.07
163	No. 4 shaft, 37 ft above bottom, NE end	40	0.28	0.24
164	10-ft incline, S. 30° W. 65 ft from No. 4 shaft, NE end	52	0.07	0.06
165	12-ft shaft, S. 35° W. 290 ft from No. 4 shaft, SW end	66	0.09	0.04

See footnote at end of table.

TABLE 5. - Gallagher mine vanadium assays, 1942 [1] --Continued

Sample No.	Description	Width, inches	V_2O_5, pct Hawley & Hawley assays	V_2O_5, pct Bultinos assays
166	20-ft vertical shaft, near SW end line on mill vein in 8-ft X-cut	54	0.18	0.11
167	5-ft hole, S. 70° W. from pump shaft, SW end	54	0.11	0.09
168	Open cut, 20 ft SW of SW corner of mill	86	0.14	0.15
169	Open cut at SW corner of mill	72	0.09	0.08
170	Open cut, 15 ft NE of No. 169	84	0.12	0.04
171	4-ft hole, N. 68° W. 120 ft from deep shaft	46	0.07	0.03
172	Cut 3 ft deep, N. 75° E. 45 ft from deep shaft	34	0.15	0.12
173	Cut 4 ft deep, N. 40° W. 33 ft from deep shaft	36	0.15	0.11
174	Incline 10 ft deep, S. 62° E. 126 ft from deep shaft	65	0.12	0.08
175	Cut 5 ft deep, N. 46° E. 210 ft from No. 174	42	0.06	0.03
176	Shaft 15 ft deep, on Blanket No. 6 claim. In face drift 12 ft SW shaft	42	1.13	1.16
177	Open cut 4 ft deep, in bottom of cut S. 55° W. 30 ft from 15-ft shaft	38	0.15	0.02
178	Hole 5 ft deep, S. 55° W. 72 ft from 15-ft shaft	48	0.17	0.13
179	Hole 8 ft deep, S. 55° W. 102 ft from 15-ft shaft	78	0.07	0.03

See footnote at end of table.

TABLE 5. - Gallagher mine vanadium assays, 1942[1/] --Continued

Sample No.	Description	Width, inches	V_2O_5, pct Hawley & Hawley assays	V_2O_5, pct BuMines assays
180	Cut 3 ft deep at SW end, S. 60° W. 252 ft from 15-ft shaft	48	0.04	0.09
181	Shaft 10 ft deep, S. 58° W. 135 ft from No. 180, NE end	78	0.13	0.02
182	Shaft 10 ft deep, S. 67° W. 162 ft from No. 181, NE end	44	0.22	0.11
183	Reuter claim at location monument, shaft 8-ft deep	66	0.15	0.07

Weighted average of Hawley & Hawley assays is 0.132 percent V_2O_5.

Weighted average of BuMines assays, Reno, Nev., is 0.09 percent V_2O_5.

1/ Chapman, Thom. L. Gallagher Vanadium and Rare Minerals Mine, Cochise County, Ariz. BuMines files, Tucson, Ariz., Dec. 30, 1942.

One shipment of 530 tons sorted by hand assayed 0.04 ounces gold, 2.8 ounces silver, 18 percent lead, and 0.45 percent copper. It was produced at a financial loss.

Known mineralization on the Gallagher properties is subore grade, but the extent and character of this mineralization is significant.

OTHER MINERAL POTENTIAL

Sand and Gravel

Extensive sand deposits occur in the San Pedro River channel and in main side washes. Unsorted gravel deposits can be found in older deposits through the valley. These deposits possibly may meet Bureau of Reclamation construction requirements, but beyond that, remoteness from market and relatively low quality preclude their being commercial sand-and-gravel sources.

Oil and Gas

The sedimentary section described earlier should be present below part or all of the Charleston Reservoir site. The sequence is predominantly carbonate rock plus some sandstone, any part of which could form an excellent oil or gas reservoir. If a trap, structural or stratigraphic, could be found, oil production might be achieved. This consideration explains the number of Federal oil and gas leases issued for areas in and near the reservoir site. Areas so covered include the following:

T. 21 S., R. 22 E.

N½NE, SWNE, NENW, SENW, NESW, sec. 7

S½NE, SENW, NESW, SESW, N½SE, sec. 8

SW, sec. 17

SWNE, SENW, NESW, SE, sec. 18

S½NE, SWSW, N½SE, SESE, sec. 19

NE, S½NW, N½SW, SWSW, sec. 20

NE, NENW, SENW, NESE, NWSE, sec. 33

T. 22 S., R. 22 E.

All, sec. 3

Lots 1-6, S½NE, NESE, SESE, sec. 4

Lots 1-4, NENE, SENE, sec. 9

All, secs. 13-15, 23-26

Lots 1-4, NE, NESE, SESE, sec. 27

Lots 1-4, NENE, SENE, NESE, sec. 34

Exploratory oil wells drilled in this part of Arizona are listed in table 6.

It is apparent that one well in this vicinity, the No. 1-A State, did have shows of oil.

TABLE 6. - Exploratory oil wells

Location	Operator	Well	Total depth, ft	Completed	Description
NWNW sec. 29, T. 19 S., R. 18 E.	Mountain States Exploration	No. 1 State	1050	Dry and abandoned	Drilled in valley fill to total depth
NENE sec. 29, T. 19 S., R. 18 E.	Mountain States Exploration	No. 1-A State	4410	Dry and abandoned	Cretaceous, surface to total depth. No cores or tests. Slight show of oil at 1260, 1370, 1400, and 1435 ft. Show of oil at 1500 to 1512. Slight show at 1745.
SESE sec. 17, T. 21 S., R. 23 E.	R. B. Moncrief	No. 1 State	2446	Dry and abandoned	Tertiary from surface to total depth
NWSE sec. 5, T. 21 S., R. 24 E.	R. B. Moncrief, et al.	No. 1 Clarke-Davis	3525	Dry and abandoned	Tertiary from surface to total depth
SENE sec. 25, T. 21 S., R. 25 E.	R. B. Moncrief	No. 1 Davis	4023	Dry and abandoned	Tertiary from surface to total depth

WATER REQUIREMENTS FOR MINING

It is probable that known ore at the Grant mine will be mined. It also is possible that large deposits may be found below the extensively altered parts of the Charleston district. In either case a local concentration mill would be necessary.

If and when such a mill is built, water would be necessary for its operation. The quantity required would be a function of the size of the mill, which in turn should be predicated on the grade of ore to be processed and the estimated total reserve. Mill-water demand varies according to the design of the mill and water-recirculation possibilities. In the Southwest, when treating ores of the character found at the Grant mine, the new-water demand commonly ranges from 300 gallons to 600 gallons per ton of mill feed.

CONCLUSIONS

The now inactive mines of the Charleston district are within 1 mile of the Charleston Damsite. Parts of the district would be below the water level of the reservoir as now planned. Veins are present in extensively altered and weakly mineralized outcrops of the Bronco volcanic rocks. Commercial deposits of lead, zinc, or vanadium may exist in the volcanic rocks or more likely may occur in underlying sediments.

Oil or gas may be present in commercial quantities in the sediments underlying the reservoir site. Such deposits probably could be developed by directional drilling from the shore if a reservoir is established.

Sand and gravel deposits suitable for dam construction probably can be developed locally by the Bureau of Reclamation. Such deposits would be too far from potential markets to be commercial in other uses.

RECOMMENDATIONS

It is suggested that a dike be built about as shown on figure 6 to protect the major portion of the Charleston district from flooding or excessive seepage. It is recognized that such a dike also would require provision for surface-flow diversion or for pumping water that will accumulate behind the dike.

Mineralized ground along the western limit of the district would be flooded, even if the suggested dike is provided. However, mineralization is very weak in this portion of the area and the loss would not be significant.

Adequate provision should be made to permit future mineral exploration and possible development.

Bureau of Reclamation plans for Charleston Reservoir should include an allocation of water for a proposed mill or concentrating plant in the Charleston mining district.

190

August 10, 1964

Mr. Charles H. Suiter
5008 West Weldon
Phoenix 31, Arizona

Re: Charleston Mines

Dear Mr. Suiter:

There is enclosed "Affidavit of Performance of Annual Assessment Work and Mining Activity" which was received this date from Mr. Coppock, together with a photo copy of Mr. Coppock's letter dated 9 August, 1964.

As soon as the ore settlement voucher, referred to in Mr. Coppock's letter, is received in our office, it will be transmitted to you.

Very truly yours,

JAMES STEWART COMPANY

da
Encl.

M. S. Horne
President

161

(9 August, 1964

James Stewart Company
3033 N Central Ave
Phoenix, Arizona

Gentlemen:

Enclosed please find a copy of Affidavit of Performance of Annual Assessment work and Mining Activity completed by the B and E Mining Company

A small shipment of ore(34, 900 dry lbs) was made on July 8, 1964 A copy of the ore settlement voucher will be forwarded to your office within the week

For the Heron Mining Company,

G D Coppock Jr
19 Broadmor Dr
Tempe, Arizona

C.A. Cosgrove (7-7-65)

July 9, 1965

Mr. H. Clyde Davis
1000 North Mountain Avenue
Tucson, Arizona

Dear Clyde:

We are enclosing some data on the Charleston Mine, Tombstone, Arizona. A group is proposing to drill to approximate depth of 800' to 1000' using 8" to 10" rotary bore. We are requesting your opinion of the proposed drill locations.

During our meeting at the Mine early in 1961, we were discussing a possible hole location while inspecting the access road to the pit. It was our feeling at that time that a hole to the south of this pit road, and to the east of the High Cone Mountain along the probable secondary ~~lane~~ fault, would uncover a good possibility of an enlarged ore body.

We have made a sketch, which is enclosed, (Exhibit I), showing the drill positions of the Churn Drill Hole #2 bottoming at 345', drilled in 1950, with the superimposed location of Diamond Drill Hole #8 at 45° drilled in 1962.

To further refresh your memory, we are enclosing pictures of the pit operation with the Diamond Drill hole casing projecting on the skyline (Exhibit II); a plotting of the ore intersects of both Diamond Drill #8 and Churn Drill #2 (Exhibit III) made by Dr. Gaines with the Heron Mining Company; an Assay Report Summary (Exhibit IV) of the ore intersects of the Diamond drilling of the Heron Mining Company; a plot of all intersects encountered in the Diamond Drilling by Heron Mining Company (Exhibit V); a plotting from the notes of Nash & Vogel, plotting made by Dr. Gaines, of the ore intersects of the Nash & Vogel drilling (Exhibit VI); a Preliminary Geophysical Reconnaissance (Exhibit VII) prepared by Heinrichs Geoexploration Company, Tucson This contains a rather detailed surface workings map which will assist your recollection of the property.

Shattuck-Denn, in their recent exploration of this property, felt strongly that there was a rather large ore body to be encountered in this Mine, but they recommended prior to any drilling that further geophysical research be done to assist in the hole locations. A copy of the Assay reports and drilling log of the Churn Drill Hole #2, prepared by Robert P. Teten, Geologist, is enclosed (Exhibit VIII).

We are also furnishing a copy of the Notes on Exploring this Mine by Paul Gilmour, Geologist for Shattuck-Denn (Exhibit IX).

Due to your past interest in this property, we would appreciate receiving your opinion of the proposed work and/or any recommendations you might have to offer in this connection.

Yours very truly,

JAMES STEWART COMPANY

C. A. Cosgrove

CAG:ef
Encls.

Geophy Survey - by
Chris Ludwig (9-20-66)

258

GEOPHYSICAL SURVEY
CHARLESTON AREA
COCHISE COUNTY, ARIZONA

For

G. V. R. M.

September 1966

By

Heinrichs Geoexploration Company
P. O. Box 5671 Tucson, Arizona

3-31

TABLE OF CONTENTS

INTRODUCTION

At the request of Mr. Neil Vogel, acting in behalf of G.V.R.M., Heinrichs Geoexploration Company conducted and completed a preliminary magnetic and self potential survey over parts of the Blanket and Stella Claim group in the Charleston Area, Cochise County during the interim August 29 to September 2, 1966.

A total of 15,1000' each of magnetic and self potential traverse was run, all on 50 foot stations. The lines were 500' apart and oriented N35°W - S35°E, approximately parallel with the end lines of the claims.

The magnetic readings were obtained with a Jalander vertical intensity, flux-gate type, hand-held magnetometer having a sensitivity of +/- 10 gammas.

Self potential measurements were taken with a Leeds and Northrup potentiometer having a sensitivity of better than one millivolt.

The data are presented as combined magnetic and self potential profiles for each line. A plan location map shows the approximate relation between the lines and claims. The purpose of the survey was to attempt to find extentions of known veins and to locate any near surface blind ore shoots as well as gaining further insight into the geology of the area.

Geoex personnel involved in the field work were Ron Palmer, and Fred Heinrichs, geophysical technicians and Mike Fitz, helper. Report and interpretation were done by Chris S. Ludwig, Senior Geophysicist.

CONCLUSION, RECOMMENDATIONS, AND INTERPRETATION

The known veins correlate with erratic, low amplitude self potential variations, not well defined lows as is usually the case over oxidizing sulfide veins. This could mean that no concentrations of shallow oxidizing sulfides occur in the vicinity of these lines, or that if they do occur, they are in discontinuous bodies. Likewise, the magnetics become more erratic near the known veins indicating perhaps the alteration and redistribution of magnetite near the veins rather than the vein material itself.

Several possible vein extentions or new veins are indicated. Near station 2200, Line 1, magnetics indicate a fault or contact that could possibly have an associated vein although the self

potential here is quite flat, perhaps due to complete oxidation of the vein material if any exists. At station 1900, Line 3, the same type of effect occurs, a magnetic high on a self potential flat.

At about 2100, Line 5 and 2300, Line 6, the self potential drops somewhat, perhaps correlating with the northeast extention of the southeastern-most veins.

Since the anomalism from the known veins is quite weak and ill-defined from both magnetics and self potentials, it is recommended that no further work of this nature be undertaken in the area. However, induced polarization and resistivity measurements, while more expensive may give better penetration and resolution of subsurface sulfides if more work is desired in the future.

Respectfully submitted,

HEINRICHS GEOEXPLORATION COMPANY

Chris S. Ludwig

Chris S. Ludwig
Senior Geophysicist

September 20, 1966
P. O. Box 5671
Tucson, Arizona

Misc. Charleston Reports.

263

Western Minerals Corporation

President
WILLIAM A. KNOX
8967 LADUE ROAD
ST. LOUIS, MO. 63124

Secretary-Treasurer
RALPH J. SCHAEFER
4378 LINDELL BLVD.
ST. LOUIS, MO. 63108

C. NEIL VOGEL
1820 E. HAMPTON
TUCSON, ARIZONA

File Affidavit - G.U.P.M.

Check Probate Julia Gallagher 64.000

Mrs Elizabeth Gallagher Stratton

to Ruth Stratton Cook 608 East Pinecrest Alhambra, Cal.

Arthur Flagg 10.000

Mr Record Dec 21-66

Checked Dec 21-66

Listed as No Value 10.000

Listed Certificate 80 - 9619 - Probate

Marion L Roberts - 2604 Samoa Drive, El Paso, Tex

Westerly Side Line -

Easterly Side Line - Alice

& Ann Roberts

Westerly Side line of

Easterly Side Line of Marion

155 { 362 363

Maria 65-404
Lindy 65-403
} 2 miles Easterly from Chaileolos
Part of Graveyard group

Copper Blossom 47-274

~~Maria~~
Gatita 143-514 - Joins Westerly end line of Copper Blossoms
Ro Rio 143 513
Easterly line Joins Westerly line of Gatita

Old Soldier 129-223 - Morgan & Livingston

388-732

143-513
514

NW side of Old Manila
1400' NE - from base
300' each side

Voyel

269

PROSPECTUS OF THE WAR HORSE COPPER MINING COMPANY
Tombstone Mining District, Cochise County, Arizona

***

The above company owns fifteen mines, as follows: War Horse, War Horse No.2, War Horse No.3 and 4, War Eagle, War Eagle No.2, Bald Eagle, Bald Eagle No.2, 3, 4 and 5, Osker, Bessie, Orin and Homer. About six miles southwesterly from Tombstone, and about twenty miles northwesterly from Bisbee, three-fourths mile from Charleston, on main line of El Paso & Southwestern Railroad. County road from Tombstone to Fort Huachuca runs within two hundred feet of Shaft No.1 on War Horse mine.

DEVELOPMENT WORK ON WAR HORSE MINE

Double compartment shaft five hundred and eight feet deep, timbered to bottom. Cross cut on two hundred level with some drifting both east and west, with shipping ore in both drifts. Large sump with station pump.

On four hundred foot level cross cut with large sump and station pump. At two hundred and sixty-five feet in shaft ledge of copper ore five and one-half feet was cut. Average assay copper 6 per cent, silver 16 oz. gold $1.00.

At 286 feet in shaft low grade ledge was cut and lasted to 315 feet in shaft, when it dipped out same as copper ledge. Cross cut on 400 level cut through this ledge on 400 level for 27 feet, but was not extended far enough to cut the copper ledge or the ledge cut on 200 level.

At 450 feet in shaft high grade ledge was cut through but no cross-cutting has been done at bottom of shaft to cut this ledge, or any other.

On War Eagle mine double compartment shaft timbered 100 feet deep no cross-cutting done for the ledge. War Horse No.3, one shaft 85 feet one 60 feet. On balance of group numerous shafts have been started ranging in depth from 10 to 50 feet, some of which show high grade ore with a showing of ore in every one.

The 27 foot ledge can be traced on the surface through War Horse, War Horse No.2, 3 and 4, War Eagle and War Eagle No.2, a distance of 9,000 feet. The big ledge assays on 400 foot level from $1.00 to $4.50 gold and 2 per cent copper at 30 cents for copper would average $13 per ton in copper and gold.

MACHINERY ON PROPERTY

One Double Cylinder hoisting engine, 25 horse power
One Single Cylinder hoisting engine, 10 horse power
Two 70 horse power boilers.
One 30 horse power boiler.
Two Duplex Station pumps, 4 in. discharge.
Two Cameron Sinkers, No. 7 and No. 9.
Cage in shaft, six ore cars, hoist building, blacksmith shop, oil house, tool house, etc.

The Company has placed in the Treasury 300 thousand shares of stock. The price of the first 50 thousand shares to be sold for 25 cents per share, 50 thousand to be sold for 35 cents per share, and 100 thousand shares at 50 cents per share, for the purpose of purchasing air compressor, air drills, cross-cutting further on 200, 400 and 500 foot levels. Sinking shaft 200 feet deeper and putting in lift pumps to drain the mine; sinking air shaft to connect with 200 foot level, to comply with the laws of the state.

Stock is fully paid and non-assessable, and we expect to commence shipping ore in a short time after mine is unwatered. The water has only increased 20 thousand gallons in 2½ hours in sinking shaft from 200 to 500 foot levels and is only making about 70 thousand gallons per day.

We are only offering 200 thousand shares of the stock for sale, as we expect the stock to advance when we get the mine unwatered and start shipping.

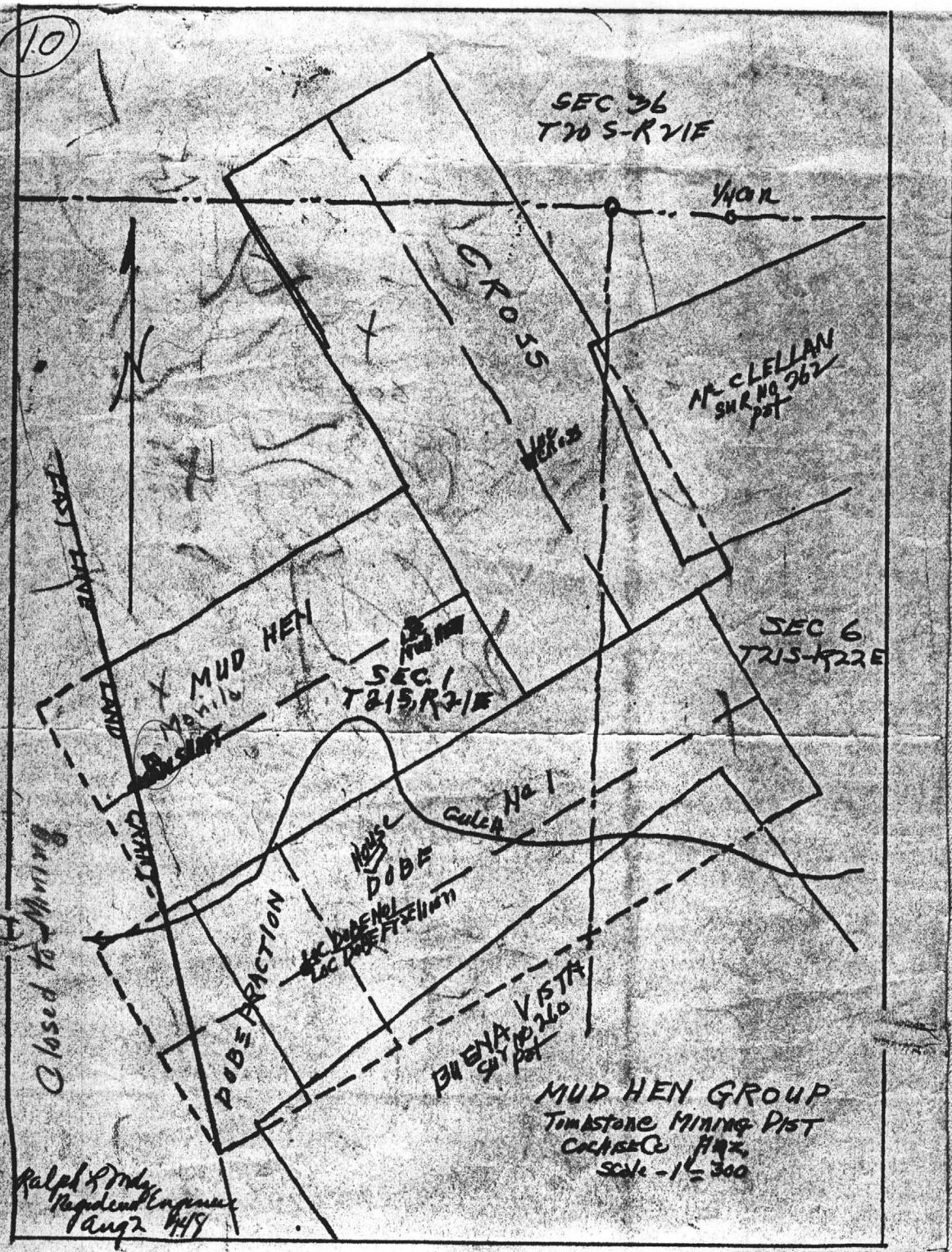
There are no debts on the property.

These mines are in the Tombstone District, which has produced about 40 million dollars in gold, silver and lead, and were worked in the early days to water, which was struck at about 400 feet, and the President of this company was the first man to go below water and strike copper.

Our officers are business men, and the President has had over 35 years experience in mining.

OFFICERS

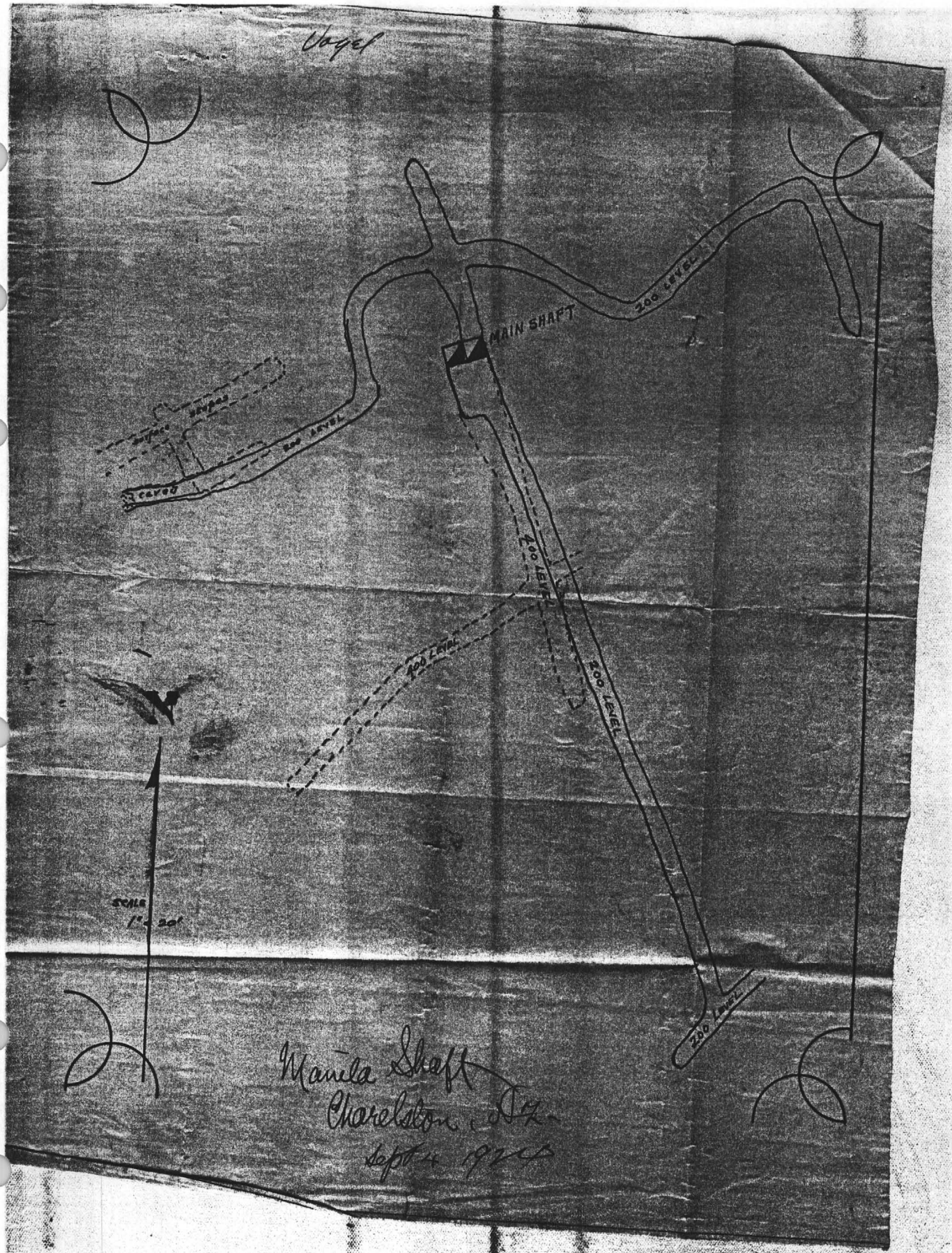
H. T. Fisher	President
John Rock	Vice President
F. J. Abell	Sec.-Treas.
Douglas Gray	Director
J. L. Smythe	Director
L. M. Fisher	Director



X Open

Dobe No I probably closed - Note Buena Vista & McClellan Pat claims.

Vogel



Manila Shaft
Charleston Dist.
Sept 4 1928

Notice of Mining Location

LODE CLAIM

TO ALL WHOM IT MAY CONCERN:

This Mining Claim, the name of which is the Expansion Mining Claim, situate on lands belonging to the United States of America, and in which there are valuable mineral deposits, was entered upon and located for the purpose of exploration and purchase by O'Neil Vagel et al.

(Locator must insert either "a citizen of the United States" or "who has declared his intention of becoming a citizen of the United States.")

the undersigned, on the ..... day of ....., 19.....

The length of this claim is 1500 feet,

and We claim 1200 feet,

in a Northeasterly direction and 300 feet in a Southwesterly direction from the center of the discovery shaft, at which this notice is posted, lengthwise of the claim, together with 300 feet in width of the surface grounds, on each side of the center of said claim. The general course of the lode deposit and premises is from the ..... to the .....

The claim is situated and located in the Tombstone Mining District, in Cochise County, in the State of Arizona, about In Section 1 - T21 in a R21 E ~~Southerly~~ direction from N. And borders the Buena Vista claim 260 on its Norther sideline and its southern end line is the Boguesus Land Grant Line

The surface boundaries of the claim are marked upon the ground as follows: Beginning at At a post & Monument

at a point in a Southeasterly direction 300 feet from the discovery shaft (at which this notice is posted), being in the center of the South east end line of said claim; thence 300 feet to a Monument, being the North West corner of said claim; thence 1500 feet to a Monument, being at the NE corner of said claim; thence 300 feet to a Monument at the center of the NE end of said claim; thence 300 feet to a Monument being at the SE corner of said claim; thence 1500 feet to a Monument at the SE corner of said claim; thence 300 feet to the place of beginning.

Dated and posted on the grounds this ..... day of ....., 19.....

.....

.....

.....

Form No. 24—Notice of Location—Lode Claim—A. P. Line Legal Blanks—Phoenix, Arizona

Excerpts from the Mining Laws of the State of Arizona

Title XXXIV of the Revised Statutes of 1923, Chap. 1, and Amendments thereto.

Section 4038. Such location shall be made by erecting at or contiguous to the point of discovery a conspicuous monument of stone not less than three feet in height, or an upright post, securely fixed, projecting at least four feet above the ground, in which monument of stones or on which post there shall be posted a location notice which shall be signed by the name or names of the locator or locators.

Sec. 4030. From the time of the location of a mining claim, as above specified, the locator shall be allowed ninety days within which to do or cause to be done the following things:

* * * * *

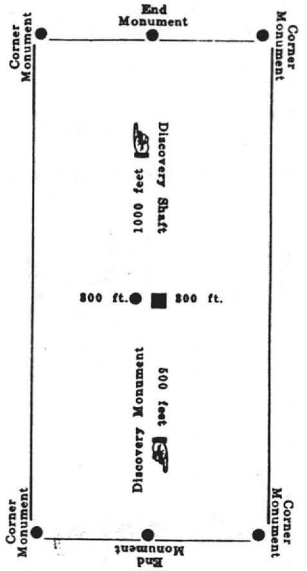
2. To sink a discovery shaft in the claim to a depth of at least eight feet from the lowest part of the rim of the shaft at the surface, and deeper, if necessary, until there is disclosed in said shaft mineral in place.

* * * * *

Sec. 4032. Such surface boundaries shall be marked by six substantial posts projecting at least four feet above the surface of the ground, or by substantial stone monuments at least three feet high, to-wit: One at each corner of said claim and one at the center of each end-line thereof.

Provided, however, that when the point of a monument of a mining claim is at the same point, and coincides with a monument of the survey of the United States, the monument of such government survey shall be and is hereby declared to be a mining claim monument of claims heretofore or hereafter located.

Sec. 4034. Location notices may be amended at any time and the monuments changed to correspond with the amended location; Provided, That no change shall be made that will interfere with the rights of others.



This diagram is to give locator a general idea of plan of location under the new law. The Discovery Shaft can be in the center of claim or any distance from either end desired. In the diagram it is placed 500 feet from one end, and 1000 feet from the other. Commence description of claim at a center end monument, giving its distance and direction from center of Discovery Shaft; thence bound the claim in either direction. In description be careful to state locality of claim with reference to some natural object, or permanent monument, as will identify the claim.

Notice of Location

LODE CLAIM

.....

.....

.....

.....

Dated ....., 19.....

STATE OF ARIZONA }
County of ..... } ss.

I hereby certify that the within instrument was filed and recorded at

request of .....

.....

Book.....

In Docket.....

on page.....

Witness my hand and official seal the day and year aforesaid.

.....
County Recorder.

By.....
Deputy Recorder.

Doc

This old report was probably written about 1900. The War Horse is near the property referred to you by Vogel - it may pay to put down core-hole to intersect the "ledge" -

Aug 29, 1966

Dale

C O P Y

27

PROSPECTING OF THE WAR HORSE COPPER MINING COMPANY
Tombstone Mining District
Cochise County, Arizona.

The above company owns fifteen mines, as follows: War Horse, War Horse No.2, War Horse Nos. 3 and 4, War Eagle, War Eagle No. 2, Bald Eagle, Bald Eagle Nos. 2, 3, 4 and 5, Osker, Bessie, Orin and Homer. About six miles southwesterly from Tombstone and about twenty three miles northeasterly from Bisbee, three fourths miles from Charleston on main line of El Paso and Southwestern Railroad. County road from Tombstone to Fort Huachuca runs within two hundred feet of Shaft No. 1 on War Horse mine.

DEVELOPMENT WORK WAS ON WAR HORSE

Double compartment shaft five hundred and eight feet deep, timbered to bottom. Cross cut on two hundred level with some drifting both East & West with shipping ore in both drifts. Large sump with station pump. On four hundred foot level, cross cut with large sump and station pump. At two hundred sixty five feet in shaft, ledge of copper ore fice and one-half feet was cut. Average assay copper 8%, Silver 16 oz., Gold $1.00. At 285 feet in shaft low grade ledge was cut and lasted to 315 feet in shaft, when it dipped out same as copper ledge. Cross cut on 400 level cut through this ledge on 400 level for 27 feet, but was not extended far enough to cut the copper ledge or the ledge cut on the 200 foot level.
At 450 feet in shaft high grade ledge was cut through but no cross cutting has been done at bottom to cut this ledge or any other.
On War Eagle mine, double compartment shaft timbered 100 feet deep, no cross cutting was done for ledge. War Horse No. 2, one shaft 85 feet, one 60 ft.
On balance of group numerous shafts have been started ranging in depth from 10 to 50 feet, some of which show high grade ore, with a showing of ore in every one.
The 27 foot ledge can be traced on the surface through War Horse, War Horse Nos. 2, 3 and 4, War Eagle and War Eagle No. 2, a distance of 8000 feet. The big ledge assays on 400 foot level from $1.00 to $4.50 gold and 2% copper at .30 cents for copper would average $13.00 per ton copper and gold.

Machinery [redacted] on Property

One double cylinder hoisting engine, 25 horse power.
One single cylinder hoisting engine, 10 horse power.
Two 70 horse power boilers
One 20 horse power boiler
Two duplex station pumps, 4 inch discharge
Two Cameron sinkers, No. 5 and No. 9
Cage in shaft, six ore cars, hoist building, blacksmith shop, oil house, [redacted] tool house, etc.

The company has placed in the Treasury 300 thousand shares of stock, the price of the first 50 thousand shares to be sold for .25 cents per share, and 100 thousand shares at .50 cents per share for the purpose of purchasing air compressor, air drills, cross cutting further on 200 foot 400 foot and 500 foot levels, sinking shaft 200 feet deeper and putting in ait lift pumps to drain mine, sinking air shaft to connect with 200 foot level to comply with the laws of the State.

Stock is fully paid and non-assessable and we expect to commence shipping ore in a short time after mine is unwatered. The water has only increased 20,000 gallons in twenty four hours in sinking shaft from 200 to 500 foot levels and is only making about 70,000 gallons per day.

We are only offering 200,000 shares of stock for sale, as we expect the stock to advance when we get the mine unwatered and start shipping.

There are no debts on the property, these mines are in the Tombstone District which has produced $40,000,000 in gold, silver and lead and were worked in early days to water, which was struck about 400 feet, The President of this company was the first man to go below water and strike copper.

Our officers are business men and the President has had over 35 years experience in mining.

OFFICERS:

H. T. Fisher, Pres. John Rock, Vice-Pres. F. J. Abell, Scy & Treas. Douglas Gray, J. L. Smythie and L. M. Fischer, Directors.

Subscribed and sworn as true copy of original printed copy of the Prospectus referred to above - - - - Signed J.B.G.

(1) Vogel 274

R E P O R T

on the properties of

GALLAGHER VANADIUM AND RARE MINERALS CORPORATION

These properties are situate near Charleston station on the Southern Pacific Railway (formerly E.P. & S.W. Ry) 60 miles westerly from the smelteries of the Copper Queen and Calumet & Arizona Mining Companies at Douglas, Arizona, in Tombstone Mining District, Cochise County, Arizona, and comprise the Bradshaw-Gallagher and Blanket groups of mining claims.

BRADSHAW-GALLAGHER Group

This group of two claims lies one mile east south-east from Charleston, whence it is reached by automobile or truck road.

The history of this property credits it with a production of $65,000.00 from the first and high grade stope of ore produced, with values of up to 2,000 ounces silver per ton; and a further production of $20,000.00 of lower grade ore. These amounts cannot be verified by record, the books having been destroyed a few years ago, but can be considered as authentic.

The depths of the operations is uncertain, but is reputed to be about 200 feet on an incline of 80 degrees.

The ore occurs in a small rhyolite dike highly altered and kaolinized, which intruded an earlier andesite dike with a northeast strike, and a dip to the south-east of about 80 degrees, and which in turn had intruded a flow of bufflike andesite, covering the paleozoic limestones.

The old workings could not be entered beyond a depth of 65 feet, but the pillars or unmined parts of the vein show values of from 0.01 oz gold, 1 oz. silver to o.02 oz gold, 16 oz silver, 4% lead in samples cut across the vein for the width of the pay streak--15 inches to 4 feet.

The silver mineral is, to the depth of 65 feet cerargyrite or horn silver, with siliceous gangue.

The waste dump on this group contains 5000 tons of material calculated on a basis of 22 cubic feet per ton, and gives 0.01 oz gold, 0.30 oz silver per ton.

Some points of ore left by the former operators show that there was ore in the mine of the grade mentioned above but gambuddnos and chloriders have cleaned any bunches that showed to be worth taking out.

THE BLANKET Group:

This group lies about one mile northeast from Charleston and comprises 10 claims, along the south side of the Tombstone road.

A flow of porphyrite has covered the Paleozoic limestones leaving some ribs and lenses of those sedimentaries showing on the surface. A series of andesite dikes with northeast strike and southeast dip at 60 degrees cut the porphyrite flow. The andesite dikes were in turn intruded by dikes of rhyolite having the same strike and dip. Alteration-kaolinization and mineralization followed and the ore is found principally, replacing the rhyolite.

This zone of mineralization is traceable on the surface for 4,500 feet on the Blanket, San Antonio and Aurora, and parallel zones to the south are found on the Blanket No.1, and again on the Nos. 2 and 3.

On the Southwest end of the Blanket mining claim the ore is principally galena carrying gold and silver, with lenses of vanadates of lead; from the center of the claim to the northeast the ores are principally vanadinite with some galena and carbonates of lead showing.

The Blanket is developed by three shafts: an incline shaft at about the center of the claim 75 feet deep at 30 degrees. From this shaft drifts have been put out northeast and southwest and connected with a vertical shaft 40 feet. The stopes in this working have

yielded some $4,500.00 worth of silver-lead ore as per liquidation sheets from the El Paso Smeltery. Another vertical shaft has been sunk 50 feet for the purpose of cutting the vein on its dip at a point 150 feet southeast of the incline shaft, but has not yet reached the depth necessary to do so. Another twenty feet should reach the vein and would open a new block of stoping ground.

Along the strike of Blanket vein to the northeast vanadates of lead are found until we reach the 36 foot shaft on the San Antonio claim, where a lense of vanadinite is shown with a width of 4 feet extending to the bottom though someshat broken, and traceable for approximately fifty feet each side of the shaft on the surface. The vanadates here are in general fairly large crystals one-sixteenth to three-sixteenths of an inch in diameter, incrustations up to a square foot, one-eighth inch in thickness and studded with vanadinite crystals are found in this working, samples giving four % vanadic acid for the width of the shaft.

Another particularly good showing is found at a point on the Aurora 1,300 feet northeast of the San Antonio shaft and 2400 feet northeast of the Blanket incline shaft, out-cropping of 5 feet in width of highly crystalline vanadinite over a width of 5 feet across the strike and for 20 feet in length, yielding 2% vanadic for the width of the shoot of ore, and a picked sample giving 18.5% of V_2O_5. Many other points along the line of this vein show interesting occurrences of vanadates making 4,500 feet in length of vanadiferous carrying vein.

The Blanket No.1, adjoining and to the south of the Blanket shows several occurrences of vanadates.

The Blanket No.2, adjoining and to the southeast of the Blanket No.1, has a 25 foot shaft with seven feet of vanadium bearing quartzose ore with 1% vanadic acid.

The Blanket No.3 has a 40 foot incline shaft which shows some interesting features carrying about 1% vanadic acid. Three other shallow shafts between 15 and 20 feet in depth show the same

Character of material and can be expected to become producersof vanadium ore.

The Stella and May Powell show several outcrops of vanadates as well as the Maggie which has croppings of vanadates highly crystalline and of good value. These last mentioned claims lie to the northwest of the Blanket zone and are on a distinct but well mineralized line of veins.

In conclusion I find that the Bradshaw-Gallagher group does not offer at the present time, sufficient encouragement for the expenditure of the necessary amount of capital to prove its potentialities. These are the Silver Claims- Silver now at $1.29 makes this attractive. (No Water on These claims)

On the Blanket group I find that the property is of sufficient merit to warrant further operation with the view of opening a lead mine and bringing into production a vanadium mine of which it gives great promise. In fact the exposures of vanadates showing at the present time warrant the installation of a plant for the concentration and reduction of these values as found in the vanadium mineral.

A mill for the beneficiation of the vanadates could be used at other times for the concentration of the lead-silver ores-- in other words one mill would serve for both ores.

I therefore recommend that work be prosecuted on the known and mentioned exposures of the vanadates in the form of cuts and shafts to a depth of at least the present water table. As the higher grade of lead ores can be shipped to the smelters, it will, without doubt, be in order to install a milling plant for the recovery of and realization on, the values contained in the lower grades of ore produced.

(Signed) JONATHAN GORDON
Tombstone, Arizona
24th October, 1925

(S E A L)
Registered Mining Engineer

Log Claim
in Tombstone

S U M M A R Y

HISTORY:

Located in 1880's. Manila shaft on west end of property sunk to 500 foot level. Lead Vanadate and Molybdate recognized on 400 foot level.

ENGINEER'S REPORTS contained herein:

1927- Mr. A. B. Frenzel, formerly Rare Mineral Commissioner State of Colorado. - Deceased

1927-1948- Mr. A. L. Flagg, Field Engineer, Mineral Reserves Arizona, Phoenix, Arizona. - Can be reached at this address

CLAIMS:

Twenty-one unpatented and three patented claims--380 Acres

LOCATION:

Seven miles from Tombstone, Ariz. on all-weather county road. One and one-half miles from Charleston, flag stop main line Southern Pacific Railroad.

DEVELOPMENT:

Several small assessment holes- shafts to 90 feet deep-- latest 124 ft shaft and 250 ft of drifting at 105 ft level.

ORE:

Lead, Silver, Gold, Vanadium, Molybdenum.

VEIN SYSTEM:

Four distinct and proven parallel veins 4500 ft in length with cross veins on West side of property. East property has strong silver assays. Abandoned Silver-Lead mine reported $200,00.00 in 2 year shipments 1880-1881. Several parallel veins 2000 feet long.

FACILITIES:

Electric high line over property. Mill facilities removed. One operating mine shaft to 30 tons per day electric powered and lighted.

SHIPMENTS:

Since October, 1951- 580 tons mine run direct to smelter, paid $21,000 - average 18.3 % lead.

ENGINEER'S COMMENTS:

Largest known Vanadium deposit in the U.S. Mineralized area 3000 feet wide, 4500 feet long on only half of property.

(Several additional veins uncovered by bulldozer 1951.)

H I S T O R Y

Government records of patents granted in the early 1880's on the McClellan, Buena Vista and Richmond claims, as well as mineral surveys authorized (though the patents were not issued therefor) on other claims adjoining and in the immediate vicinitym establish beyond doubt that there were substantial mining developments, shortly after the historic discovery of Tombstone, on the claims which now comprise an important part of the holdings of the Gallagher Vanadium and Rare Minerals Corporation. That there was a worthwhile production from some of these claims notably the Bradshaw, is evidenced by the records of bullion produced in near-by custom mills and sold to the U. S. Mint.

Subsequebtly Mr. H. T. Fisher, who installed and operated the first mill in Tombstone, located a number of claims covering a large part of the same area now held by the G.V.R.M. Corporation,- claims now known as the Blanketm B lanket Nos.1 to 7, May Powell, Stella, Maggie, Aurora, Gallagher-Bradshaw and Gallagher Bradshaw No.1. After doing considerable exploratory work he organized and financed in the early 1900's a company known as the Pittsburg-Arizona Mining Company.

The new company's efforts were concentrated on the Manila shaft which was sunk to a depth of 515 ft. A considerable amount of drifting was done on the 140 and 400 ft levels. Though the presence of lead vanadate and lead molybdate were recognized by the Pittsburg-Arizona Mining Company on the 400 ft level and above, they were interested in only gold, silver, lead and copper. Development continued until the panic of 1907. For a year or two thereafter only annual labor requirements were complied with.

Some time later the Pittsburg-Arizona Company defaulted and lost its possessory title to the claims. Mr. Fisher again located the claims, and in 1917 organized a new company known as the Warhorse Copper Mining Company. After a few years this company defaulted, and in 1923 the Gallagher interests located the area. Later the same interests acquired the patented mining claims McClellan, Buena Vista, and Richmond.

ALL ORIGINAL RECORDS of locations, records of tax sales, the proper deeds to patented claims, affidavits of labor and other evidences of title are duly recorded in the office of the County Recorder in and for Cochise County, at Bisbee. The titles are in all respects, without flaw.

In 1923 the Gallagher Vanadium and Rare Minerals Corporation was formed, with an authorized capital of 500,000 shares at $1.00 per share par value. At this time 300,000 shares were issued to various interests in recognition of financing done prior to incorporation. Since that time 73,403 shares have been issued, from the treasury, to some of the original stockholders, for more recent financing.

The total amount expended on the properties by the Gallagher interests to date for labor, supplies, buildingsm equipment, services, etc. approximates $100,000.00.

Neither the property not the corporation has been involved in any receivership, reorganizationm bankruptcy or other compromise. There are no outstanding obligations other than current expenses for annual labor requirements now being performed.

Except for a period of overseas services during the World War the management of the properties has been in the hands of Mr. Jules B. Gallagher, one of the original locators of the properties. In the Spring of 1928, equipment for a pilot plant was purchased by the late A. B. Frenzell, of Denver, Colorado, formerly Rare Mineral Commissioner to the State of Colorado. Before all the equipment was delivered on the property Mr. Frenze ll became ill, and at his suggestion Mr. A. L/ Flagg was called in as consultant to supervise the construction of the plant and test runs. This work extended into 1929, terminating when the panic of that year halted further plans for financing.

Since 1929 the operations at the property have been intermittent, principally kee ping up the annual labor requirements. The mill has been operated for short periods, by lessees, principally on ores from some other properties in the Tombstone District.

L O C A T I O N

The Claims lie almost wholly in Section 6, Township 21 South, Range 22 East, Gila and Salt River Base Line and Meridian.

M I N I N G P R O P E R T Y

There are three patented mining claims:

Buena Vis ta, U. S. Mineral Survey No.260 (1881)
Richmond, U. S. Mineral Survey No.261 (1881)
McClellan, U. S. Mineral Survey No.262 (1881)

Names and place of record of unpatented mining claims.
County Records are at Bisbee, county seat for Cochise County.

CLAIM	Book	Page
Gallagher-Bradshaw	69	54
Gallagher-Bradshaw No. 1	69	56
Gallagher-Bradshaw No. 2	69	56
Gallagher-Bradshaw No. 3	69	57
Blanket	69	36
Blanket No. 1	69	37
Blanket No. 2	69	38
Blanket No. 3	63	523
Blanket No. 4	63	524
Blanket No. 5	63	525
Blanket No. 6	69	39
Blanket No. 7	63	527
Blanket No. 8	69	9
Blanket No. 9	69	10
Stella	69	40
May Powell	62	522
Maggie	69	41
Side Shot	69	58
Necessity	67	370
Union Flag	69	88
Aurora	62	255

Copy of a report by the late A.B. Frenzel,
Formerly Rare Mineral Commissioner for Colorado.

A. B. Frenzel, Consulting Engineer
1540 Sherman St., Denver, Colorado.

Report made at the request of Mr. & Mrs. Louis Reuter and Mr. J. B. Gallagher.

The property of the Gallagher Vanadium and Rare Minerals Corporation is advantageously located about two miles from the Southern Pacific R.R. near Charleston, Cochise County, Arizona, with an easy down-hill haul to a side track already in. There are 24 claims, three of which are patented; the ground covered by patent and locations is approximately 380 acres, and the main highway passes through the tract for nearly a mile. The road is in excellent condition for traffic.

In former times several of the claims were producers of silver lead ores carrying small values in gold, and quite a number of shafts were sunk between 12 and 200 ft in depth. This development work will apply when the claims are patented and is a valuable asset. It was prior to the time that vanadium and molybdenum came into general use in steel and in other industries, and great credit is due Mr. J. B. Gallagher for having discovered the valuable vanadium and molybdenum ores in evidence and standing by this property for many years as the demand for these rare minerals increased and became permanent.

In my investigations covering three weeks, I find a wide belt the full width of the property, containing profitable values in vanadium, molybdenum and lead, with associated values in silver and gold; most favorable conditions for actually operating the property; sufficient water already developed for treating at least 100 tons; that yields readily to mining and the recovery of values at reasonable costs and profitable market ahead of production.

A site for mill and camp, with outside telephone connections; a flowing spring of good water; freedom from floods; twenty minutes f from Tombstone for supplies; telegraph, bank, good schools, etc. are economic advantages.

For business purposes it is not necessary to refer to geology, metallurgical technicalities or vague references. A general description of the ore bodies and their extent, and information regarding treatment of the ore follows.

THE ORE BODIES

Veins carrying ore vary in width from 4 to 40 ft, some are parallel and cross veins. They are to be seen on every cla im on the group. What may be called the main vein extends without a break from NE to SW 4,500 ft. through three claims 1,500 ft. long. A continuation of this vein to the SW on adjacent property, has a shaft sunk on the vein 600 ft. This important fact indicates depth, and permanency of the vein and assures a large tonnage of ore below in your property.

It is not always possible to gauge the width of the vein by surface showings but when vanadium or molybdenum are indicated it will be worthwhile to prospect the ground by sinking or by surface trenching. The veins are usually vertical or with thirty degrees inclination and values frequently extend from wall to wall; thes e values are determined by assaying during the progress of working.

Ore already developed warra nts the erection of a small 25 ton mill, that will treat ores from development work on the various claims; this mill will be a working asset, and can be enlarged from time to time. Additional water will be developed to supply all future needs.

The treatment of the ore is not complicated, and compares with good modern practice, now in general use, with lead, zinc and copper.

The proposed mill will not require the services of operators

skilled in electricity, chemistry or metallurgy, as it will produce on concentrate containing the recovered values. Machinery for this mill is standardized and can be assembled and erected in about four months. Economy can be practiced by using some good second-hand machinery.

Total cost of installation will be between $12,000.00 and $15,000.00; costs of buildings, timber for shafts, and other requirements will be $5,000.00. An immediate provision of $25,000. will carry out these plans and provide a sum for labor and incidental ex expenses until the pilot plant is self-sustaining.

Mr. Gallagher and associates here qualify to erect this plant, with the assistance of a good millwright. After erection they will operate the mill.

A mill of this character will stimulate the production of similar ores in the district and can do profitable custom work if desired.

Costs of mining and milling, on a small scale, will approximate $5.00 per ton, with overhead. This cost will be less if the milling capacity is increased.

TEST B Y CONCENTRATION AT SCHOOL OF MINES, TUCSON, ARIZONA

For several days I was accompanied by Mr. J. B . Gallagher and took random samples from various dumps, shafts, and surface workings on nearly every claim in the group. These various samples were taken to the School of Mines; Dean Butler engaged Professor Cunningham to direct the work and he concentrated the large composite sample that weighed 611 pounds on a small Plat-O*Deister table. The ore was passed through the breaker and rolls dry, and over a 20 mesh screen. Mr. & Mrs. Reuter, J. B. Gallagher and myself were present throughout the diration of the test, three days in all. Results of the test were:

V Rod V_2O_5 Tech + 1.40 / lb
1.30

Pricing 1967

10.8 = 136 @ .12 16.32
37 @ 1.30 48.10
25 @ 1.80 45.00

109.42

10% Loss Recovery 10.94

98.48

Mining Cost/Ton 15.00

83.48

Milling Cost/Ton 8.00

75.48

Each 100 pounds of composite sample averaged:

	Weight in pounds	Percent
Concentrates	9.77	10.4
Middlings	9.81	10.5
Tails	64.10	68.4
Slimes	10.00	10.7
Unaccounted (loss)	6.32	
	100.00	100.00

The samples for assaying were ground to pass 65 mesh screen and were delivered to Mr. Johathan Gordon, M.E. at Tombstone, Arizona. The results were as follows:

	Oz Gold	Oz Silver	% Lead	%V205	%Mo03
Heads	Tr	0.90	10.8	1.875	1.245
Concentrates	0.04	2.86	51.8	8.446	8.550
Middlings	Tr	1.46	14.4	2.162	
Slimes	Tr	0.62	8.0	0.955	
Tails	Tr	0.58	2.3		

The gold and silver values are low but some of the values may be saved, possibly $2.00 to $3.00.

The test showed that with better apparatus these values can be greatly improved, and I am sure that a final test which I am familiar with will result in a recovery of at least 85% of the values of lead, vanadium and molybdenum, and in a mill of proper design this recovery will approximate 90% extraction.

This composite sample indicates good values throughout the entire property, with large bodies of ore in sight. The assays indicate the following values:

Heads:	10.8% lead	136 lbs.@ 6¢	$ 8.16	19.-
	1.875% V205	37.5 lbs.@ 75¢	28.14	131.-
	1.245% Mo03	24.91 lbs.@ 65¢	19.50	87.-
		Total	55.70	237.
	Deduct 15% loss in recovery		8.35	
			47.35	
	Deduct $5.00 ton mining and milling		5.00	
	Net value per ton composite sample		$ 42.35	

COMMERCIAL ASPECT

From the fact that there are unquestioned large bodies of ore on this property, contained in veins that are from 4 to 40 ft. wide, proven to various depths, from surface to bottom of shafts varying in depth from a few feet to 200 ft., the outlook is favorable for a substantial, commercial operation, free from mining risks that are often misleading. There are very few mines with values of approximately $40.00 per ton profit in sight; in fact, the greatest producers in the world seldom approach this figure. A small 25 ton pilot mill can pay for its cost of installation and maintenance in a few months and will pay a profit on this property under trustworthy and competent management. By developing these ore bodies, as the situation now warrants, there are possibilities of profitable operations on a large scale, principally because there is an increasing demand for vanadium and molybdenum and also on account of a rising stable market that does not fluctuate as in the case in prices of lead, zinc, silver and copper.

RECOMMENDATIONS

I suggest that you proceed forthwith to patent your locations erect the small pilot mill, provide dwellings for your employees and secure a competent, experienced mining engineer and assayer to direct and supervise the usual mining operations incident to this character of work. Also to send one of the 100 pound sacks of ground ore now at the School of Mines at Tucson, together with the results of Mr. Gordon's analysis to Webb City and Carterville Foundry and Machine Works, Webb City, Mo., for their test by jigging. This may alter the flow-sheet (plan) of the pilot mill to your advantage. Addresses in the U.S.A. and foreign countries of buyers of your products will be given to Mr. J. B. Gallagher by me, together with other needful data for future consideration.

An Omitted reference is made regarding the lead, which, in your case, should command a premium of about 1% as it is free from arsenic and other deleterious elements and is in demand for making pure "chemical" lead, largely used in the various mechanic arts.

(Signed) A.B.Frenzel,Consulting
(Registered in Colorado) Engineer
Ex-Rare Mineral Commissioner for Colorado.

Tombstone, Arizona
February, 1928

In October, 1928, a series of flotation tests on a composite sample of these ores was made at the plant of the Universal Engineering Company, by Mr. C. M. Nokes, Metallurgist. The final test No. 60 (Reconstructed) as given below, is indicative of what may be expected from flotation. There are many details to be worked out, but the essentials are known.

PRODUCTS	WEIGHT Grams	%	GOLD oz Ton		SILVER oz Ton	% Metal	LEAD % Ton	% Metal	VANADIUM % Ton	% Metal
Heads, assay	1000				1.8		11.3		2.05	
Heads, compt	979	100	Tr		.84	100	12.05	100	1.90	100
Tailings	750	76.6	Tr		Tr		1.7	10.7	Tr	
Concentrates	229	23.4	.021	100	4.1	100	46.0	89.3	8.10	100

Ratio of Concentration: 100 tons of crude ore produces:

23.4 tons of concentrates 76.6 tons of tailings

This concentrate, being a rougher, can be graded up to assay about as follows ;

Gold	Silver	Lead	V205
.02 oz	4.50 oz	56%	10%

****

REPORT BY A. L. FLAGG

The property of the Gallagher and Rare Minerals Corporation consists of twenty-one unpatented and three patented mining claims, situateed in the Tombstone mining District, Cochise County, Arizona.

This particular part of the Tombstone Mining District lies west and south of Tombstone Hills, on the gentle slopes bordering

the San Pedro river. The Company's camp is 7.5 miles from Tombstone, county seat of Cochise County, at an elevation of approximately 4,200 ft above sea level.

The county road from Tombstone to the military reservation at Ft. Huachuca passes through the property and within a few hundred feet of the pilot plant. The Southern Pacific Railroad is only 1.5 miles distant. At Charleston there is ample side track facility. The Mountain States Telephone and Telegraph Company (Bell System) lines cross the claims and the pipe lines of the Tombstone Municipal water system also crosses the property.

The neighborhood camp of Tombstone has always been famous for its wet mines. There is an abundance of water in this particular part of the district but as yet it is not at what elevation the permanent water stands. Water developed in the present workings does not seem to shed much light on this subject.

The Company owns a well equipped testing and assay laboratory and a 25 ton (per 24 hrs.) pilot plant. The mining equipment consists of two hoists, a portable and a small stationary compressor, drills and miscellaneous tools, a supply of mine timber etc. A small camp which serves for the officers of the company, a garage and a blacksmith shop complete the equipment. The mining equipment is adequate for the initial prospecting period, but must be replaced by more substantial and powerful equipment later.

The Tombstone district, in which the property is situated, is one of the oldest in Arizona. Undoubtedly these properties figured more or less in the events of the early romantic days of Tombstone about which so much has been written. It is probable that because of these locations being somewhat remote from the center of activity that this area did not receive more attention in those stirring days. It is also true that there were no such permanent bodies of high-grade ore as were encountered in the main camp. Whatever the cause

may have been, the property received little attention until somewhat less than twenty years ago. Since then prospecting has been almost continuous, culminating in its present activities.

The claims lie in an area of low relief at an elevation of about 4200 ft above sea level. The terrain slopes gently to the south and west. The drainage is to the San Pedro River. The surface at best is covered with only a thin layer of soil which supports but little growth.

The Tombstone Hills to the northeast are capped by sedimentary formations dipping east and forming a conspicuous feature in the landscape. There are no sedimentaries exposed on this property. The principal rock mass is Tertiary Andesite flow, in a variety of phases, usually dark greenish, fine grained and massive except for jointing. Brecciated and amygdaloidal textures occur but they are not prominent. The same andesite breccia or agglomerate noted in other parts of the state wherer formation is similar has not been noted here. Typical alteration products, epidote, calcite and chlorite have resulted from the breaking down of the ferromagnesian minerals.

There are fine grained, light gray dikes which weather to white or yellow outcrops. These have been classified provisionally as rhyolite. The close association of the most prominent dikes with the principal vein system suggests a probable genetic relation which is not definitely proven. Smaller dikes of similar megascopic characteristics are more or less closely associated with the other veins. In general these light colored dikes are parallel to the veins, have the same general direction of dip but vary often in degrees.

Another dike system, crossing the vein system, and running more nearly north and south is indicated by isolated but conspicuous outcrops. In texture it is strongly porphyritic. The prevailing

color is greenish, expecially in weathered exposures, though fresh specimens are more gray and mottled. In the outcrop the most conspicuous features are the white phenocryses of feldspar which stand prominently against the somber background of the fine-grained mass. Tentatively this material is classified as quartz-mica-diorite as has been described by Ransome in the Ray, Christmas and other quadrangles in Arizona.

Faults if present are not indicated at the surface and it is believed that if any are encountered they will not be of a serious nature.

The vein system strikes NE-SW and dips south from angles as low as 20 degrees to almost vertical. Unquestionably some of the low lying flat veins are offshoots of the main vein which stand at steep angles. There are at least five parallel veins crossing the main body of claims and these are traceable for a length of three or more claims.

The widths of the veins vary from a few inches for the less cpnspicuous to well over two hundred feet on the main Blanket vein, a short distance of the power plant SW. In all probability the average vein width will be about four feet.

The walls are usually smooth and fairly regular though at times their intersection with normal joint planes in the andesite have caused local cariations or have afforded opportunity for the formation of spur veins or rich pockets. The vein filling is principally quartz, sometimes cementing fragments of andesite or rhyolite or both.

The metals of commercial importance are lead, gold, silver vanadium and molybdenum. Copper occurs sparingly as does zinc. The numerous works show a wide variety of mineral species. There is probably a greater variety of vanadium minerals to be found here than at any other locality in the Southwest.

The earliest prospecting on these claims was a search for the silver-lead or gold ores. Some open cuts and underhand stopes testify to the success of these quests. Later, when the presence and value of vanadium became known, prospecting was more for the purpose of determining the horizontal limits than for the sake of investigating depths or values. The sum total of the development work is considerable, yet its nature and distribution are such that though it affords no opportunity to measure up ore which will satisfy all the critical requirements of the definition of "ore blocked out", there are abundant exposures for sampling. Therefore, in evaluating the property one must be governed almost entirely by criteria of a different sort than those used in developed ores. Such a valuation is serviceable only in proportion as the observed facts are intelligently analyzed, and interpreted in terms of proven ore bodies of a similar form, nature or occurrence. Studied in this manner, the property appears to promise a tonnage that will be computed in the hundreds of thousands of tons. As to value it would seem that within certain limits it is simply a question of what will satisfy the requirements of the treatment practice as finally determined by the pilot plant. From this it should not be inferred that the values of vanadium are always phenominally high. Research in the exploration of this type of deposit has indicated that the most desirable average for mill feed is approximately 1% V_2O_5. There is no reason to believe that this value cannot be maintained easily for considerable time to come. While it is impossible to assert with precision that there are a definite number of tons blocked out on the property, experience gained from intimate contact with other deposits warrants the opinion that in point of volume and value of its vanadium content this property will in no wise prove disappointing or unprofitable.

This section has been prospected, located and relocated many times no doubt, The development was stimulated by finding silver and lead ores near the surface and by frequent high gold assays. Some very satisfactory shipments of lead ore have been made in recent years, while in the past the silver ores of the Bradshaw group commanded an attractive price at the collar of the shaft. However in spite of all this, the development is limited to shallow workings.

The deepest development in this part of the district is in the Manila shaft which is some 1200 ft west of the McClellan claim. Reports vary as to the depth of this shaft. However, it seems to be quite certain that the shaft is more than 300 feet deep. It is equally certain that vanadium values persist to at least 250 ft in depth. There are good reasons for believing that the values in vanadium may persist to depths below 250 ft, but the data is insufficient for making any positive statement. The depth at which vanadium has been found in this shaft has an important bearing on the possibilities of the properties nearby.

The deepest workings on the G.V.R.M. property is the Bradshaw shaft which is 240 ft deep according to notes contained in the survey for patent made in February 1881. This data is available from the U.S.General Land Office in Phoenix. Since the shaft was first sunk, very little work has been done on the property and the shaft is out of commission.

It should be noted that the Bradshaw unit alone does not show conspicuous quantities of vanadium minerals. Vanadates occur sparingly. It is well known that in the early days the production of high grade silver ore was considerable. Reports vary as to the total production and authentic records on the subject are no longer available. There are two distinct veins in this group. A small

amount of work has been done on each. The principal silver mineral in the more shallow workings is Cerargyrite, in the dumps, Galena-which probably carries some silver- and tetrahedrite have been found. While the values in such workings as are accessible now are low, there is sufficient hustification for the further prospecting of these veins at depths below those reached by early operations.

The next deepest development is the shaft on the McClellan from which water is pumped to supply the mill and camp. This is a vertical shaft nearly 90 ft deep. There is a crosscut to the south for over eighty feet from a point near the bottom.

The sum total of the openings made on the property amounts to between 125 and 150. Some are only shallow prospects, pits not exceeding five ft in depth, others are more pretentious, having a depth of from 40 to 60 ft, frequently with a drift or crosscut, by way of lateral development. No attempt has been made to calculate or even estimate the total footage of such development, principally because the deeper workings are somewhat out of repair now.

It is significant that nearly every opening on any part of the property will show some signs of vanadium, The more important vein system is clearly marked by a series of openings closely spaced, all of which have abundant indications of vanadium minerals. Many of these openings have produced silver-lead ores of shipping quality as is evidenced by the limited amount of material remaining as dumps and by the signs of hand sorting and screening.

For the present, the most valuable work and that which will be made use of in opening up the property for production is located approximately 2000 ft from the mill on the Blanket No.1 and Stella claims. This work consists of two shafts formerly known as the San Antonio and Aurora. They are about 450 feet apart. Each is

about 40 ft deep and shallow prospecting between them indicates an area of vanadium values more or less continuous, which bids fair to develop into a single shoot of ore more than five feet in width and of exceptional value. To the east of the Aurora shaft there are indications of another shoot of the same general characteristics and probable length. These two shafts afford a desirable site for initial development.

That at no distant date the so-called "low-grade complex ores" will supply the bulk of the vanadium of commerce is hardly to be doubted. The deposits of this type of ore have been ignored consistently because they presented certain difficulties as to treatment and because vanadium could not be recovered as easily or as cheaply as from other sources. Conditions which govern the Vanadium situation have changed and are changing rapidly. The mechanical and metallurgical difficulties which prevented or at least hindered the exploitation of this type of deposit in the past have been successfully overcome, and there is no longer any reason why the utilization of these dormant sources of supply should be delayed.

In conclusion it may be said that as compared with other vanadium deposits of the same general type in the Southwest, this property has a greater potential value than any other examined by the writer. There are several features of considerable importance. First, all of the available data points to a probable greater ~~xxxxxxx~~ vertical range of profitable vanadium values than is usual. Second, the horizontal extent of the distribution is of such nature as would indicate long shoots. The values contained in the other metals are of considerable importance, and it is probable that underlying the deepest levels from which vanadium can be recovered economically and profitably there will be profitable bodies of base and precious metals. Taken as a whole, this property

is of more than usual interest, because it is unquestionably a very large potential source of supply of vanadium and because it has great promise of production of other minerals at depth.

Respectfully submitted

Phoenix, Arizona
November 28, 1928 A. L. FLAGG, Consulting Engineer

Since the foregoing report was written, a considerable amount of work has been done on the property. While the results of this later work are not correlated because the work is still in progress it is well worth while to record and study the data collected.

The most interesting discovery is the marked difference between this deposit and others of a similar nature. A great many of the generally accepted rules governing lead vanadate deposits appear to be the exception here and practically every tradition concerning the occurrence of the lead vanadate is violated.

One of the most important features is the lack of alteration in the vanadates. This is indicated in many ways, the most striking evidence being the finding of loose vanadate crystals in clusters in the soil among the outcrop. These crystals and aggregates of crystals which have been undoubtedly freed from their original enclosing gangue by erosion are absolutely unaltered and quite as fresh as any taken from underground.

Another feature quite worthy of note is the unusual relation between the vanadinate and the quartz. Whenever vanadinite occurs with the quartz it is not found on pre-existing fractures or joint planes. A fresh break in a fragment of vein quartz, not previously shattered, will show crystals of vanadinite and descloizite embedded deeply in the enclosing quartz.

The vanadinite persists to some depth below the present known water level in the district is quite clear. How far it will extend below this horizon cannot be told with accuracy but it is known that

commercial values in vanadium exist at a depth of over 80 feet. In view of the conditions where observation can be made at depths in excess of 50 feet it seems more than probable that the vanadium va values can be counted on to a depth of one hundred feet or more.

A detailed study of the material gathered from the outcrops of the rhyolite dikes indicates that the fracturing in the rhyolite is very extensive. The whole shattered mass of rhyolite seems to be permeated on the fracture planes, with vanadium minerals. The fracturing of the rhyolite is very uniform as well as extensive and the deposition of vanadium occurs on practically every fracture plane. These facts justify the expectation that the entire dike material will come under the head of commercial ore. To make possible the utilization of all the material will require an accurate knowledge of the extent and content of each dike. Exploratory work tending to secure this data is in progress but will require some time to complete. However the work is justified for it is confidently expected that the results will indicate a large tonnage project rather than the selective mining of high grade shoots.

It is of interest to study the situation from the viewpoint of possible ore. There are four parallel vein systems ranging in width from 4 ft to nearly 200 ft. These are prospected for their e ntire length by numerous openings as stated in the report. In the case of the original B lanket vein system which has a maximum width near its west end of 200 ft, a length of 4000 ft, and is known to carry vanadium in commercial quantities to a depth of 80 ft. Assuming that the width of the ore is only an average of 5 ft and that not over half of the vein system in length will prove to be productive, we have a tonnage of possible ore of 61,194 tons. If we assume that this ore has a gross value of $21.80 a ton, which assumption is based on a 90% recovery of 1% V205, 2% lead, and $2.00 c ombined gold and silver, the gross value of the potential ore is $1,334,029.20. Such Calculations which are not purely speculative

justified the conclusion expressed by many who are competent to judge that this deposit is not only unique, but without doubt it is the largest potential deposit of lead vanadate known in this country. The other three dikes, though not as thoroughly prospected, show every indication of being equal in magnitude to the original Blanket, therefore a very conservative estimate of the potential tonnage of indicated ore of an average value of 1% vanadic acid cannot be less than 500,000 tons.

The equipment for the pilot plant was selected by the late A.B. Frenzel, on the assumption that the vanadium could be recovered by coarse concentration. It was demonstrated soon after the starting of the plant that crushing to -20 mesh in the rod liberated all of the vanadium values, and that 29.14% of the total discharge from the rod mill was -150 mesh and this carried 28.4% of the total vanadium. More than 60% of the total vanadium was to be found in the -100 mesh material. About 10% is in the -40 to plus 60 mesh.

During the short time while the pilot plant was in operation, it was demonstrated beyond any possibility of doubt that no method of coarse concentration will be satisfactory for this ore. Fairly high grade concentrates were made by the present equipment, but the tailings loss was high, and the recovery low. The maximum recovery was not much over 50% of the total vanadium contained, The highest grade concentrate made carried 17.4 vanadic acid. This was made from -100 mesh material. In the coarser sizes (plus 60 mesh) the highest grade concentrate was 9.19% vanadic acid.

The series of flotation tests made in 1928, and mentioned in the foregoing report are indicative of the higher percentage of recovery to be expected from flotation. Other work at the Company's laboratory has suggested certain lines of investigation in this connection. Though all of the details of operation have not been worked out, there is little doubt that the final outcome of these

experiments in dressing these particular ores by some system of flotation.

Phoenix, Arizona
April 12, 1929

(Signed) A. L. FLAGG

SUPPLEMENTAL REPORT by A. L. Flagg, Cons. Eng. May 30th, 1938

Since the attached reports by the writer were made no extensive development work has been done on the property. Therefore, the reports are practically up to date. During the elapsed time the annual labor requirements have been performed each year. This work, though shallow is of value in that it further proved the general and wide spread extent of the occurrence of vanadium and molybdenum on the properties. Exploration along the projected strike of the several veins shown on Map No.5, Exhibit B, Section C, has definitely proven the continuation of satisfactory vanadium showings beyond points known when this map was prepared, in some cases completely filling in breaks. No sampling has been done in these newer openings.

In these later workings the average width of the ore exposed is in excess of that used in estimating probable in Paragraph (g) Section D, Exhibit B and in Exhibit C. Without taking credit for the greater width, it is probable that the potentially productive area has been increased not less than fifty percent.

of the developed work referred to above, the more important operations are described herewith. No samples for assay were taken, but considerable panning was done. In all, several tons of ore from these openings were put through the mill.

On the Gallagher-Bradshaw and Gallagher-Bradshaw No. 1 some exploration was attempted through the original workings about which very little is known. It seems fairly certain that there was a production of something over $200,000.00 out of the original shaft. These figures are supported by entries in a "Bullion Day Book" taken from the safe in the Charleston office building in the early 1930's. Due to the manner in which entries are made in this record, it is

quite impossible to determine the identity of all the ores received at the mill during the period covered in this record.

About 50 ft of sinking was done in the shaft on a parallel vein on the Gallagher-Bradshaw No.1, approximately 650 ft north of the main Bradshaw shaft. The sinking was begun at 76 feet below the collar in an old shaft. From the bottom a drift was run 15 ft SW and another 6 ft NE. When sinking operations reached 123 ft below the collar of the shaft they broke into an old stope which was filled with gob. Some cleaning out was done for a short distance each way. The back on both sides of the shaft shows good ore.

From a point about 50 ft below the collar in the original Bradshaw shaft a drift was run SE about 10 ft. Southeast of the shaft some fifty ft a surface cut was made 12 ft long by 10 ft deep.

During 1936 or 1937 some lessors working on the property took ore from each of these newer workings and milled it. They also treated a hundred tons or more from the old Bradshaw shaft dump. There is no dependable record of their operations.

The original location shaft on the Richmond claim, U.S.M.S.261 was identified, cleaned out and sunk an additional 8 ft. Close by a surface cut was made 8 ft long by 5 ft deep. Both of these showed molybdenum and vanadium value but were not sampled for assay.

On the Blanket claims, Map 5, Exhibit B., Section C, an open cut was made across a wide area of mineralized ground south of Sample 105, 17 ft from the surface at the location of Sample 105, a 6 ft crosscut was made to the east. This disclosed 5 ft of solid quartz, well mineralized with vanadinite.

Also on the Blanket Claim at a point about 10 ft SE of Sample 127 an open cut 5 ft wide by 10 ft. deep by 8 ft long was made in which the high grade streak was 40 inches wide. The indications here point to a mineable width considerably in excess of 10 ft.

On the Blanket No.4 at a point about 100 ft east of Sample 110 a 4x6 shaft was sunk ten ft. This shows 4 ft of ore in which 8 inches is exceptionally high in both vanadium and molybdenum. This is a

newly discovered feature in the wide rhyolite belt and if persistent to a depth of 100 ft or over and shows a stope length of the order used in estimating the probable ore (Exhibit B, Section D) the figure for potential ore can be increased greatly for making the estimate of the average mill heads.

In the Blanket No.1, at about 150 ft SE of Sample 118 a shaft was sunk to 10 ft. Here again is an eight inch high grade streak with a total width of a mill ore of five feet. On the same claims some 200 ft east of the San Antonio shaft, another ten ft hole was sunk which was 5x7 ft. Here the high grade streak was 10 inches wide, but good values are found the full width of the vein.

On the Aurora claim, near Sample No.122, just to the NE, an open cut 12 ft long and shallow at its extremities but 8 ft deep in the center showed an even dissemination of values without any accompanying high grade streak. Northeast of the main Stella shaft a cut 35 ft long by 18 ft deep by 4 ft wide was made. This also showed an even distribution of values. The ore taken out of this cut was milled with a resulting concentrate of over 12% V_2O_5 and 10% MoO_3.

Also on the Aurora, some 75 ft NE of Sample No.125½ a 4x6 ft shaft was sunk 10 ft. In this there is ore throughout, of which 8 inches is high grade.

Though this work cannot be reduced to a mathematical statement of additional tons of ore of a certain value, it is still a fact that it has been of considerable benefit to the property. During the elapsed period the writer has visited the property from time to time and kept in touch with the operations. The last visit was May 24-25 of this year.

Phoenix, Arizona
May 30, 1938

(Signed) A. L. FLAGG, Cons. Eng.

GEOLOGICAL NOTES

The following geological notes, to accompany a geological map (Sheet 1) of a portion of the Gallagher Vanadium and Rare Minerals Corporation properties, in the Tombstone Mining District, Cochise County, State of Arizona, are the results of observations made during June July and August, 1930, when several brief visits were made to the property while annual labor was being performed. The conclusions set forth are by no means final, but are subject to revision when more detailed investigations can be made.

In these notes the current names for the different formations have been adhered to. Petrographic investigations may indicate the desirability of subdividing parts of what is now taken as a single formation or may prove that some terms now in use are misnomers. Such refinements of classification are necessary in a survey which is so much in the nature of a reconnaisance.

The relative ages of the intrusive dikes have not been established definitely. Neither is much light shed upon the suspected relation between certain dikes and veins. Undoubtedly the first question can be answered after a further study of surface conditions, but it is doubted if any definite conclusions can be reached regarding ore genesis until more development work has been done.

The principal formation over the entire district is andesite. This andesite is cut by two prominent intrusives in the form of dikes, locally known as rhyolite and birds-eye porphyry. Beyond the limits of this property other dikes occur but the two mentioned are the only ones seen here so far.

The andesite is a fine-grained, dense, compact rock, dark green or nearly black in color. On weathered surfaces the bleached lath-shaped feldspar phenocrysts are conspicious. Other phenocrysts are not prominent, at least megascopically, nor have the predominating

ferromagnesian minerals yet been determined, The rock breaks into angular fragments with straight sharp edges. Variations in color and texture occur, some probably due to differentiations in the original magma, others due to the rate of cooling. At least two prominent sets of joint planes occur, one dipping east, the other practically perpendicular. The east dipping set strikes N. 25 E. (Magnetic) while the other strikes N. 75 W. Weathering usually follows these planes though there is some very pronounced examples of spheroidal weathering where the texture is coarser than the rock which yields angular fragments.

The rhyolite is a light-colored, fine-grained rock without any individual grains or crystals which can be recognized even with a hand lense. Everywhere on the property it is greatly altered, whether wholly from weathering or from other causes remains to be determined. Its usual appearance is a white, chalky, though rarely vitreous, mass streaked with iron oxide stains on the fractures. Sometimes large masses of the material in places are of a soft ocher color. The harder white material is pitted with minute holes filled with iron oxide. No structure of any sort is distinguishable. Beyond the limits of the property to the west brecciation and subsequent silification are quite unmistakable and there is some distortion resembling silification are quite unmistakable and there is some distortion resembling flow structures.

The birds-eye prophyry is conspicuous because of the bleached feldspar crystals which stand out in sharp contrast to the olive-green groundmass in all outcrops. It weathers to a crumbling surface of rounded forms and because of its lack of resistance to erosion, prominent out crops are lacking. The effects of weathering have penetrated so deeply that no unaltered material has been found. The rock bears some resemblance to the quartz-diorite porphyry of other localities in Arizona, which also cut andesites.

There is some reason to believe that the mineralization is related

genetically to the birds-eye porphyry intrusions. These dikes seem to be the youngest of all the intrusive dikes in the immediate district. Some evidence in support of this theory is to be found outside the limits of the property to the west and northwest. Veins occur within the rhyolite dikes and in the andesite. They are frequently more of the nature of wide zones or complex vein systems than simple simgle mineralized fissures. Mineralization extends into the wall rock to a greater or lessor degree, more particularly when the veins lie wholly within or parallel to the rhyolite.

The vein filling consists of mineralized andesite or rhyolite which ranges from two to eight ft in width. Through this vein quartz runs, sometimes in a single streak, again in parallel streaks. In some instances the vein width is much greater than 8 ft; the quartz streaks range in thickness from a few inches to three ft and follow irregular courses along the veins, sometimes in the center, but as often crossing from one wall to the other. Conspicuous enlargements of the quartz streaks are to be seen in veins between andesite walls. Usually at no great distance from such enlargements on one side or the other there is an outcrop of the birds-eye porphyry.

The ore minerals in the order of their importance are, the vanadium minerals, lead carbonates, galena, wulfenite andcalcopyrite. Gold and silver occur but not normally in large quantities.

The vanadium group of minerals deserves special mention because of the variety. The most abundant vanadium mineral is vanadinite, the lead vanadate, usually found in deep coffee brown crystals. It occurs sometimes in large aggregates of coarse crystals, but as often in the form of crusty incrustations ranging in thickness from mere films to as much as one-eighth of an inch, The next in importance is descloizite. Psittacinito, endlichite, brachbuschite and at least one if not more unidentified varities complete the list of vanadium materials which are

widely distributed in veins and rhyolite.

The major vein system is that which runs through the Blanket, Blanket No.4, Stella, Blanket No.1 and Aurora Claims. These veins occur in close association with a rhyolite dike (or dikes) one of which is over 200 ft in width at its western end. The course of this dike through the west half of Blanket No. 1 is not definitely established, but it is seen again on the Stella at its eastern end near the Stella shaft, and appears again on the Aurora still further east. To the Southwest the dike continues beyond the limits of the property for more than a mile.

North of this major system through the center of the Stella claim is another prominent vein, also associated with rhyolite. Still to the north, on the May Powell claim is another vein in the rhyolite.

To the south, through the Blanket No.5 and No.2 is a vein which lies between andesite walls and does not appear to be in any way connected with the rhyolite intrusions. Local enlargements of the quartz streak are prominent in this vein at a number of points.

Still further south, through Blanket No.6 and 3, is another wide vein system, also in the andesite and so far as is now known not connected with rhyolite. This is an intricate system of parallel veins, spurs and cross connecting veins.

Beginning at a point about midway between the NE corner and the SE corner of the Necessity claim and running in a northeasterly direction through the entire length of Blankets No.6 and No. 3, this vein is in the andesite and so far as is known, not associated with any rhyolite. The upper portion (on the map, sheet 1) often shows great widths, particularly on the Blanket No. 3 claim. This vein follows the course of a prominent wash, the main drainage channel of the area on Sheet 1.

The South, (or lower portion) of this vein system has been more extensively opened up, probably because the quartz streak is more

prominent. It is reported that this quartz has carried high values in gold. There is more vanadium and lead in this portion than is to be seen on that part which follows the wash, though some of the cross veins leading into the north portion have produced some small shipments of galena. The quartz streak in the south vein ranges from a few inches to three feet in width. The vanadium mineralization extends over widths up to ten feet or more.

From the information in hand, it would seem that the vein in the wash is a somewhat irregular fault zone having a general trend of about N 20 E along which there has been extensive alteration and/or mineralization, This alteration has also taken place along the natural joint planes in the andesite, causing cross stringers and the enlargements such as are so conspicuous on the Blanket No.3. There is less regularity to the strike and dip of the north part.

Close to both segments of this vein system the birds-eye porphyry appears, sometimes forming one wall, sometimes cutting the main vein or the cross stringers. The dike varies in width from a few feet to over twenty feet. Its outcrop is not continuous as it disappears under the soil frequently but it seems to be close to the veins for at least half their length.

The foregoing notes form an incomplete description of that part of the property covered in Sheet 1 of the Areal Geology. This is less than one-half the total area of the property. The work has been of a purely preliminary nature, but will serve to indicate some of the geological relationships and to point out the areas in which there are specific problems to be solved. Some of these problems depend upon deeper development for their solution; others can be worked out by a continuation of the surface investigations.

Phoenix, Arizona
August 30, 1930

(Signe d) A. L. FLAGG

REPORT * Mr. A. L. Flagg, Cons. Eng.

June 26, 1948

The properties of the Gallagher Vanadium & Rare Minerals Corporation, consisting of twenty-one claims, three of which are patented, are situated in the Tombstone Mining District, Cochise County, Arizona. By road the property is 7.5 miles southwest of Tombstone, and 1.3 miles from Charleston, on the main line of the Southern Pacific Railroad. The elevation is 4200 ft above sea level.

An R.E.A. electric power line, and also the Mountain States (Bell system) telephone pass and cross through the property. Two or three very old buildings, scarcely habitable now, might be serviceable for temporary use. Water is available on the property, but the source will need to be reconditioned and a pump installed.

The principal formation over the entire district is Andesite. This is cut by two prominent intrusives in the form of dikes, locally known as Rhyolite and Birds-eye Porphyry. The rhyolite dike extends across the property in a NE-SW direction and for more than a mile to the Southwest.

The Andesite is fine-grained, dense rock; dark green or nearly black in color, showing bleached, lath-shaped phenocrysts of feldspar on weathered surfaces. Variations in texture and color occur, probably due to differentiation in the original magma. Two sets of joint planes occur which strike N 25 E and N 75 W, the former dipping east and the latter nearly perpendicular. These give rise to spheroidal weathering where the texture is coarser.

The Rhyolite is light colored, fine grained rock without any visible individual grains or crystals. Everywhere on the property it is highly altered, whether from weathering or from other causes remains to be determined. Its usual appearance is white to cream, chalky though locally vitreous. To the southwest, beyond the limits of the property brecciation and silification are quite unmistakable in the outcrops. This dike is variable in width, reaching a maximum

of 200 ft in places.

The birds-eye porphyry has an olive green ground mass in which are conspicuous bleached feldspar crystals. It weathers to a crumbling mass of rounded grains and both outcrops are lacking. Probably this is the younger dike.

Veins occur in the rhyolite and andesite with mineralization extending into the wall rock in the rhyolite. Vein quartz runs thru the veins in an irregular manner. Sometimes it occurs in the middle position; again it crosses from wall to wall and frequently breaks into a net work of veinlets.

The ore minerals are : lead carbonate and sulphate, vanadinite, cupor-descloizite, wulfenite, galena and chalcopyrite. Gold and silver values are usually low, though there are instances of very high silver content.

The major vein system is that which runs through the Blanket, Stella, Blanket No.4, Blanket No. 1 and Blanket No.5 claims. These veins occur in or in close association with the rhyolite dike. The course of the rhyolite dike through the west half of the Blanket No. 1 claim is area. This same dike material and dike-vein combination is repeated on various parts of the property, clearly defined five separate zones of mineralization.

Veins: The vein system has a general strike N.E. -S.W. which conforms more or less to the strike of the outcrops on the major rhyolite intrusions. The dip is toward the south and varies from very flat to almost vertical. The Bradshaw is typical of steep veins. Structurally there is natural division into five separate and parallel vein systems on the property. The veins average better than 3 ft in wi width. The tested mineralization shows that in areas composed of intrusives that are mineralized, and veins reach a maximum of 200 ft in places. It is believed that the entire dike material, when properly prospected, will come under the head of ore. About one-half of the property has been mapped in detail to show the geology, width of ore and values.

Ore: In 1938 an estimate was made of indicated ore in a very limited area and which had been prospected to a depth of over 50 ft by three shafts covering a horizontal distance of a little more than 500 ft. The indicated ore in this case was 42, 856 tons. The net value of the concentrates from this ore is estimated at over $350,000. This particular area is only a very small part of the whole property, in fact not over one-tenth of the half mapped in detail.

Treatment: Tests made in the pilot plant indicated conclusively that an all gravity system of concentration is not satisfactory because of the low recovery and the poor grade of concentrates, which averaged only 9.19% V205. However some tests on finer material yielded a concentrate carrying 17.4% V205 or vanadic acid. In commercial testing laboratories it has been demonstrated that the ores can be treated successfully with a high recovery by flotation. In fact flotation plants of more than 500 tons daily capacity have been operated successfully on ores of this type since the experimental work was done on the Gallagher ores. These concentrates are marketable at satisfactory prices at present. If the operations are expanded at the property, and processes of reduction can be carried down one or two steps farther, would yield an amount of manufacturing revenue.

Summary: Summing up the situation at the Gallagher property, it appears to me to have unlimited possibilities. My investigation began in 1928, carried on through 1929, and intermittently thereafter through 1931. These studies brought three very striking facts, each of which is of sufficient importance to warrant some elaboration for emphasis.

FIRST: The extent of the mineralization over an area approximately over 3,000 feet wide by 4,500 feet long, which is about half of the area of the whole property, is greater than I have seen amywhere else in the southwest. There are four parallel vein systems which will average four feet in width. The main Blanket vein system includes

the major rhyolite dike which has a maximum width of two hundred feet. This dike has every indication of being mineralized through its entire width and length. Each of the other three vein systems, though less extensively explored, show signs of horizontal distribution of vanadium quite as extensive, though at no point does the rhyolite attain the great width of the major intrusion.

T he SECOND impressive fact is the potential value of ore to be developed in this area. On the Blanket system the depths are known to exist to a depth of sixty feet in the rhyolite dike. Another shaft, also in this same dike, a thousand feet away and over six feet in depth shows vanadium distinctly established by surface relations, but it is seen again on the Stella and passes through the Aurora. This system more than 4,000 feet in length is most important.

Prospecting is more recent years has centered around the vanadium possibilities. In the extensive sampling to determine the vanadium content no account was taken of the lead, gold and silver.

From time to time small shipments of lead ore have been made from shallow workings, but no records of these is available except the six small lots shipped to Hawley & Hawley, Ore Buyer, Douglas, Arizona, during 1948. The results were:

Lot 1	4.6165 tons,	gold 0.04 oz.,	silver 4.6 oz.,	lead 50.2 %
Lot 2	1.1965 tons,	gold 0.41 oz.,	silver 51.6 oz.,	lead 39.4 %
Lot 3	7.9495 tons,	gold 0.04 oz.,	silver 6.5 oz.,	lead 56.5 %
Lot 4	6.1350 tons,	gold 0.07 oz.,	silver 4.6 oz.,	lead 44.3 %
Lot 5	5.1915 tons,	gold 0.06 oz.,	silver 4.0 oz.,	lead 37.7 %
Lot 6	0.3575 tons,	gold 0.06 oz.,	silver 8.9 oz.,	lead 51.6 %

From reports from those who are familiar with the earlier history of the property, it seems reasonable to believe that previous small lot shipments were about the same character and tenor. These were not the results of systematic mining, but the work of lessees working without mechanical equipment in scattered holes.

For the immediate lead ore possibilities the logical point of attack is the nearly vertical Stella shaft, about 45 feet deep. The

shipment just mentioned above came from a southwest drift off the bottom of this shaft. To begin the operation the shaft must be timbered. It should be deepened to 100 feet before any lateral work is started. The Blanket No.4 shaft may have yielded some ore recently for a lease was contemplated some weeks ago. By having a portable compressor, work could be carried on in both these shafts. The No.4 shaft is inclined but has a consistent showing to its bottom (50 ft) averaging about 4 ft in width. The geological conditions supplemented by fragmentary reports of the past shipments of lead ores justify the further exploration of the property beginning on a small scale. As more ground is opened up, the operations can be extended as conditions may require. Some shipping ore might be recovered in the exploration work. The surface conditions are excellent. The problem is to find out what happens at depth.

Phoenix, Arizona
June 26, 1948
Registered Professional Engineer
Arizona

Respectfully submitted,

A. L. FLAGG, Cons. Engineer

A PARTIAL Copy of letter report made by Arthur Flagg

Arthur L. Flagg
Consulting Engineer
P.O Box 2345
Phoenix, Arizona.

August 6, 1947

Mrs Louis Reuter
1 West 30th Street
New York City, N.Y.

Dear Mrs Reuter :

Yesterday, August 5~~th~~, I spent more than four hours in a re-examination of a restricted area at the northeastern extremity of your property. I submit herewith my findings.

The area examined was approximately 1800-feet in length in a northeasterly direction along the strike of the Blanket vein system, beginning at the San Antonio shaft and terminating at a un-named, un-timbered shaft, twenty-five feet deep, near the end of the Aurora claim but not shown on the geological map,

The southwesterly portion of this area has been examined critically on previous occasions and sampled, the results tabulated on the geological map and discussedin detail in the report of 1930.

The purpose of this examination was (1) to check the reported discovery of additional high-grade vanadium ore behind a "false wall" at the bottom of the San Antonio shaft, and (2) to check the occurence of vanadium in an un-namedshaft twenty-five feet deep, approximately 330-feet northeast of the San Antonio shaft. → Stella - now 190'

This shaft is not shown on the geological map. It was ########## inaccessible in 1930 but had been opened up recently. Incidently the Aurora shaft a short distance beyond the common end line of Blanket No.1. and Aurora claims was re-examined but since no newwork was done there recently no additional information was obtained.

In the bottom of the San Antonio shaft on the southeast side what had been assumed to be a hanging-wall of the vein was broken into recently and disclosed four feet of additional high-grade vanadium ore. The gangue is a breciatedquartz on which vanadinite occurs abundantly and charactaristically in rather coarse crystals, coffee-brown in color. The material behind the new ore streak isslightly silicified rhyolite which merges imperceptibly into the usual bleached and chalky rhyolite containing smaller sized vanadinite crystals. This new disclosure brings the total width of vanadium ore at the bottom of the shaft up to eight feet.

The vein in the un-named shaft some 330-feet northeast of the San Antonio shaft is on the contact between rhyolite on the southeast and "birds-eye" porphyryon the northwest. The width of the high-grade breciated quartz with abundant andcoarse brown crystals of vanadinite is ten inches. On the southeast the rhyolite is fractured as noted everywhere in previous examnations, the fractures showing the usual smaller vanadinite crystals, An old shallow test pit about twenty-five feetbeyond shows "birds-eye porphyry"

on both walls. Outcrops of rhyolite to the northeast became less frequent along the strike and the vein filling to the end of the claim is firm quartz, heavily stained with iron and manganese. Vanadium bearing minerals at this end are inconspicuous. The untimbered vertical shaft (not shown on the geological map) at the very end of the claim, evidently about twenty-five feet deep, shows a strong wide vein. The dump material is live vein quartz in which there is a small amount of lead carbonate with considerable hematite. This could contain appreciable values in gold.

The disclosure of an additional three to four feet of vanadium ore in the San Antonio shaft behind the so-called "false wall " though not previously predicted ----------. Reference to the recomended program of exploration made in 1930, ---------- that crosscutting is given equal prominence to drifting in that whole ---------- crosscuts of considerable length especially on the Blanket vein ---------- to make complete any exploritory program. Too much emphasis ---------- the matter of crosscutting, a fact which should be evident after ---------- examination of the property. An indication of what may be ex---------- crosscuts is seen in the disclosure in the San Antonio shaft. ----------
existence of high grade vanadium ore for another three hundred ----------
at least interesting. However, without that, there has been demonstrated previously along the strike of the Blanket vein system enough area of intensely mineralized ground with favorable structure to signify a serious and comprehensive exploratory program.

Sincerely,

Signed Arthur F. Flagg.

---------- denotes the words missing in the report that were torn from the lower portion of the letter head. With some accuracy one can arrive at the thought inferred by the writer C.N.V.

ASSAYS

The following analysis from Ledoux & Company was made November 18, 1921

No. 306168 a — Marked F & L

	"F"	"L"
Vanadium	5.74%	6.51%
equivalent to vanadium Pentoxide	10.24%	11.62%
Lead	53.55%	54.06%
Arsenic	0.27%	0.23%
Sulphur	0.16%	0.19%
Copper	0.06%	0.03%
Phosphorus	0.28%	0.32%
Silver per ton 2000 lbs	42.40 oz	1.50 oz
Gold per ton 2000 lbs	.06 oz	0.02oz

The samples do not contain any chromium or uranium, nor molybdenum.

The following samples were taken on the property during 1928 and 1929, and most of them were assayed on the property. Many others were taken during during the same period, but there is not sufficient data with the results to make it possible to locate the sample definitely or know its width. The following samples can be definitely located and described. Up to sometime in 1937, when the mill was under lease, the rejects from these samples, as well as from many others, including the series (Nos. 100 to 164 incl.) in the A. L. Flagg report of 1930, were all stored in safe containers in the mill. Several hundred samples have been assayed, but they are of little value without an accurate description.

(1) April 18, 1929, sample by the late A. B. Frenzel, State Minerologist of Colorado. A large sample (exact weight not known but over one hundred pounds) from the dump on the Blanket claims. The sample was sent to Webb City, Mo. for a test run in some sort of jig. The Heads assayed: 0.26% V_2O_5, and 4.29% Pb.

(2) In May, 1928 about 100 lbs of material was taken off the dumps on the Blanket claims, beginning at the (adjoining property) Manila Shaft, and going northeast along the strike of the adjoining mineralization, over a width of about 200 ft. Pieces were picked up at random, no fines, but pieces about three inches for the shortest diameter. A length of about 5000 ft. was covered.

The se samples were all crushed together to ¼ inch and then split in a Jones sampler. Three five pound samples were taken out and each given to a competent assayer, one of whom has been chemist for one of the principal ferro-alloy manufacturers and very well informed on vanadium. The second went to a custom assay office in Phoenix, Ariz. The third to a chemist in Los Angeles. The Vanadium content reported was (a) 4.12 V_2O_5; (b) 5.25% V_2O_5; and (c) 4.10% V_2O_5. Later the material was run for lead and silver: Silver 2.5%, lead 31.0%.

(3) Composite from dumps and material in place at 21 openings on the east end of the Blanket, west end of the Stella and west end of the Blanket No.1. This material was crushed and split in sampler as above, and samples submitted to two chemists. The V_2O_5 content was (a) 1.12% and (b) 1.16%.

(4) Composite from seven dumps on the Blanket, south of the telephone line. Only one assay: 1.03% V_2O_5.

(5) Composite of 8 openings on Blanket, north of telephone line. Only one assay was made on this: 1.20% V_2O_5.

(6) Outcrops and three openings in slope between road and Mill: 1.06% V205.

(7) Selected ore at "Water Hole" 3.40% V205

(8) Grab from dump at "A" Shaft 0.43% V205

(9) Blanket No.6 Face of drift 0.378% V205
Blanket No. 6 6" High-grade 2.142% V205

(10) San Antonio (shaft C) dump 0.506% V205

(11) San Antonio shaft 10 ft. from surface, north side 1.602% V205

(12) San Antonio, all around bottom of shaft 0.360% V205

(13) San Antonio, vein only at bottom of shaft.486% V205

(Samples 3 to 13 incl. were taken in November, 1928, by A. L. Flagg, and assayed at the University of Arizona by George T. Scholey, excepting 3, 4, 5 and 6.)

(14) Mill run on Blanket ore, Jan. 25, 1929.

	AU	AG	V205	PB
Heads	0.024	1.06	0.507	4.22
Conc.(Classifier Coarse)	0.022	9.26	3.080	50.28
Cond.(Classifier Overflow)	0.047	5.06	6.260	57.34
Tails (combined	Tr.	0.96	0.332	2.51

(15) Mill run Feb. 13, 1929. Open cut material, Blanket No. 6 Heads 0.77 V205, Tails 0.22% V205

(16) Mill run Feb. 15, 1929. Open cut material, Blanket No.6 Heads 0.68%V205, Tails 0.17% V205

(17) Mill run, March 2, 1929, Dump ores from several places

	AU	AG	V205	PB
Heads	0.026	0.78	0.35	1.37
Concentrates	0.126	1.13	9.191	41.82
Tails	Tr	0.82	0.1925	0.782

(18) Samples from Shaft "B" Sept.14, 1929
Across 42", center west drift, bottom 2.12%V205
Across 48", east end bottom of shaft 1.14 % V205
Across 8", high grade, west drift 4.08 % V205

Screen analysis, composite of dump samples close to mill.

No.	Mesh	% Total	V205	Pb	Ag	Au
2389-1	P 20	11.67	0.219	1.749	.023	Tr.
2	P 40	25.99	0.124	1.176	.016	Tr.
3	P 60	17.17	0.275	1.362	.040	.84
4	P 80	6.44	0.196	1.562	.037	1.26

5	P100	5.05	0.191	1.321	.120	.84
6	P150	8.90	0.168	1.598	.061	1.05
7	M150	24.47	0.236	1.818	.076	.63
2389-a	P 20	3.74	0.291	1.065	.042	.85
b	P 40	37.92	0.065	.94	.030	Tr.
c	P 60	14.89	0.063	.71	.027	Tr.
d	P 80	5.42	0.059	.74	.050	.315
e	P100	3.54	-0-	.57	.040	Tr.
f	P150	5.34	0.112	.46	.037	.42
g	M150	29.14	0.077	.23	.023	Tr.

Screen analysis of batch of experimental concentrates February 14, 1929 using an unclassified feed, direct to tables from rod mill.

No.	Size	% Total	V205	Pb	Au	Ag
2390-1	P 48 Mesh	26.65	3.26	31.30	.041	3.78
2	P 65 Mesh	15.32	3.13	28.22	.419	3.00
3	P 100 Mesh	21.90	2.478	11.43	.90	3.17
4	P 150 Mesh	15.55	2.395	11.40	.839	1.92
5	P 200 Mesh	18.99	2.831	20.65	.525	1.35
6	M 200 Mesh	11.50	6.394	29.80	.05	3.40

The heads from which this concentrate were made assayed 0.78 V205, 5.12 Pb, Tr. gold and 1.7 oz. silver.

100: From dumps of old shallow hole, 25 ft. east of A-19 sample out of piles 0.43% V205

101: Near tailings Dam, on strike of North quartz stringer; about midway between A-13, A-14. Beginning on foot-wall, 16" brecciated quartz 24" mineralized country rock, 16 in. brecciated quartz, 24 in. leached country rock 0.53% V205

102: Shallow pit west of A-21, pink altered andesite with minor quartz streaks and iron stains 0.28% V205

103: Across 4 ft. in shallow pit west of old powder magazine; 3.2 ft. soft white rhyolite & 0.8 ft. quartz 0.19% V205

104: Across the quartz streak, 0.8 ft. at each end of the pit where sample 103 was taken . 1.42% V205

105: From the small dump at the west end center monument of the McClellan patented claim 0.52% V205

106: Sample of dump at A-19, a shaft about 25 ft deep perpendicular near SW corner, McClellan Claim rhyo 1.16% V205

107: In shallow hole 12 ft west of mill, across 5ft. altered rhyolite with two lean quartz stringers 8" and 5 "; about 30 ft west of A-21 0.43% V205

108: Across 5 ft of quartz outcrop, showing almost no vanadium or other mineralization, at A-21 0.23% V205

109: North half of dump at A-17; all rhyolite from the 84 ft vertical shaft 0.94% V205

110: South half of dump at A-17 0.87% V205

LLL: At A-22, across 4 ft; 2 ft of pink and brown rhyolite a 2 ft of quartz stringers; west side of pit 0.48% V205

112: Ann. Labor location, 1930, near NE corner of McClellan claim; altered andesite and possibly some rhyolite 0.43% V205

113:	Composite of all dumps around the original Blanket incline. Represents area at least 200 x 200 ft.	1.16% V205
114:	From across 4 ft.on east side of original Blanket incline, 18. in. lean quartz on bottom	0.43% V205
115:	Shallow hole at A-33 south side of road; decomposed andesite, little value indicated	0.37% V205
116:	Shallow hole, south side of road; A-33. Width 4.5 ft with 16 in. quartz and altered andesite only	0.43% V205
117:	At A-35, north side of road at crossing of wash; without 2 ft horse of andesite in center; all rhyolite and small amount of quartz stringers	0.76% V205
118;	Two shovels full from each of two dumps at location of sample No. 117	1.16% V205
119:	At A-36, across 3.5 ft on east side of hole 5 ft below surface hanging wall not yet exposed	0.76% V205
120:	At A-37 across E. side of shallow hole 5 ft wide	0.37% V205
121:	At A-38, across 32 ft leached rhyolite & quartz	0.23% V205
122:	Across west end shallow pit 10 ft east of Stella shaft, silicified country rock	0.00% V205
123:	From dump A-39 represents 1920 Ann. Labor; rhyolite	1.05% V205
124:	From 14 in quartz streak, locality 123	0.76% V205
125:	Across 4 ft rhyolite streaked with quartz at A-40; west side of hole about 6 ft from top	0.80% V205
126:	From 8 in quartz streak in shallow hole A-23	0.17% V205
127:	From west 10 ft pit; across 3 ft, near B-5	0.87% V205
128:	At east end of same pit, small quartz streak	0.28% V205
129:	At shallow hole A-24; across 5 ft country rock	0.28% V205
130:	At shallow hole A-25 near No. 4 shaft, width 5 ft.	0.87% V205
131:	At hole A-27 on hanging wall of No. 4 vein, taken across 4 ft at each end of hole	1.64% V205
132:	At location of 131 ; from west side	1.87% V205
133:	Across 3 ft. middle pit Blanket No. 2	1.10% V205
134:	Quartz material mostly, sample of dump at locality No. 133 which is location work of Blanket No. 2	0.80% V205
135:	Across 3 ft in pillar left in No. 6(Blanket) open cut when ore was broken for mill in early 1929	1.63% V205
136:	At B-17 near road in 1930 Ann Labor hole on Blanket No. 6; a 10 in streak of quartz and 14 in vein matter on the hanging wall side	1.33% V205
137:	West of road on Blanket No. 7; from the middle of three holes not far from wash.	0.62% V205
138:	About 10 ft below collar No 4.Shaft; from west side across 5 ft; a 2 in high grade streak in back near hanging wall is not accessible at this point and not included in sample	1.44% V205
139:	Approximately 5 ft below No. 138, but on opposide side of incline; only 38" next to footwall open for sampling	0.62% V205
140:	Approximately 5 ft below No. 139 in incline in east side across 3 ft leaving out 6 in high grade pocket and lacking about 1ft ore in back behind lagging next to hanging wall	0.23% V205
141:	Five ft below No. 140, across chalky rhyoline on footwall, and in an irregular 4 in of quartz, but without one foot or more of the ore next to the hanging wall, behind lagging	0.43% V205

142:	Below No. 141 about 6 ft on west side of incline Across 2 ft of vein as exposed; 2 ft more behind lagging on hanging wall	0.28% V205
143:	On W side of incline 9 ft below 142 across 5 ft on foot wall;hanging wall material behind lagging	0.23% V205
144:	Below 143 on W side across 3 ft very little quartz on foot wall; hanging wall streak not included	0.28% V205
145:	Across 3.5 ft in center of last set timbers, no vanadium minerals in rhyolite; hanging wall streak not taken	0.14% V205
146:	Across 3.5 ft west drift	0.71% V205
147:	Across 2 ft quartz location 146	0.48% V205
148:	Across 1.5 ft rhyolite location 146	0.42% V205
149:	Cone dump at No.4 shaft (sump and west drift)	0.57% V205
150:	Across 2.5 ft Stella Shaft, west side just under end plates of collar-set; footwall gouge	0.37% V205
151:	Opposite 150, across 6 ft 4 in, same elevation mostly white rhyolite, some quartz	0.87% V205
152:	Six feet below 151, across 4 ft of silicified rhyolite on the foot wall	0.57% V205
153:	Four ft below 152, across silicified rhyolite 4 ft.	0.42% V205
154:	Across 4.5 ft bottom Stella shaft on east side	0.42% V205
155:	Across 3 ft on west end shaft just above drift mostly crushed quartz	0.32% V205
156:	Across 16 in of east bottom (loc.154) on foot wall side; firm rhyolite	0.57% V205
157:	Across 6 ft of crosscut bottom Stella shaft	0.57% V205
158:	Across 2 ft face W. drift bottom Stella shaft shows no vanadium minerals	0.37% V205
159:	East side No. 1 shaft, across 5 ft at 10 ft depth	0.37% V205
160:	Opposite 159; same elevation	0.42% V205
161:	Across 6 ft bottom No. 1 shaft (east)	0.37% V205
162:	Across 6 ft bottom No. 1 shaft (west) more quartz	0.28% V205
163:	Rhyolite at 162 and 161	0.80% V205
164:	Across 4.5 ft at 40 ft. depth Maris shaft	1.74% V205

The following records of shipments are included as additional evidence of the values contained in the ores. No payment was made for either vanadium or molybdenum as these were not recovered at the smelters.

Smelter Lot 2315 Consolidated Kansas City Smelting & Refining Co.
August 15, 1923 El Paso, Te x.
Dry Weight: 50205 lbs, Silver 8.1 oz, Lead 8.1 %,Insoluble 75.8%

Smelter Lot 2316 Consolidated Kansas City Smelting & Refining Co.,
August 15, 1923 El Paso, Tex.
Dry Weight: 15910 pounds, Silver 20.7 oz,Lead 56 %,Insoluble 25.2%

Smelter Lot 1446 Consolidated Kansas City Smelting & Refining Co.
June 16, 1924 El Paso, Tex
Dry Weight 3038 pounds, Gold 0.05 oz, Silver 20.6 oz, Lead 34.4%
Insoluble 44.8%

Smelter Lot 985 Consolidated Kansas City Smelting & Refining Co.
April 25, 1924 El Paso, Texas
Dry Weight: 2450 lbs, Silver 21.1 oz, Lead 39.1%, Insoluble 40.6%

Smelter Lot 1719 Consolidated Kansas City Smelting & Refining Co.
July 2, 1924 El Paso, Tex.
Dry Weight: 3031 lbs,gold .07 oz,Silver 21.4 oz,Lead 41%,Ins.39.2%

Smelter Lot 281 Phelps Dodge Corporation, Douglas, Arizona
April 3, 1929 (Concentrates
Dry Weight 29918 lbs,Gold .09 oz, Silver 4.37 oz,Lead 35.1%, Ins.24.2%

The above material was shipped from the blanket & Stella Claims from Sh[illegible] and whose samples 112 and 114 were [illegible]

ASSAYS

Taken since May 1st, 1951

		oz Gold	oz Silver	% Lead	
(1)	May 5, 1951, Jonathan Gordon				
	Shaft material 10' deep, 200 paces South of Stella	0.01	0.30	1.20	
(2)	May 14, 1951, Jonathan Gordon				
	Cross vein 15 ft Stella	Tr	0.52	0.51	
	Hanging wall 35 ft Stella	Tr	0.41	0.456	
(3)	June 20, 1951, Hawley & Hawley				
	#245976, Shaft #2, Jewel Box N&S	0.03	0.5	1.4	
	" Shaft #4	0.01	1.1	3:3	
	Dump from Tailings close to dam	0.01	1.6	3:1	
	Bottom Stella at 50 ft	0.07	4.3	21:2	
(4)	6-27-51, Hawley & Hawley #246106				
	3 ft East bottom Stella		0.2	1.0	
	2 ft Center bottom Stella		0.3	0.9	
	3 ft West bottom Stella		0.2	0.7	
	Hand picked (4)		1.0	6.1	0.27 V205
	Brown rocks		0.2	0.9	
	Sample No. 6 test for uranium, nil				
(5)	8-9-51, Hawley & Hawley #247049				
	Stella 8-3 60 ft Fines and grab samples from stockpile-no lumps	.08	1.9	18.1	
(6)	8-15-51 Jacobs Assay Office #48897				
	129402 #1 Slime from pump Stella	.02	0.5	5.4	
	129393 #2 Stella 10" vein, 8-8-51	.04	11.0	64.0	
(7)	9-23-51, Jacobs Assay Office #48920				
	129487 #1 Dog Leg mine	.005	0.2	1.0	
	129488 #2 Dog Leg Mine	0.01	2.3	16.8	
(8)	9-11-51, Hawley & Hawley #247729				
	Stella, 65 ft, Select piece Copper 1.16%	.05	13.6	62.6	
	Dog Leg fines from trench Copper 0.07%	Tr	0.5	0.5	
(9)	11-3-51, Jacobs Assay Office #49106				
	130071 Footwall	0.01	1.4	5.9	
	130072 Across face	.005	0.6	3.8	
	130073 Hanging Wall	Tr	0.4	0.2	
	130074 Composite fines, Copper .021	.03	2.5	20.3	
(10)	12-24-51, Hawley & Hawley #249682				
	North face sample 71 ft level	.03	0.3	5.7	
	South face sample 71 ft level	.05	0.5	3.5	

		oz Gold	oz Silver	% Lead	% V205	% Copper
(11)	April 11, 1952, Miller's					
	Comp. Lot 4	0.02	1.6	11.2		0.10
	Comp. Lot 5	0.02	1.6	11.5		.10
(12)	May 10, 1952, Jacobs #49573					
	131614 (sample X)	0.03	1.0	9.0		
(13)	May 5, 1952, Hawley & Hawley					
	252738- 6-Mine run	.02	1.1	15.4		.07
	252739- 7-Screened	.04	1.1	14.7		.12
(14)	July 12, 1952, Jonathan Gordon		Vanadium Pentox. 4.889			
	6012	0.11	0.48	22.13 = 2.741		
(15)	August 11, 1952, Jonathan		Vanadium Pentox. 5.052			
	Gordon- 6016	Tr	0.60	12.01 = 2.832		1.09

16 - Sept 17, 1952 - J Gordon. 6015
Surface No 7 - side of Ditch 0.03 2.10 2.33%

(17) Oct 4- 1952 J Gordon 6017
6" Vein at 12 foot depth
Prospect hole No. 7- Tr .04 17.06 Van. 2.374
Vanadium Pentoxide 4.339

SPECTOGRAPHIC ANALYSIS

Two samples were sent to Smith-Emery & Co., Los Angeles, Calif. for spectographic analysis.

(a) Sample taken from Stella at 50 ft level, 8-15-51 #341672 27#
* (b) Sample taken from drift at 71 ft level Stella, 11-8-51 # 345194

	(a)	(b)
Gold	0.11 oz	0.32 oz
Silver	2.93 oz	Tr
Lead	25.12 %	51.94 %
Potassium	0.5 %	
Copper	0.5 %	
Antimony	0.1 %	0.01 %
Magnesium	0.1 %	
Molybdenum	0.1 %	16.00 %
Zinc	0.1 %	
Vanadium	0.01 %	1.0 %
Zirconium	0.01 %	
Manganese	0.005%	
Gallium	0.001%	
Chromium	Tr	0.05 %
Iron		0.1 %
Strontium		0.05 %
Barium		0.05 %
Titanium		0.05%
Bismuth		0.005%
Boron	0.001%	

[redacted]

* Spectograph Sample No. 345194 (b)

Wulfenite streak about 3 inches wide extending in drift at 105 foot level as well as at 71 foot. Narrow wulfenite veins are to be seen in the quartz running parralell with the vanadium .

Crystals are to be found over the entire property where the veins are exposed and on all old dumps where quartz is seen. Molybdate is not noticed in the kaolin or fine altered area.

Sulphur	1.17
Vanadium Pentoxide	0.80
Manganese Oxide	0.18
Phosphorus Pentoxide	0.05
Chlorine	0.10
Titanium Dioxide	0.40
Barium Sulphate	0.52
Sodium & Potassium Oxides	3.50
Gold	.06 oz
Silver	1.80 oz

322

COMPARATIVE FIGURES On Ore Sample taken at mine(Stella), and Smelter Returns on Shipment made 8-6-52, Lot 2571, 95,520 lbs.

* * * * *

ELEMENTS PRESENT	COLORADO ASSAYING COMPANY % and oz	* SMELTER * % and oz	REP. % and oz	* SETTLE. % and oz
Carbon Dioxide & Combined Water	-3.25	5.7		
Silica	50.72			
Aluminum Oxide	8.90			
Iron Oxide	8.35			
Calcium Oxide	1.15			
Magnesium Oxide	0.79			
Copper	0.15			
Lead	18.80	13.6	14.0	13.8
Oxygen (with part of lead)	0.87			
Sulphur	1.17			
Vanadium Pentoxide	0.80			
Manganese Oxide	0.18			
Phosphorous Pentoxide	0.05			
Chlorine	0.10			
Titanium Dioxide	0.40			
Barium Sulphate	0.52			
Sodium & Potassium Oxides	3.50			
Gold	0.06 oz	0.045 oz	0.06 oz	0.0525 oz
Silver	1.80 oz	1.0 oz	1.3 oz	1.15 oz

* * * * *

SHIPMENTS

		oz Gold	oz Silver	% Lead	% Copper
(1)	10-26-51, Smelter Lot 3284 American Smelting & Refining El Paso-Dry Weight 82991 lbs Gross $ 88.57 per ton	0.375	3.25	29.4	.38
(2)	11-24-51, Smelter Lot 3581 American Smelting & Refining El Paso, Dry Weight 91194 lbs	.06	2.95	29.1	.44
(3)	1-5-52, Smelter Lot 54 American Smelting & Refining El Paso, Dry Weight 69245 lbs	.055	2.15	24.75	.30
(4)	3-26-52, Smelte r Lot 1034 American Smelting & Refining El Paso, Dry Weight 101740	.055	2.45	20.5	
(5)	4-5-52, Smelter Lot 1158 American Smelting & Refining El Paso, Dry Weight 92809 lbs	.065	1.65	13.5	.14
(6)	4-15-52, Smelter Lot 1300 American Smelting & Refining El Paso, Dry Weight 99798 lbs	..033	1.05	14.85	.18
(7)	4-26-51, Smelter Lot 1396 American Smelting & Refining El Paso, Dry Weight 97075 lbs	.037	1.62	15.2	.28
(8)	5-7-52, Smelter Lot 1526 American Smelting & Refining El Paso, Dry Weight 100205 lb	.045	1.5	16.3	.16
(9)	6-4-52, Smelter Lot 1882 American Smelting & Refining El Paso, Dry Weight 81242 lbs	.042	1.15	15.4	.26
(10)	7-18-52, Smelter Lot 2380 American Smelting & Refining El Paso, Dry Weight 106912 lb	.0375	.7	9.05	.11
(11)	8-6-52, Smelter Lot 2571 American Smelting & Refining El Paso, Dry Weight 90075 lbs	.0525	1.15	13.8	.26

Early in 1928 a table concentration test was made at the School of Mines, University of Arizona, under the direction of Professors Chapman and Cunningham. The material used for this test was a composite sample which weighed 611 pounds, taken from t the various dumps on the property, under the supervision of Mr. J. B. Gallagher, the original locator of the greater part of the property. Every effort was made to have this sample representative and as near the average of run-of-mine ore as possible. As the dump material in many instances is the result of hand sorting, and average of the dumps cannot be considered an average sample of the mine in the strictest sense of the word. The material so secured was nearly enough representative for the requirements so far as the physical characteristics were concerned. The sample was crushed dry through a crusher and rolls, then passed over and through a twenty mesh screen. The resulting product, all -20 mesh, was treated on a Deister Plat-O table with the following results:

	Au.	Ag	Pb	V_2O_5	MoO_3
Heads	Tr	0.90	10.8	1.875	1.245
Concentrates	.04	2.86	51.8	8.446	8.550
Middlings	Tr	1.46	14.4	2.162	
Slimes	Tr	0.52	8.0	0.955	
Tailings	Tr	0.58	2.3		

REPORT OF ANALYSIS OF CONCENTRATES FROM INITIAL RUN.

(Ledous & Company New York)

No. 395180

March 16, 1929

Lead 28.72 % equivalent to Lead Oxide		30.94%
Vanadium 2.90% equivalent to Vanadium Pentoxide		5.17%
Molybdenum 0.52% equivalent to Molybdenum trioxide		0.78%
Copper		0.19%
Arsenic		0.12%
Antimony		0.09%
Iron	16.28%	
Iron Oxide		23.28%
Manganese		1.69%
Silica		17.37%
Alumina		4.57%
Calcium Oxide		0.90%
Sulphur trioxide		2.24%
Phosphorous pentoxide		1.10%
Chlorine		0.74%
Ignition loss		5.88%
Gold per ton		1.40 oz
Silver per ton		6.07 oz

326

12-50 Cairns

AMERICAN SMELTING AND REFINING COMPANY

EL PASO SMELTING WORKS

EL PASO, TEXAS, 11/14/51 19

BOUGHT OF C. N. Vogel

ADDRESS Tombstone, Arizona

SHIPPING POINT Tombstone, Arizona

NAME OF MINE

SMELTER LOT 3284

SHIPPERS LOT -/-

CLASSIFICATION Ore

RATES, EXCEPT ON CONTRACTS, SUBJECT TO CHANGE WITHOUT NOTICE

IX	ARRIVAL DATE	CAR NUMBER	CAR RR	GROSS WEIGHT	CONTAINERS NO.	CONTAINERS WEIGHT	WET WEIGHT	% H2O	DRY WEIGHT
	10/31	151477	SP				86720	4.3	82991

QUOTATIONS

COINAGE SILVER	90.0	¢ PER OZ.
FOREIGN "	88.0	¢ PER OZ.
LEAD $	19.00	PER CWT.
COPPER		¢ PER LB.

B/L DATE: 10/26

SSAYS	OZ. PER TON GOLD	OZ. PER TON SILVER	WET LEAD %	COPPER %	INSOL %	SiO2 %	IRON %	MN %	LIME %	ZINC %	S %	AL2O3 %	As %	Sb %	Bi %	%
CLTER	0.035	3.2	28.8	0.20						0					0	
PPER	0.4	3.3	30.1	.33												
PIRE			29.4													
TALLICS																
TTLE	.0375	3.25	29.4													

VALUES PER TON

	PAY CONTENT	PRICE	AMOUNT	FREIGHT (FIXED)
.03 2% PAYMENT	20.3	1.21		
	.0375	32.3185	1.21	1.21
ER, LECS % MIN. OZ.	2.25	.885	1.99	1.99
), LESS 30# @ 90 %	502.2	.17	85.37	25.11
PER, LESS @ %				
SS VALUE			88.57	28.31
S DEDUCTIONS (NET CHARGE)			5.88	5.88
VALUE			x x x	22.43
ALUE			82.69 @ 41.4955	DRY TONS

DEDUCTIONS

	CHARGE	CREDIT
BASE, INCL. LABOR ADJ.	5.50	
EXCESS VALUE OVER $		
10 ¢ PER UNIT PB + - 30 %	.21	
LEAD—COPPER PRICE ESCALATOR		
BULLION FREIGHT TA @ .00034	.17	
INSOL—SILICA		
IRON—LIME		
ZINC		
As: Sb: Bi:		
NET CHARGE	5.88	—
-21.47 WET TON		

DEBITS	CREDITS
	3431.26
211.61	
11.19	
88.53	
13.00	
1.66	
312.68	
2314.13	
3431.26	3431.26

WET TONS @ 4.47+65 P.T. 205.55 TAX 6.16

FREIGHT: 43.36

SWITCHING 4.26+13= 4.39 Less Reset 6.60 + 20 = 6.80

HAULING 1.50 P.W.T. 65.04 + 1.95 Tax

REPRESENTATION $ 9.00 UMPIRE $ 4.00 SAMPLING $

OUNT WITHHELD PENDING RECEIPT OF SILVER AFFIDAVIT (10% - .17) H 4397

ROYALTY 10%

BALANCE DUE SHIPPER

ECKED CORRECT APPROVED

327

49 Cairns

AMERICAN SMELTING AND REFINING COMPANY

EL PASO SMELTING WORKS

BOUGHT OF C. Neil Vogel

ADDRESS Tombstone, Arizona

SHIPPING POINT " "

NAME OF MINE

EL PASO, TEXAS, 12-14-19 51

SMELTER LOT 3581

SHIPPERS LOT

CLASSIFICATION Ore

RATES, EXCEPT ON CONTRACTS, SUBJECT TO CHANGE WITHOUT NOTICE

ARRIVAL DATE	CAR NUMBER	CAR RR	GROSS WEIGHT	CONTAINERS No.	CONTAINERS WEIGHT	WET WEIGHT	% H2O	DRY WEIGHT
11-[illegible]	151645	SP				95740	4.8	91144

QUOTATIONS

COINAGE SILVER	90.0 ¢ PER OZ.
FOREGN "	88.0 ¢ PER OZ.
LEAD $	19.00 PER CWT.
COPPER	¢ PER LB.

B/L DATE: 11-23

	OZ. PER TON GOLD	OZ. PER TON SILVER	WET LEAD %	COPPER %	INSOL %	SILICA %	IRON %	MANGANESE %	LIME %	ZINC %	SULPHUR %	ALUMINA %	AS %	SB %	BI %	%
	0.035	2.8	29.1	0.30						0					0	
	.0[illegible]5	3.1	29.1	.44												
CS	.06	2.95	29.1													

VALUES PER TON

	PAYMENT PAY CONTENT	PAYMENT PRICE	AMOUNT	FREIGHT (FIXED)
	.06	32.3185	1.94	1.94
ss % MIN. 1 oz.	1.95	.885	1.73	1.73
.30# @ 90 %	496.8	.17	84.46	24.84
ess @ %				
GROSS VALUE			88.13	28.51
LESS DEDUCTIONS (NET CHARGE)			5.91	5.91
FREIGHT VALUE			x x x	22.60
NET VALUE			82.22 @ 45.572	

DEDUCTIONS

	CHARGE	CREDIT
BASE, INCL. LABOR ADJ.	5.50	
EXCESS VALUE OVER $		
10 ¢ PER UNIT PB + – 30 %	.24	
COPPER UNDER 8#		
LEAD—COPPER PRICE ESCALATOR		
BULLION FREIGHT TAX @ .00034	.17	
INSOL—SILICA		
IRON—LIME		
ZINC		
AS: SB: BI:		
NET CHARGE	5.91	–

= 21.52 WET TON

DRY TONS

	DEBITS	CREDITS
		3746.93
47.87 WET TONS @ 4.87 + 6% P.T. 225.82 TAX 6.80	233.62	
LESS SWITCHING 4.26 + .13 = 4.39 Less Reset 6.60 + .20 = 6.80	11.19	
LESS H[illegible]NG @ 1.50 P.W.T. 71.81 + 2.15 Tax	73.96	
LESS RE[illegible]SENTATION $ 9.00 UMPIRE $ SAMPLING $	9.00	
AMOUNT WITHHELD PENDING RECEIPT OF SILVER AFFIDAVIT (10% - .18) H 4435	1.82	
LESS ROYALTY 10%	351.73	
BALANCE DUE SHIPPER	3075.61	
	3746.93	3746

CORRECT

APPROVED

328

AMERICAN SMELTING AND REFINING COMPANY

EL PASO SMELTING WORKS

BOUGHT OF C. N. Vogel — EL PASO, TEXAS, 1-17 19 52

ADDRESS Tombstone, Arizona — SMELTER LOT 54

SHIPPING POINT " " — SHIPPERS LOT

NAME OF MINE — CLASSIFICATION Pb Ox

RATES, EXCEPT ON CONTRACTS, SUBJECT TO CHANGE WITHOUT NOTICE

LOT	ARRIVAL DATE	CAR NUMBER	CAR RR	GROSS WEIGHT	CONTAINERS NO.	CONTAINERS WEIGHT	WET WEIGHT	% H2O	DRY WEIGHT
	1/7	94607	SP				73980	6.4	69245

QUOTATIONS

COINAGE SILVER	90.0	¢ PER OZ.
FOREIGN "	88.0	¢ PER OZ.
LEAD $	19.00	PER CWT.
COPPER		¢ PER LB.
B/L DATE:	1/3	

ASSAYS	OZ. PER TON GOLD	OZ. PER TON SILVER	WET LEAD %	COPPER %	INSOL %	SiO2 %	IRON %	MN %	LIME %	ZINC %	S %	Al2O3 %	As %	Sb %	Bi %	%
SMELTER	0.05	2.0	24.8	0.30						-0					0	
SHIPPER	.06	2.3	24.7	.18												
METALLICS																
SETTLE	.055	2.15	24.75													

VALUES PER TON

	PAYMENT PAY CONTENT	PAYMENT PRICE	AMOUNT	FREIGHT (FIXED)
GOLD	.055	32.3185	1.78	1.78
SILVER, LESS % MIN. 10%	1.15	.885	1.02	1.02
LEAD, LESS 30# @ 90 %	418.5	.17	71.15	20.93
COPPER, LESS @ %				
GROSS VALUE			73.95	23.73
LESS DEDUCTIONS (NET CHARGE)			6.32	6.32
FREIGHT VALUE			x x x	17.41
NET VALUE			67.63	@ 34.6225

DEDUCTIONS	CHARGE	CREDIT
BASE, INCL. LABOR ADJ.	5.50	
EXCESS VALUE OVER $ 10 ¢ PER UNIT Pb +− 30%	.68	
LEAD—COPPER PRICE ESCALATOR		
BULLION FREIGHT TAX @ .00034	.14	
INSOL—SILICA		
IRON—LIME		
ZINC		
As: Sb: Bi:		
NET CHARGE	6.32	—
= 16.30 WET TON		
DRY TONS		

DEBITS	CREDITS
	2341.52
146.60	
11.19	
57.15	
9.00	
1.04	
211.65	
1904.89	
2341.52	2341.52

FREIGHT: 36.99 WET TONS @ 3.63 + 6% P.T. 142.33 TAX 4.27

SWITCHING 4.26 + .13 = 4.39 Less Reset 6.60 + .20 = 6.80

HAULAGE @ 1.50 p.w.t. 55.49 + 1.66 Tax

REPRESENTATION $ 9.00 UMPIRE $ SAMPLING $ H4524

AMOUNT WITHHELD PENDING RECEIPT OF SILVER AFFIDAVIT (10% - .10)

ROYALTY 10%

BALANCE DUE SHIPPER

CHECKED CORRECT APPROVED

329

8-41 12-50 Cairns

AMERICAN SMELTING AND REFINING COMPANY

EL PASO SMELTING WORKS

BOUGHT OF C. N. Vogel

ADDRESS Tombstone, Arizona

SHIPPING POINT " "

NAME OF MINE

EL PASO, TEXAS, 4-9 19

SMELTER LOT 1034

SHIPPERS LOT

CLASSIFICATION Ore

RATES, EXCEPT ON CONTRACTS, SUBJECT TO CHANGE WITHOUT NOTICE

MIX	ARRIVAL DATE	CAR NUMBER	CAR RR	GROSS WEIGHT	CONTAINERS NO.	CONTAINERS WEIGHT	WET WEIGHT	% H2O	DRY WEIGHT
	3/29	152361	SP				106200	4.2	101740

QUOTATIONS

COINAGE SILVER	90.0	¢ PER
FOREIGN "	88.0	¢ PER
LEAD $	19.00	PER CW
COPPER		¢ PER

B/L DATE: 3/26

ASSAYS	OZ. PER TON GOLD	OZ. PER TON SILVER	WET LEAD %	COPPER %	INSOL %	SiO2 %	IRON %	MN %	LIME %	ZINC %	S %	Al2O3 %	As %	Sb %	Bi %	%
SMELTER	0.05	2.4	20.5	0.20						0					0	
SHIPPER	.06	2.5	20.5	.26												
UMPIRE																
METALLICS																
SETTLE	.055	2.45	20.5													

VALUES PER TON

	PAYMENT PAY CONTENT	PAYMENT PRICE	AMOUNT	FREIGHT (FIXED)	DEDUCTIONS	CHARGE	CREDIT
GOLD	.055	32.3185	1.78	1.78	BASE, INCL. LABOR ADJ.	5.50	
SILVER, LESS % MIN. 1 oz.	1.45	.885	1.28	1.28	EXCESS VALUE OVER $ 10 ¢ PER UNIT Pb +− 30 %	1.10	
LEAD, LESS 30# @ 90 %	342.0	.17	58.14	17.10			
COPPER, LESS @ %					LEAD—COPPER PRICE ESCALATOR		
					BULLION FREIGHT TAX @.00034	.12	
					INSOL—SILICA		
					IRON—LIME		
GROSS VALUE			61.20	20.16	ZINC		
LESS DEDUCTIONS (NET CHARGE)			6.72	6.72	As: Sb: Bi:		
NET WEIGHT VALUE			x x x	13.44	NET CHARGE	6.72	—
NET VALUE			54.48	@ 50.87	= 12.88 WET TON		
					DRY TONS	DEBITS	CREDITS
FREIGHT: 53.1 WET TONS @ 2.79 + 6% P.T. 157.04 TAX 4.71						161.75	2771.40
SWITCHING 4.26 + .13 = 4.39 Less Reset 6.60 + .20 = 6.80						11.19	
HAUL @ 150 p.w.t.o. 79.65 + 2.39 Tax						82.04	
REPRESENTATION $ 9.00 UMPIRE $ SAMPLING $						9.00	
PAYMENT WITHHELD PENDING RECEIPT OF SILVER AFFIDAVIT (10% - .15) H4690						1.53	
ROYALTY 10%						250.59	
BALANCE DUE SHIPPER						2255.30	
						2771.40	2771.40

CHECKED CORRECT APPROVED

330

S&M 12-50 Cairns

AMERICAN SMELTING AND REFINING COMPANY

EL PASO SMELTING WORKS

BOUGHT OF C. N. Vogel

ADDRESS Tombstone, Ariz.

SHIPPING POINT " "

NAME OF MINE

EL PASO, TEXAS, 4-18- 19 52

SMELTER LOT 1158

SHIPPERS LOT

CLASSIFICATION Ore

RATES, EXCEPT ON CONTRACTS, SUBJECT TO CHANGE WITHOUT NOTICE

MIX	ARRIVAL DATE	CAR NUMBER	CAR RR	GROSS WEIGHT	CONTAINERS NO.	CONTAINERS WEIGHT	WET WEIGHT	% H2O	DRY WEIGHT
	4-9	150124	SP				97900	5.2	92809

QUOTATIONS

COINAGE SILVER	90.0	¢ PER OZ.
FOREIGN "	88.0	¢ PER OZ.
LEAD $	19.00	PER CWT.
COPPER		¢ PER LB.

B/L DATE: 4-5

ASSAYS	OZ. PER TON GOLD	OZ. PER TON SILVER	WET LEAD %	COPPER %	INSOL %	SiO2 %	IRON %	MN %	LIME %	ZINC %	S %	AL2O3 %	As %	Sb %	Bi %	%
SMELTER	0.06	1.5	12.8	.10						0					0	
SHIPPER	.065	1.8	13.3	.14												
EMPIRE																
METALLICS																
CITTLE	.0625	1.65	13.05													

VALUES PER TON

	PAY CONTENT	PRICE	AMOUNT	FREIGHT (FIXED)
PAYMENT				
LD	.0625	32.3185	2.02	2.02
ER. LESS % MIN. 1 Oz.	.65	.885	.58	.58
D. LESS 30# @ 90 %	207.9	.17	35.34	10.40
PER. LESS @ %				
SS VALUE			37.94	13.00
DEDUCTIONS (NET CHARGE)			7.42	7.42
GHT VALUE			x x x	5.58
VALUE			30.52 @ 46.4045	-5.29 WET TON
				DRY TONS

DEDUCTIONS	CHARGE	CREDIT
BASE, INCL. LABOR ADJ.	5.50	
EXCESS VALUE OVER $		
10 ¢ PER UNIT Pb +- 30%	1.85	
LEAD—COPPER PRICE ESCALATOR		
BULLION FREIGHT TAX @ .00034	.07	
INSOL—SILICA		
IRON—LIME		
ZINC		
As Sb Bi		
NET CHARGE	7.42	—

FREIGHT: 48.95 WET TONS @ 2.40 + 6% P.T. 124.53 TAX 3.74

SWITCH 4.26 + .13 = 4.39 Less Reset 6.60 + .20 = 6.80

HAULING @ 1.50 P.W.T. 73.43 + 2.20 Tax

REPRESENTATION $ 9.00 UMPIRE $ SAMPLING $

AMT WITHHELD PENDING RECEIPT OF SILVER AFFIDAVIT (10% - .09) H 4699

ROYALTY 10%

DEBITS	CREDITS
	1416.27
123.27	
11.19	
75.63	
9.00	
.93	
119.13	
1072.12	
1416.27	1416.27

BALANCE DUE SHIPPER

CORRECT

APPROVED

331

7

3M 12-50 Cairns

AMERICAN SMELTING AND REFINING COMPANY

EL PASO SMELTING WORKS

BOUGHT OF C. N. Vogel — EL PASO, TEXAS 5-2- 1952

ADDRESS Tombstone, Ariz. — SMELTER LOT 1300

SHIPPING POINT " " — SHIPPERS LOT 6

NAME OF MINE — CLASSIFICATION Ore

RATES, EXCEPT ON CONTRACTS, SUBJECT TO CHANGE WITHOUT NOTICE

Mix	Arrival Date	Car Number	RR	Gross Weight	Containers No.	Containers Weight	Wet Weight	% H2O	Dry Weight
	4-21	151753	SP				104720	4.7	99798

QUOTATIONS

Coinage Silver	90.0	¢ per oz.
Foreign "	88.0	¢ per oz.
Lead $	19.00	per cwt.
Copper		¢ per lb.

B/L Date: 4-15

Assays	Oz. per Ton Gold	Oz. per Ton Silver	Wet Lead %	Copper %	Insol %	SiO2 %	Iron %	Mn %	Lime %	Zinc %	S %	Al2O3 %	As %	Sb %	Bi %	%
Smelter	.015	0.9	14.7	0.10						0					0	
Shipper	.045	1.1	15.0	.18												
Umpire	.033	1.05														
Metallics																
Settle	.033	1.05	14.85													

Values Per Ton

	Pay Content	Price	Amount	Freight (Fixed)
Gold	.033	32.3185	1.07	1.07
Silver, Less % Min. 1 oz.	.05	.885	.04	.04
Lead, Less 30# @ 90 %	240.3	.17	40.85	12.02
Copper, Less @ %				
Gross Value			41.96	13.13
Less Deductions (Net Charge)			7.25	7.25
Freight Value			x x x	5.88
Net Value			34.71 @	49.899 Dry Tons

Deductions	Charge	Credit
Base, Incl. Labor Adj.	5.50	
Excess Value Over $		
10¢ per unit Pb +− 30 %	1.67	
Lead—Copper Price Escalator		
Bullion Freight Tax @ .00034	.08	
Insol—Silica		
Iron—Lime		
Zinc		
As: Sb: Bi:		
Net Charge	7.25	—
=5.60 Wet Ton		

		Debits	Credits
Net Value			1731.99
Freight: 52.36	Wet Tons @ 2.40 + 65 P.T. 133.20 Tax 4.00	137.20	
Swing 4.26 + .13 = 4.39	Less Reset 6.60 + .20 = 6.80	11.19	
Hauling @ 1.50	78.54 + 2.36 Tax	80.90	
Representation $ 9.00	Umpire $ Sampling $	9.00	
Amount Withheld Pending Receipt of Silver Affidavit	H 4712		
Royalty 10%		149.37	
Balance Due Shipper		1344.33	
		1731.99	1731.99

Checked — Correct — Approved

332

8-51 12-56 Cairns

AMERICAN SMELTING AND REFINING COMPANY

EL PASO SMELTING WORKS

BOUGHT OF C. N. Vogel

ADDRESS Tombstone, Ariz.

SHIPPING POINT " "

NAME OF MINE

EL PASO, TEXAS, May 20, 1952 19

SMELTER LOT 1396

SHIPPERS LOT 7

CLASSIFICATION Pb ox

RATES, EXCEPT ON CONTRACTS, SUBJECT TO CHANGE WITHOUT NOTICE

MIL	ARRIVAL DATE	CAR NUMBER	CAR RR	GROSS WEIGHT	CONTAINERS NO.	CONTAINERS WEIGHT	WET WEIGHT	% H2O	DRY WEIGHT
	4/30	151033	SP				102400	5.2	97075

QUOTATIONS

COINAGE SILVER	90.0	¢ PER OZ
FOREIGN "	88.0	¢ PER OZ
LEAD $	17.833	PER CWT.
COPPER		¢ PER LB.

B/L DATE: 4/25

ASSAYS	OZ. PER TON GOLD	OZ. PER TON SILVER	WET LEAD %	COPPER %	INSOL %	SiO2 %	IRON %	MN %	LIME %	ZINC %	S %	AL2O3 %	AS %	SB %	BI %	%
SMELTER	0.03	0.9	14.8	0.10						0					0	
SHIPPER	.045	1.1	15.4	.28												
UMPIRE		1.0625	15.2													
METALLICS																
TITLE	.0375	1.0625	15.2													

VALUES PER TON

PAYMENT	PAY CONTENT	PRICE	AMOUNT	FREIGHT (FIXED)
	.0375	32.3185	1.21	1.21
LESS % MIN 1 Oz.	.0625	.885	.06	.06
LESS 30% @ 90 %	246.6	.15833	39.04	12.33
LESS @ %				
GROSS VALUE			40.31	13.60
DEDUCTIONS (NET CHARGE)			7.21	7.21
FREIGHT VALUE			x x x	4.39 = 6.06 WET TON
NET VALUE			33.10 @ 48.5375	DRY TONS

DEDUCTIONS	CHARGE	CREDIT
BASE, INCL. LABOR ADJ.	5.50	
EXCESS VALUE OVER ¢		
10 ¢ PER UNIT PB + − 30 %	1.63	
LEAD—COPPER PRICE ESCALATOR		
BULLION FREIGHT TAX @ .00034	.08	
INSOL—SILICA		
IRON—LIME		
ZINC		
AS: SB: BI:		
NET CHARGE	7.21	—

	DEBITS	CREDITS
FREIGHT: 51.2 WET TONS @ 2.40 + 6% P.T. 130.25 TAX 3.91		1606.59
SWITCHING 4.26 + .13 = 4.39 Less Rest 6.60 + .20 = 6.80	134.16	
HAULING @ 1.50 76.80 + 2.30 Tax	11.29	
REPRESENTATION $ 9.00 UMPIRE $ SAMPLING $	79.10	
PAYMENT WITHHELD PENDING RECEIPT OF SILVER AFFIDAVIT (10% = .05) H 4755	9.00	
ROYALTY	.49	
	137.27	
BALANCE DUE SHIPPER	1606.59	
	1606.59	1606.59

CORRECT APPROVED

333

FOM 12-50 Cairns

AMERICAN SMELTING AND REFINING COMPANY

EL PASO SMELTING WORKS

BOUGHT OF C. Neil Vogel

ADDRESS Tombstone, Arizona

SHIPPING POINT " "

NAME OF MINE

EL PASO, TEXAS 5-23 19 52

SMELTER LOT 1526

SHIPPERS LOT

CLASSIFICATION Ore

RATES, EXCEPT ON CONTRACTS, SUBJECT TO CHANGE WITHOUT NOTICE

MIX	ARRIVAL DATE	CAR NUMBER	CAR RR	GROSS WEIGHT	CONTAINERS NO.	CONTAINERS WEIGHT	WET WEIGHT	% H2O	DRY WEIGHT
	5/12	151833	SP				104380	4.0	100205

QUOTATIONS

COINAGE SILVER	90.0	¢ PER OZ.
FOREIGN "	85.6	¢ PER OZ.
LEAD $	15.00	PER CWT.
COPPER		¢ PER LB.

B/L DATE: 5/7

ASSAYS	OZ. PER TON GOLD	OZ. PER TON SILVER	WET LEAD %	COPPER %	INSOL %	SiO2 %	IRON %	MN %	LIME %	ZINC %	S %	AL2O3 %	As %	Sb %	Bi %	%
SMELTER	0.04	1.4	15.7	0.15						0					0	
SHIPPER	.05	1.6	16.4	.16												
UMPIRE			16.3													
METALLICS																
SETTLE	.045	1.5	16.3													

VALUES PER TON

	PAY CONTENT	PRICE	AMOUNT	FREIGHT (FIXED)
SMELTER	.045	32.3185	1.45	1.45
LESS % MIN. 1 oz.	.5	.885	.44	.44
SHIPPER LESS 30¢ @ 90 %	266.4	.13	34.63	13.32
UMPIRE LESS @ %				
GROSS VALUE			36.52	15.21
LESS DEDUCTIONS (NET CHARGE)			7.11	7.11
FREIGHT VALUE			x x x	8.10
NET VALUE			29.41	@ 50.1025
FREIGHT	52.19	WET TONS @ 2.40 + 15% P.T.	144.05	TAX 4.32
SWITCHING			4.62 + .14	
HAULING	@ 1.50 p.w.t.		78.29 + 2.35 Tax	
REPRESENTATION $ 9.00	UMPIRE $	SAMPLING $		
PAYMENT WITHHELD PENDING RECEIPT OF SILVER AFFIDAVIT	(10% - .10)		11.759	
ROYALTY 10%				

DEDUCTIONS

	CHARGE	CREDIT
BASE, INCL. LABOR ADJ.	5.50	
EXCESS VALUE OVER $		
10¢ PER UNIT Pb + − 30 %	1.52	
LEAD—COPPER PRICE ESCALATOR		
BULLION FREIGHT TAX @.00035	.09	
INSOL—SILICA		
IRON—LIME		
ZINC		
As: Sb: Bi:		
NET CHARGE	7.11	
=7.78 WET TON		
DRY TONS		

DEBITS	CREDITS
	1473.51
113.37	
4.76	
80.64	
9.00	
1.00	
122.97	
1106.77	
366.74	
1473.51	1473.51

BALANCE DUE SHIPPER

CHECKED CORRECT APPROVED

334

50M 11-49 Cairns

AMERICAN SMELTING AND REFINING COMPANY

EL PASO SMELTING WORKS

BOUGHT OF C. N. Vogel

ADDRESS Tombstone, Arizona

SHIPPING POINT " "

NAME OF MINE

EL PASO, TEXAS, 6-24

SMELTER LOT 1632

SHIPPERS LOT

CLASSIFICATION Ore

RATES, EXCEPT ON CONTRACTS, SUBJECT TO CHANGE WITHOUT NOTICE

MIX	ARRIVAL DATE	CAR NUMBER	CAR RR	GROSS WEIGHT	CONTAINERS NO.	CONTAINERS WEIGHT	WET WEIGHT	% H2O	DRY WEIGHT
	6/9	95300	SP.				88020	7.7	81242

QUOTATION

COINAGE SILVER 90.0

FOREGN. " 82.75

LEAD $ 15.00

COPPER

B/L DATE: 6/2

ASSAYS	OZ. PER TON GOLD	OZ. PER TON SILVER	WET LEAD %	COPPER %	INSOL %	SILICA %	IRON %	MANGANESE %	LIME %	ZINC %	SULPHUR %	ALUMINA %	AS %	SB %
SMELTER	0.035	1.0	15.2	0.10						0				
SHIPPER	.05	1.3	15.8	.26										
UMPIRE			15.4											
METALLICS														
SETTLE	.0425	1.15	15.4											

VALUES PER TON

PAYMENT

	PAY CONTENT	PRICE	AMOUNT	FREIGHT (FIXED)
GOLD	.0425	32.3195	1.37	1.37
SILVER, LESS % MIN. 1 oz.	.15	.885	.13	.13
LEAD, LESS 30# @ 90 % 250.2	.13		32.53	12.51
COPPER, LESS @ %				
GROSS VALUE				
LESS DEDUCTIONS (NET CHARGE)			34.03	14.01
FREIGHT VALUE			7.20	7.20
NET VALUE			x x x	6.81

DEDUCTIONS

	CHARGE
BASE, INCL. LABOR ADJ.	5.50
EXCESS VALUE OVER $ 10 # PER UNIT PB + — 30 %	
COPPER UNDER 8#	1.61
LEAD—COPPER PRICE ESCALATOR	
BULLION FREIGHT TAX .00035	.09
INSOL—SILICA	
IRON—LIME	
ZINC	
AS: SB: BI:	
NET CHARGE = 6.29 WET TON	7.20

LESS FREIGHT: 44.01 WET TONS @ 26.33 @ 40.621 DRY TONS P.T. 121.46 TAX 3.64

LESS SWITCHING

LESS HAULING @ 1.50 2.40 + 15% 4.62 + 14

LESS REPRESENTATION $ 9.00 UMPIRE $ 4.00 66.02 + 1.98 Tax SAMPLING $

AMOUNT WITHHELD PENDING RECEIPT OF SILVER AFFIDAVIT (10% — .04) H 4819

LESS ROYALTY 10%

	DEBITS	CREDITS
	125.10	1039.
	4.76	
	63.00	
	13.00	
	.41	
	87.86	
	770.73	
	1039.86	1039.8

BALANCE DUE SHIPPER

CORRECT

APPROVED

335

OM 12-50 Cairns

AMERICAN SMELTING AND REFINING COMPANY

EL PASO SMELTING WORKS

BOUGHT OF C. Neil Vogel — EL PASO, TEXAS. 7-31 1952
ADDRESS Tombstone, Arizona — SMELTER LOT 2380
SHIPPING POINT Tombstone, Arizona — SHIPPERS LOT
NAME OF MINE — CLASSIFICATION Ore

RATES, EXCEPT ON CONTRACTS, SUBJECT TO CHANGE WITHOUT NOTICE

MIX	ARRIVAL DATE	CAR NUMBER	CAR RR	GROSS WEIGHT	CONTAINERS NO.	CONTAINERS WEIGHT	WET WEIGHT	% H2O	DRY WEIGHT
	7/23	89922	SP.				110560	3.3	106912

QUOTATIONS

COINAGE SILVER	90.0	¢ PER OZ.
FOREIGN "	82.75	¢ PER OZ.
LEAD $	16.00	PER CWT.
COPPER		¢ PER LB.

B/L DATE: 7/18

ASSAYS	OZ. PER TON GOLD	OZ. PER TON SILVER	WET LEAD %	COPPER %	INSOL %	SiO2 %	IRON %	MN %	LIME %	ZINC %	S %	AL2O3 %	AS %	SB %	BI %	%
SMELTER	0.03	0.5	8.8	0.05						0					0	
SHIPPER	.045	.7	9.3	.11												
UMPIRE																
METALLICS																
SETTLE	.0375		9.05													

VALUES PER TON

	PAY CONTENT	PRICE	AMOUNT	FREIGHT (FIXED)
GOLD	.0375	32.3185	1.21	1.21
SILVER LESS % MIN.				
PB. LESS 30% @ 90 %	135.9	.14	19.03	6.00
COPPER LESS @ %				
GROSS VALUE			20.24	8.01
LESS DEDUCTIONS (NET CHARGE)			7.00	7.00
WEIGHT VALUE			x x x	.21
NET VALUE			12.14	@ 53.456 DRY TONS

DEDUCTIONS

	CHARGE	CREDIT
BASE, INCL. LABOR ADJ.	5.50	
EXCESS VALUE OVER $		
10 ¢ PER UNIT PB + − 30 %	2.25	
LEAD—COPPER PRICE ESCALATOR		
BULLION FREIGHT TAX 5.00055	.05	
INSOL—SILICA		
IRON—LIME		
ZINC		
AS: SB: BI:		
NET CHARGE	7.80	—

= .22 WET TON

				DEBITS	CREDITS
FREIGHT	55.28	WET TONS @ 2.40 + 15% P.T.	152.57 TAX 4.58	157.15	
SWITCHING		1.62 + .14		1.76	
HAULING @ 1.50 p.w.t.		82.92 + 2.19 Tax		85.11	
REPRESENTATION $ 7.00		UMPIRE $	SAMPLING $	7.00	
AMOUNT WITHHELD PENDING RECEIPT OF SILVER AFFIDAVIT					
ROYALTY	10%			40.87	
BALANCE DUE SHIPPER				367.80	
				66.99	664.99

CHECKED CORRECT APPROVED

336

Mail Claims

AMERICAN SMELTING AND REFINING COMPANY

EL PASO SMELTING WORKS

BOUGHT OF C. Neil Vogel

ADDRESS Tombstone, Arizona

SHIPPING POINT

NAME OF MINE Stella

EL PASO, TEXAS Aug. 7, 1952 19

SMELTER LOT 2571

SHIPPERS LOT

CLASSIFICATION

RATES, EXCEPT ON CONTRACTS, SUBJECT TO CHANGE WITHOUT NOTICE

MIX	ARRIVAL DATE	CAR NUMBER	CAR RR	GROSS WEIGHT	CONTAINERS NO.	CONTAINERS WEIGHT	WET WEIGHT	% H2O	DRY WEIGHT
	8-11	151768	SP				95520	5.7	90075

QUOTATIONS

COINAGE SILVER	90.0	¢ PER OZ.
FOREIGN "	83.25	¢ PER OZ.
LEAD $	16.00	PER CWT.
COPPER		¢ PER LB.

B/L DATE: 8/4

ASSAYS	OZ. PER TON GOLD	OZ. PER TON SILVER	WET LEAD %	COPPER %	INSOL %	SiO2 %	IRON %	MN %	LIME %	ZINC %	S %	AL2O3 %	As %	Sb %	Bi %	%
SMELTER	0.045	1.0	13.6	0.03						0					0	
SHIPPER	.06	1.3	14.0	.26												
EMPIRE																
METALLICS																
SETTLE	.0525	1.15	13.8													

VALUES PER TON

	PAYMENT PAY CONTENT	PRICE	AMOUNT	FREIGHT (FIXED)
GOLD	.0525	32.3185	1.70	1.70
SILVER; LESS % MIN. 1 Oz.	.15	.885	.13	.13
LEAD; LESS 30# @ 90 %	22.04	.14	31.00	11.07
COPPER, LESS @ %				
GROSS VALUE			32.83	12.90
LESS DEDUCTIONS (NET CHARGE)			7.35	7.35
NET VALUE			x x x	5.55
DRY VALUE			25.48	@ 45.0375

DEDUCTIONS	CHARGE	CREDIT
BASE, INCL. LABOR ADJ.	5.50	
EXCESS VALUE OVER $		
10 ¢ PER UNIT PB +− 30 %	1.77	
LEAD—COPPER PRICE ESCALATOR		
BULLION FREIGHT TAX @ .00035	.08	
INSOL—SILICA		
IRON—LIME		
ZINC		
AS: SB: BI:		
NET CHARGE	7.35	—
= 5.23 WET TON		
DRY TONS		

	DEBITS	CREDITS
FREIGHT: 47.76 WET TONS @ 2.40 + 15% P.T. 131.31 TAX 3.95	135.76	1147.56
SWITCHING	4.76	
HAULING @ 1.50 per ton 71.64 + 2.15 Tax	73.79	
REPRESENTATION $ 9.00 UMPIRE $ SAMPLING $	9.00	
AMOUNT WITHHELD PENDING RECEIPT OF SILVER AFFIDAVIT (10% = .05) H 4919	.45	
ROYALTY 10%	92.33	53.8
BALANCE DUE SHIPPER	831.42	
	1147.56	1147.56

CORRECT NER APPROVED

337

AMERICAN SMELTING AND REFINING COMPANY

EL PASO SMELTING WORKS

BOUGHT OF C. N. Vogel — EL PASO, TEXAS 2-13 19[illegible]

ADDRESS Tombstone, Arizona — SMELTER LOT 373

SHIPPING POINT Tombstone, Arizona — SHIPPERS LOT

NAME OF MINE — CLASSIFICATION Ore

RATES, EXCEPT ON CONTRACTS, SUBJECT TO CHANGE WITHOUT NOTICE

Mix	Arrival Date	Car Number	Car RR	Gross Weight	Containers No.	Containers Weight	Wet Weight	% H2O	Dry Weight
	2/4	95411	SP				78640	3.9	75573

QUOTATIONS

Coinage Silver	.90 ¢ per [illegible]
Foreign "	.8525 ¢ per [illegible]
Lead $	13.50 per cwt
Copper	¢ per lb

B/L Date: 1/30

Assays	Oz. per Ton Gold	Oz. per Ton Silver	Wet Lead %	Copper %	Insol %	SiO2 %	Iron %	Mn %	Lime %	Zinc %	S %	Al2O3 %	As %	Sb %	Bi %
Smelter	0.04	1.2	11.7	0.08											
Shipper	.05	1.4	12.1	.16											
Umpire															
Metal															
Settle	.045	1.3	11.9												

Values Per Ton

	Pay Content	Price	Amount	Freight (Fixed)
Gold	.045	32.3185	1.45	1.45
Silver, Less % Min. 1 oz.	.3	.885	.27	.27
Lead, Less 30# @ 90 %	187.2	.1150	21.53	9.36
Copper, Less @ %				
Gross Value			23.25	11.08
Less Deductions (Net Charge)			7.53	7.53
Freight Value			x x x	3.55
Net Value			15.72	@ 37.7865

Deductions	Charge	Cr.
Base, Incl. Labor Adj.	5.50	
Excess Value Over $		
10 ¢ per unit Pb + − 30 %	1.96	
Lead—Copper Price Escalator		
Bullion Freight Tax @.00035	.07	
Insol—Silica		
Iron—Lime		
Zinc		
As: Sb: Bi:		
Net Charge	7.53	

= 3.41 Wet Ton

Dry Tons

	Debits	Credits
		594.00
	111.79	
	9.95	
	60.75	
	9.00	
H 5166		
	40.25	
	362.26	

Gross Freight: 39.32 — Wet Tons @ 2.40 + 15% P.T. 108.53 — Tax 3.26

Less Switching 4.62 + .14 = 4.76 — Reset 5.04 + .15 = 5.19

Less Haul 39.320 Wet tons @ 1.50 per wt. plus 3% Tax

Less Representation $ 9.00 — Umpire $ — Sampling $

Amount Withheld Pending Receipt of Silver Affidavit.

Less Royalty 10%

Balance Due Shipper

Checked — Correct — Approved

338

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
April 27, 1953

MINERAL PRODUCTION AND
ECONOMICS DIVISION

1600 E. 1st South
SALT LAKE CITY, UTAH

C. Neil Vogel, Mgr.
Vogel M. Co.
Box 426
Tombstone, Arizona

Dear Mr. Vogel:

I wish to thank you for sending a report giving operation and production of the Gallagher Group (Stella mine) in 1952 and also for sending 9 smelter settlement sheets for ore shipped to the El Paso smelter during the year. The settlement sheets are returned herewith.

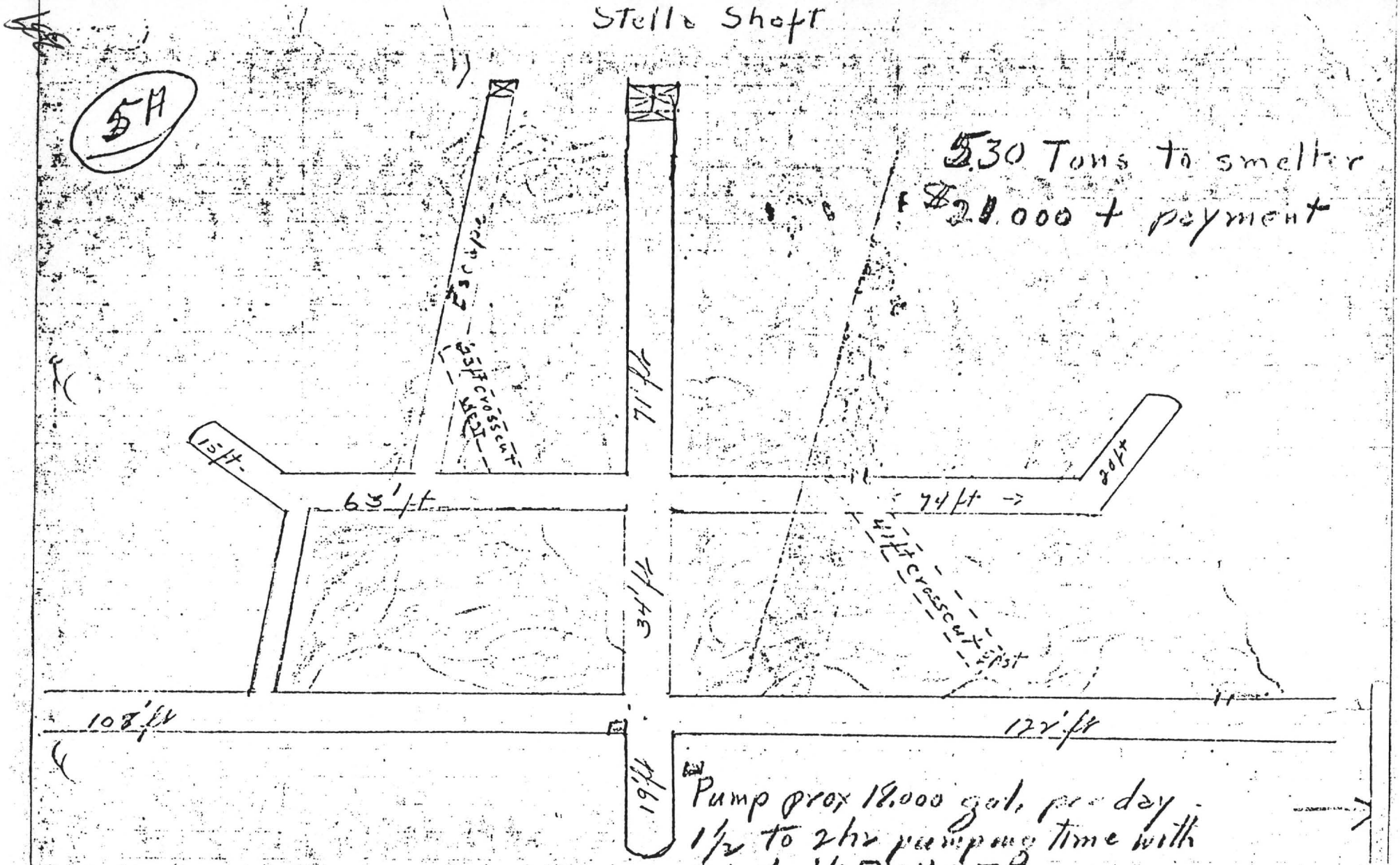
Very truly yours,

Paul Luff

PAUL LUFF
Commodity Specialist
Region IV

Encl.

BUY VICTORY


Stella Shaft
5H
530 Tons to smelter
$21.000 + payment
71 ft
63 ft
74 ft
34 ft
108 ft
122 ft
19 ft
Pump prox 18.000 gal. per day
1½ to 2hr pumping time with
Electric/Gas II to IR pump.
Vogel Mine
stoped

Ore shipments made from the G.V.R.M. properties
Tombstone , Ariz. by the Vogel Mining Co.

Stella shaft

Date	Lot	Gross	Au	Ag	Pb	Cu	Value
11-14-51	3284	86720	.037	3.25	29.4	.38	$ 3431.26
12-14-51	3581	95740	.06	2.95	29.1	.44	3746.93
1-17-52	54	73980	.055	2.15	24.75	.18	2341.52
4-9-52	1034	106200	.055	2.45	20.5	.26	2771.40
4-18-52	1158	97900	.062	1.65	13.5	.14	1416.27
5-2-52	1300	104720	.033	1.05	14.8	.18	1731.99
5-20-52	1396	102400	.037	1.06	15.2	.28	1606.59
5-23-52	1526	104380	.045	1.5	16.3	.16	1473.51
6-24-52	1882	88020	.042	1.15	15.4	.26	1089.86
7-31-52	2360	110560	.037	.7	9.5	.11	664.99
8-7-52	2571	95520	.052	1.15	13.8	.26	1147.36
2-4-53	373	78640	.045	1.3	11.9	.16	594.00

22,015,78
21,491-78

...L VOGEL MINES

GOLD TOWN, ARIZONA

...ATIVE BUT REPRESENTATIVE RECORD OF SHIPMENTS AND ASSAYS OF MINERALS FOUND ON PROPERTIES CONTAINED IN THE ATTACHED REPORT

		Gold Oz.	Silver Oz	Lead	V2O5	
1.	No. [illegible], Nov.18,1921 Lecoux & Co. New York Sample F	.06	42.4	52.5	5.7	
	Sample L	.02	1.5	54.0	6.5	
2.	Smelter Lot 2315, Aug.15,1923 Kansas City Smelting & Refining Company, El Paso, 50,105 #		8.1	8.1		
3.	Smelter Lot 2316, Aug.15,1923 Kansas City Smelting & Refining Company, El Paso, 15,910 #		20.7	56.0		
4.	Smelter Lot 1835, April 26,1924 Kansas City Smelting & Refining Company, El Paso, 2480 #		21.1	39.1		
5.	Smelter Lot 1719, July 5, 1924 Kansas City Smeltin & Refining Company, El Paso, 3001 #	.07	21.4	41.0		
6.	Smelter Lot 201, Apr.3, 1929 Phelps-Dodge Corp. Douglas, Ariz. Concentrates, 20,913 lbs.	.09	4.37	35.1		
7.	Three 5 lb. assays, May 1928 from 100 lbs. off dump. (a)				4.12	
	(b)				5.25	
	(c)				4.10	
	combined		2.5	31.0		
8.	611 lb. sample random dumps concentrated by Prof. Cunningham School of Mines, Ariz. 20 mesh screen, each 100 # Averaged					
	Heads			10.8	1.8	1.24
	Cons	.04	2.88	51.8	8.4	8.5
	Middlings	Tr	1.48	14.4	2.1	
	Slimes	Tr	.62	8.0	.9	
9.	Mill run on Blanket ore Jan. 25, 1929 Heads	.02	1.05	4.2	.5	
	Concentrates	.22	5.66	50.2	3.08	
10.	Experimental Conc. direct to mill, Sept.14,1929 Heads	tr.	1.7	5.1	.78	
	Concentrates-1- 48 mesh	.04	3.7	21.3	3.16	
	2- 65 mesh	.41	3.3	25.2	3.15	
	3- 100 mesh	.90	3.1	11.4	2.47	
	4- 150 mesh	.83	1.9	11.4	2.39	
	5- 200 mesh	.5	1.3	20.6	4.55	
	6- 200 mesh	.05	3.4	29.8	6.39	

342

		Au	Ag	Pb
(9)	11-3-51, Jacobs Assay Office #49106			
	130071 Footwall	0.01	1.4	5.9
	130072 Across face	.005	0.6	3.8
	130073 Hanging Wall	Tr.	0.4	0.2
	130074 Composite fines, Copper .021	.03	2.5	20.3
(10)	12-24-51, Hawley & Hawley #249682			
	North face sample, 71 ft level	.03	0.3	5.7
	South face sample, 71 ft level	.05	0.5	3.5

Net Balance of Ore

SHIPMENTS	oz Gold	oz Silver	% Lead	Copper
4-21-48 Hawley & Hawley, 9233 lbs.	.04	4.6	50.2	
11-15-48, Hawley & Hawley 10383 lbs.	.05	4.0	37.7	
10-26-51, Smelter Lot 3284 American Smelting & Refining El Paso - Dry Weight 82991 lbs. Gross $.88.57 ton	.0375	3.25	29.4	.38
11-24-51, Smelter Lot 3581 American Smelting & Refining, El Paso - Dry Weight 91144 lbs. Gross 88.13 ton	.06	2.95	29.1	.44
1-5-52 Smelter Lot No. 54 American Smelting & Refining Co. - Dry Weight 69245 lbs. Gross $ 73.95 ton	.055	2.15	24.75	.30
Balance of Shipments	.043	2.2		

Two samples were sent to Smith-Emery Co., Los Angeles, Calif. for Spectographic Analysis.

(a) Sample taken from Stella at 50 ft. level, 8-15-51 No. 341672

(b) Sample taken from drift at 71 ft. level Stella, 11-8-51, # 345194

	(a)	(b)
Gold	0.11oz	0.32oz
Silver	2.93oz	Tr
Lead	25.12%	51.94%
Potassium	0.5 %	
Copper	0.5 %	
Antimony	0.1 %	0.01%
Magnesium	0.1 %	
Molybdenum	0.1 %	16.00%
Zinc	0.1 %	
Vanadium	0.01%	1.0 %
Zirconium	0.01 %	
Manganese	0.005%	
Gallium	0.001%	
Chromium	Tr.	0.05%
Aluminum		.05 %
Iron		0.1 %
Strontium		0.05%
Barium		0.05%
Titanium		0.05%
Bismuth		0.005%
Boron	0.001%	

Comparative Assays

Location?

343

RESULTS OF LABORATORY MILL TESTS ON ORES FROM THE SAN JUAN MINES, Tombstone, Arizona

****

Results of Test made by Minerals Separation Corporation,
220 Battery St.
San Francisco, Calif.
30th. March 1925.

1,500 gram Charge.

Product	Percentage	Test "A" ASSAYS Ag oz.	Pb%	Zn%	DISTRIBUTION Ag%	Pb%	Zn%
No. 1 Heads	100	15.51	3.20	43.12	100	100	100
Lead Conc.	2.5	239.3	59.5	16.4	38.6	46.6	0.9
Lead Middlgs	2.7	100.4	28.2	28.2	17.5	23.8	1.8
Zinc Conc.	63.3	6.88	1.4	62.2	27.7	27.8	91.3
Tails	31.5	8.00	0.2	8.2	16.2	1.8	6.00

Treatment Lead
Nacn 1.0 lb.
8Q 0.1
2B 0.1
Z 0.1
5 minutes

Retreatment Lead
0.5 lb.
0.1 lb.
5 minutes

Treatment Zinc
CaO 6. lb.
CuSo4 1. lb.
20A 0.5 lb.
Z 0.15 lb.
10 minutes

This sample marked "AA" on assay plate.

****

1500 gram charge

		Test "B" ASSAYS				DISTRIBUTION	
No. 2 Heads	100.	6.76	2.42	32.32	100	100	100
Lead Conc.	1.8	151.7	42.6	32.	40.4	31.7	1.79
Lead Middlgs.	2.6	47.4	14.8	46.	18.2	15.6	3.72
Zinc Conc.	49.3	3.8	1.000	59.5	27.7	20.2	90.91
Tails	46.3	2.0	1.70	2.5	13.7	32.5	3.58

Treatment Lead
NaCn 1.0 lb.
2B 0.1 lb.
Z 0.1 lb.
5 minutes
Note 10 minutes.

Retreatment Lead
0,5 lb.
0.05 lb.
0.05 lb.
7 minutes

Treatment Zinc.
CaO 6.0 lb.
Cu3O4 1.0 lb.
Z 0.151lb.
15 minutes

This sample marked "BBB" on Assay plate.

****

OIL CODE

NaCN- Sodium Cyanide: 2B- Cresopylic acid: z - Xanthate:
20A - Pine oil: 8q - Saturated solution Napthalene in Xyleno.

Statement of Costs of Operation and Credits therefrom
May 10, 1927.

Based on Recovery and Ratio - of Concentration as per
Statement of Flotation Tests attached hereto.

Metal Quotations.
Silver $0.56 per oz.
Lead 0.0675 per lb.
Zinc 0.0615 per lb.

Product	Percentage	ASSAYS Silver oz.	Lead%	Zinc%	Ratio of Concentn.
Ore Crude	100.	5.2	1.88	25.00	
Lead Conc.	1.385	151.7	43.00	32.00	72.21 to 1
Zinc Conc.	37.500	---	----	60.00	2.67 to 1

****

SETTLEMENT ON LEAD CONCENTRATES:

Assay per ton of 2,000 lbs.		Payments Net paid for.	Amount per ton.
Silver	151.7 oz. 95%	144.11 oz. 56¢	$80.70
Lead	43.% 90% of 41.5%	747 lbs. 00535	39.90
		Total	$ 120.66

Deductions

Treatment per ton	$3.50	
Zinc 32% less 8 units, Net 24% @ 30¢	7.20	
Sulphur 22.5%, Maximum charge	3.00	
Total		$ 13.70
Net value per ton		$106.96
RR F t $5.60 plus 10% moisture	6.16	
Truck 14 miles @ 20¢ per ton mile, Min.	3.00	
Total	9.16	
Net value per ton lead conc.		97.80

NET VALUE PER TON OF ORE IN PLACE IN LEAD & SILVER.

****

SETTLEMENT ON ZINC CONCENTRAT ES:

	Payments.	
60 % zinc @ 83% of assay:	market - $0.0615 per lb. 996 lb.	$61.25
	Deductions	
Treatment $22.00 per ton of 2,000 lb.	$22.00	
RR Frt to Amarillo, Texas $5.75 plus 10% moisture	6.33	
Truck 14 miles	3.00	
Milling per ton crude ore $1.50	4.00	
Mining per ton crude ore $2.00	5.34	
Total		$40.67
NET VALUE PER TON ZINC CONCENTRATES IN ZINC		$20.68

****

NET VALUE PER TON ORE IN PLACE FOR LEAD	SILVER.	$1.354
" " " " " " " " "	ZINC	7.745
Total Net Value per ton of ore in place	LEAD SILVER ZINC	9.099

MINE INVENTORY, EQUIPMENT AND IMPROVEMENTS.

1 - Property consists of four (4) unpatented mining claims, 20 acres each

2 - Three mine dwellings, one used by watchman, condition fair to good, proximate 12 X 24 foot, have electric lights, water piped to houses from spring, two houses equipped with Butane, also camp stoves, beds refrigerators etc. Can be put into good condition with some work.

3 - Hoist house generally good, contains all switch boxes for electrical equipment including starter and control switch for hoist.

Pacific Foundry mine hoist, 36x30 inch drum with 500 feet of 5/8 cable, two speed 55 H.P. electric motor, depth gauge.

Ingersoll Rand 9x8 Air Compressor with 30H.P. electric motor, and 3 inch air line to outside air receiver tank. # 47505
Benches, Tool cabinets, and storage drawers in good condition.

4 - A prox. 24 foot vertical head frame equipped with good sheave and skip shaft is reported to be 300 feet and timbered to bottom, water now stands at about 60 feet, upper 100 feet of shaft retimbered in 1951, 2 inch water lines, 1½ inch air lines in shaft, electric wiring in conduit. Shaft is 1½ compartment.

5 - Blacksmith shop is good, equipment includes forge, anvil, drill press grinder all required blacksmith tools, has sufficient space to work on largest jobs including storage for truck. Inventory in shop also includes an 8 inch electric blower and 6 inch blower for mine ventilation, stopers, drill steel, Fairbanks Morse 3x3 pump and misc items.

6 - An elevated 500 gallon water storage tank.

7 - Wash room with heater and shower connections, benches, can accomodate eight or more men.

8 - A standby 6x6 air compressor without power installed in seperate metal buiding, hooked up to air receiver by 2 inch air line. ample storage space in building.

9 - 12# rail leading from shaft with switches to dump and mill and ore bin.

10- Mill building poor, equipment includes grizzley, screens, small jaw crusher with engine, two stamp mill, a good 4 cylinder I.H.C. engine with drive wheel and clutch and a standby 6 H.P. single cylinder engine (The mill will require a complete overhaul from foundation up)

11- A small ore bin for truck haul

12- A metal roofed shed to accomodate to three vehicles.

13- Byron Jackson electric powered two stage pump, 3 mine cars, mine dolly timber saws, sledges, hammers, rather complete outfit of hand tools and considerable misc equipment for use in and around a mine.

14- Three phase electric power to mine, present power adequate for small equipment, platform installed for heavy pots.

15- Gravel roadsuitable for car travel direct to mine from County road within ¼ mile.

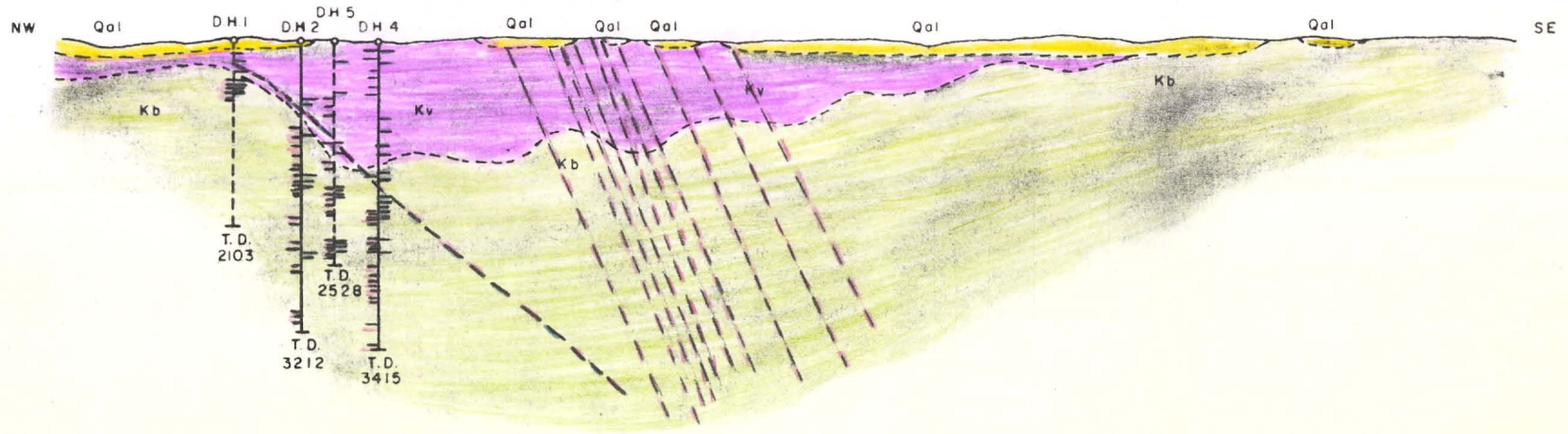
An additional operation has been started on a parallel vein some 1500 feet North of this mine shaft, values favorable, a part of this mine.

? 345

mine location

4-64 DIETERICH-POST CLEARPRINT 1000H-10

D.H.1 is projected 410' northward
D.H.5 is projected 750' southward



Qal — Quaternary alluvium

Kv — Bronco volcanics

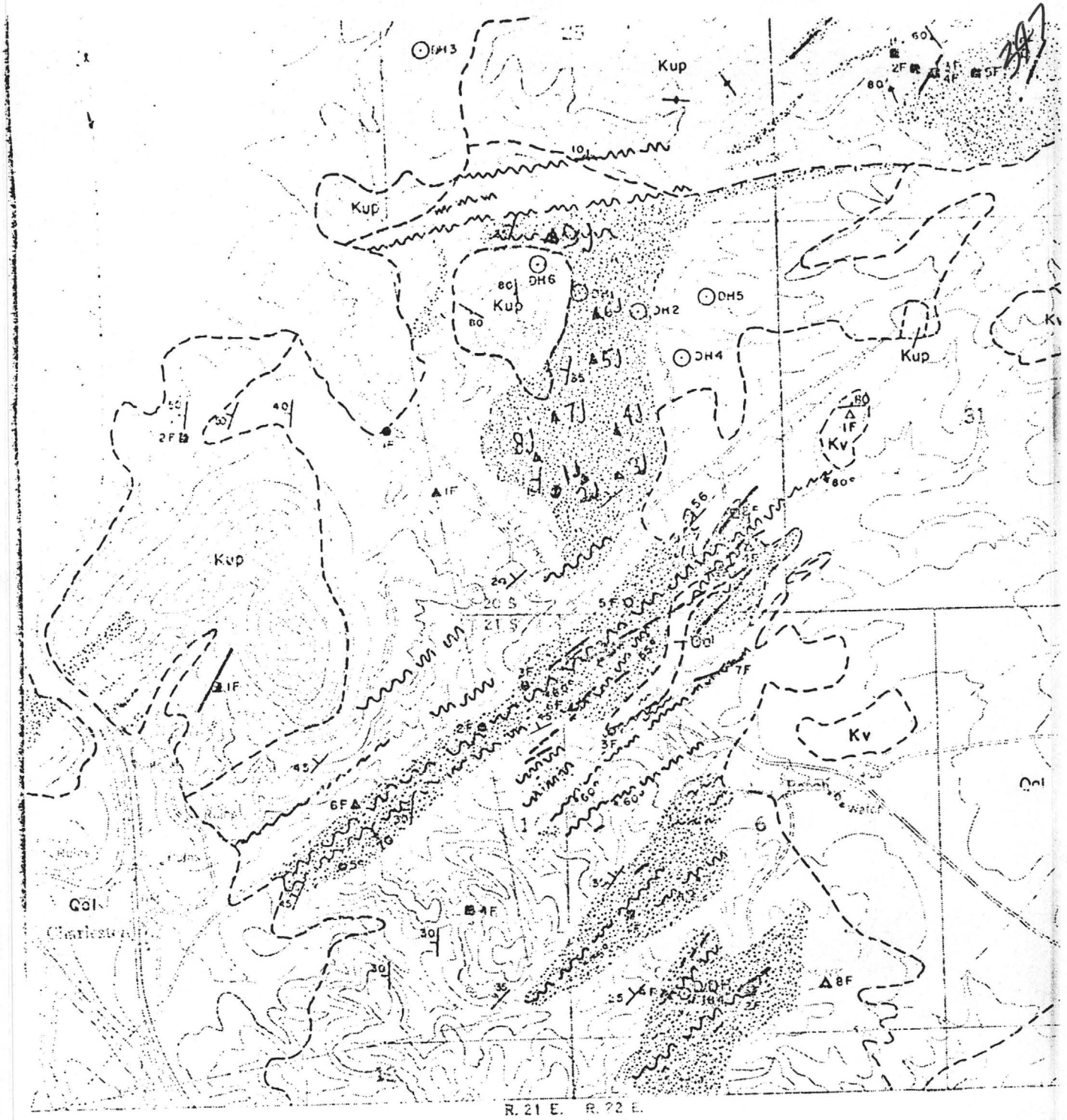
Kb — Bisbee group

Faults

Mineralized intercepts in D.H. and veins

GENERALIZED CROSS SECTION OF S40°E LINE, LOOKING NE
GALLAGHER PROSPECT
COCHISE COUNTY, ARIZONA

SCALE	H: 1" = 2000'	CONTOUR INTERVAL:	REVISIONS
	V: 1" = 2000'	DATE: NOV. 1970 BY: JDF	
SHEET OF		DRAWING NO: F M M	FILE:



Charleston Mine
Cochise County, Az
Howey Holdings Ltd

EXPLANATION

A - Geochemical Sample

Thomas W. Mitcham
Exploration Manager,
International Ranwick Limited.
First National Bank Bldg.
Denver, Colorado.

November 16, 1955
Re-Gallagher Property
Tombstone Mining District
Cochise County, Arizona

Mr. T. R. Boger, Jr.
Lease Operations Inc.
Lavernia, Texas.

Dear "Twiggs"

Under separate cover I am returning information and samples from subject property which you sent me. These items were apparently sent to you by Jules B. Gallagher, 806, Rosedale Terrace, Austin Texas.

It is rather a coincidence that I examined subject-property for a period of three days beginning September 30, 1952. I wrote a comprehensive report on the property on October 22, 1952, for the American Smelting And Refining Company. At that time the property was held under lease by a C. Neil Vogel. I recommended that the American Smelting And Refining Co. (Asarco) take action regarding the property. Subject property has been sporadically active the last 50 years. At various times, ore has been extracted from rich but, unfortunately narrow veins in andesite. Beautiful suites of minerals have been taken from these veins. Obviously, all operations on the property have been either very marginal or losses. However, there are interesting possibi-lities for Lead-zinc ores at depth; these possibilities should be test-ed after careful study to ascertain that such testing is properly locat-ed.

I would like to see our Company take an Option on the property on terms similar to the following: two year free testing period, during which owners may lease shallow ores to others if they wish; minimum periodic word requirements; 10% royalty on net mill or smelter return for ores extracted at depths less than 800 feet; 7½% royalty for ores extracted at depths from 800 to 1000 feet, and 5% royalty on ores extracted at depths exceeding 1000 feet. Minimum annual royalty payments not to exceed $10,000 beginning at the end of the third year. All royalties payable toward a final purchase price of $1,000,000.

There is no reason for me to re-examine the property. I would like to have information from Mr. Gallagher as to what mining and testing has been done since October 1952. I would suggest that you might feel Mr. Gallagher out on terms before we take further action regarding the property.

With kindest regards
Very truly yours,
(signed Thomas W. Litcham)

A summary of the gold-silver production and possibilities of the BRADSHAW ##### GALLAGHER claims, a part of the G.V.R.M. group as referred to by reports made by Gordan, Frenzel and Flagg .

Bradshaw - 2 claims.

" The history of this property credits it with a production of $ 65,000.00 from the first and high grade stope of ore produced with values up to 2000 oz. of silver per ton and a further production of $ 20,000.00 of lower grade ore. The old workings could not be entered beyond a depth of 65 feet but the pillars or unmined parts of the vein show values of from .01 oz gold, 1.0 oz silver to .02 oz. gold and 16.0 oz silver, 4% lead in samples cut across the vein for the width of the pay streak 15 inches to 4 feet. The silver mineral is to the depth of 65 feet Cerargyrite or Horn silver with silicious ga ngue"
24of Oct. 1925
Jonathan Gordon. Reg. Mining Eng. Seal.

A.B.Frenzell

" That there was a worthwhile production from some of these claims, notably the Bradshaw, is evidenced by the records of bullion produced in near-by custom mills and sold to the U.S.mint"
E.B.Frenzell. E.M. Mineraloligist State of Colo.
1928

Flagg

" While in the past the silver ores of the Bradshaw group commanded an attractive price at the collar of the shaft " Flagg Nov 20, 1928

" The deepest workings on the G.V.R.M. property is the Bradshaw shaft which is 240 feet deep according to notes contained in the survey for patent made in Feb. 1881" Flagg Nov.20,1928

"It should be noted that the Bradshaw unit alone does not show conspicuous quantities of vanadium minerals. It is well known that in early days the production of high grade silver ore was considerable" Flagg Nov. 28, 1928.

"On the Gallagher Bradshaw and Gallagher-Bradshaw 1, someexploration was attempted through the original workings about which very little is known. It seems fairly certain that there was a production of something over $ 200.000 out of the original shaft. These figures are supported by entries in a "Bullion day Book" taken from the safe in the Charleston office building in the early 1930" Flagg May 30, 1938

"About 50 feet of sinking was done in the shaft on a paralell vein on the Gallagher-Bradshaw -1- approximately 650 feet north of the main Bradshaw shaft. Thissinking was begun at 76 feet below the collar in an old shaft. From the old bottom a drift was run 15 feet S.W. and another 6 feet N.E. When sinking operations reached 123 feet below the collar of the shaft they broke into an old stope which was filled with gob. Some cleaning outwas done for a short distance each way. The back on both sides of the shaft shows good ore" Flagg May 30, 1938

Summary" summing up the situation at the Gallagher property, it appeals to me as having unlimited possibilities. My investigation began in 1928, were carried on through 1929, and intermittently there-after through 1931 "

Signed A.L.Flagg
June 26, 1948
Registered Professional Eng.

REPORTS, DATA, MAPS PERTAINING TO THE G.V.R.M. PROPERTIES LOCATED IN THE TOMBSTONE MINING DISTRICT, COCHISE COUNTY, ARIZONA.

ENCLOSURE

1 Report by Jonathan Gordon (1925)
2 Report by A.B.Frenzel (1928) with mill findings.
3 Report by A.L.Flagg (1928 - 1929- 1938-1947- 1948)
3A Geological Notes A.L.Flagg (1930)
4 Areal Geology and Assay map showing claims and partial development.
5 Suggested development map. Flagg.
5 A Rough sketch map of development Stella shaft and record of ore shipments by Vogel Mining Co.
5B Sketch of mine shaft San Antonio, head frame erected, shaft timbered.
(6 Map showing bull dozer cuts, roads, power lines etc (1959))
7 Original G.V.R.M. claim map, later amended and recorded.
8 Geologic map of Cochise County
9 Tope Map of Tombstone Mining District, showing claim area.
10 Claim map of Mud Hen group, Manila shaft, and report of War Horse

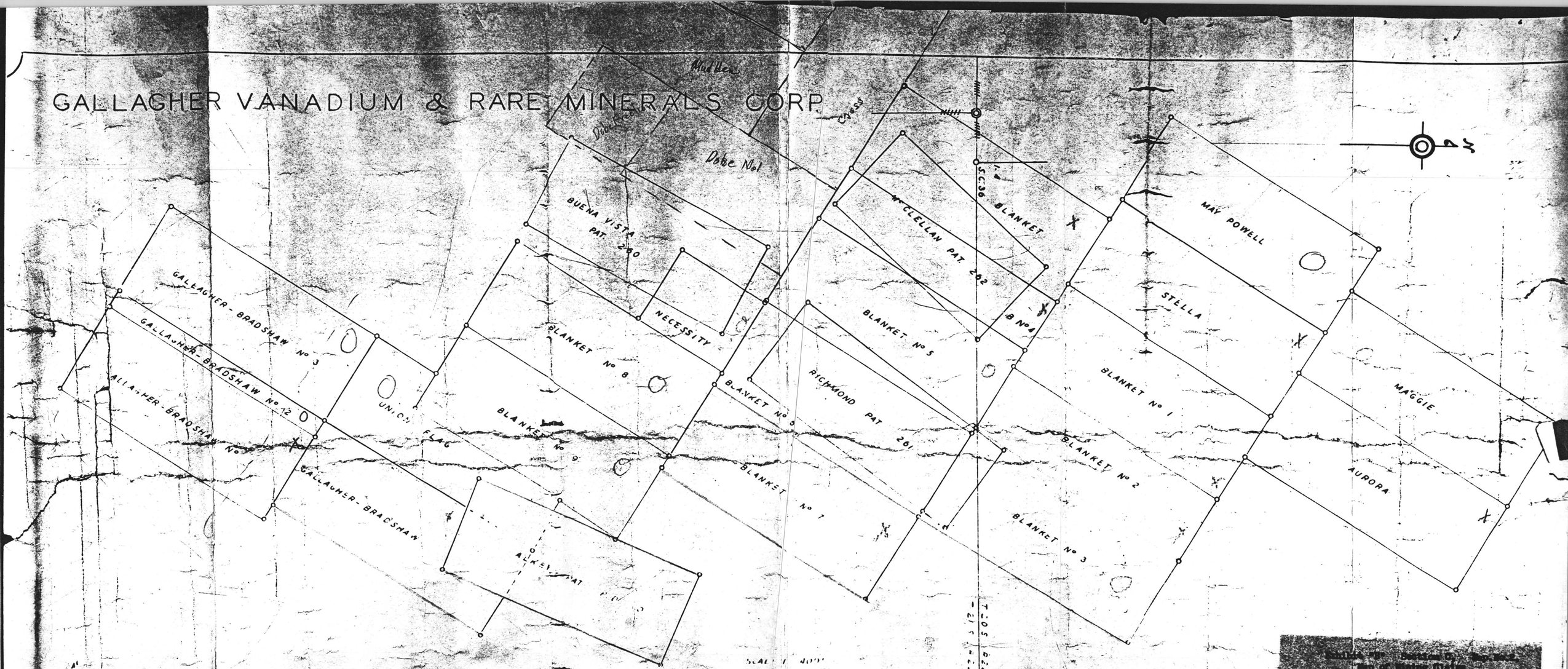
Return to

O Neil Vogel
1820 E Hampton St.
Tucson, Arizona.

6- All dozer cuts - mineralized

Mines Hand Book "Weed" XIII Page 542
Refers to this War Horse Copper

GALLAGHER VANADIUM & RARE MINERALS CORP



Charleston - Tombstone

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

PROFESSIONAL PAPER 281 PLATE 9

R. 22 E.

T. 19 S.

T. 20 S.

T. 21 S.

R. 21 E.

Fairbank

Brookline

Charleston

Lewis Springs

TOMBSTONE

San Pedro River

EXPLANATION

TERTIARY AND QUATERNARY

QT — Alluvium

TERTIARY

Tsc — Schieffelin granodiorite

Tap — Andesite porphyry

Tup, ib — Uncle Sam porphyry ib, intrusive breccia

CRETACEOUS OR TERTIARY

TKbv — Bronco volcanics

CRETACEOUS

Kb — Bisbee formation

PRE-PALEOZOIC AND PALEOZOIC

PAL — Paleozoic and pre-Paleozoic rocks undifferentiated

Contact
Dashed where approximately located

Fault
Dashed where approximately located

Concealed fault

50 — Strike and dip of beds

90 — Strike of vertical beds

⊕ Horizontal beds

30 — Strike and dip of foliation or flow banding

Strike of vertical foliation or flow banding

60 80 — Strike and dip of foliation and plunge of lineation

50 — Bearing and plunge of lineation

1 2 3 4 5 6 7 8 9 10 11 12

M R-1561

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C.

Geology by J. Gilluly and R. S. Cannon, Jr., 1938

GEOLOGIC MAP SHOWING STRUCTURAL RELATIONS OF THE UNCLE SAM PORPHYRY, COCHISE COUNTY, ARIZONA

1 0 2 Miles

5-14-58

DOME
4540' HILL MENTIONED IN GILLULY REPORT. ON PAGE 95

APPROXIMATE DISTANCES

45'

130'

130'

GRANITE
DIP UNKNOWN
PROBABLE HANGING WALL OF ALTERED ZONE.

VEIN - IRON OXIDE

OFFSET

ROAD

CHURN DRILL NO. 1
+65'

SUGGESTED BENCHING

CHURN DRILL NO. 2 - 350' DEEP
ORE 65' TO 340'

+20'
PIPE

ORIGINAL SURFACE

WASHING PLANT

O'-ELEV.

UNALTERED ANDESITE AND RHYOLITE

APPROX. 5000 TONS OF SERICITE AND SULPHIDE ORE REMOVED

45'

110' CLAY AND SULPHIDE

CLAY AND SULPHIDE 65'

CLAY

CAVED

NO. 3 SHAFT

ANDESITE WALL

50' CROSSCUT

104'

80' CROSSCUT AND 104' SHAFT ACCORDING TO GORDON

FUTURE SHAFT TO GLORY HOLE

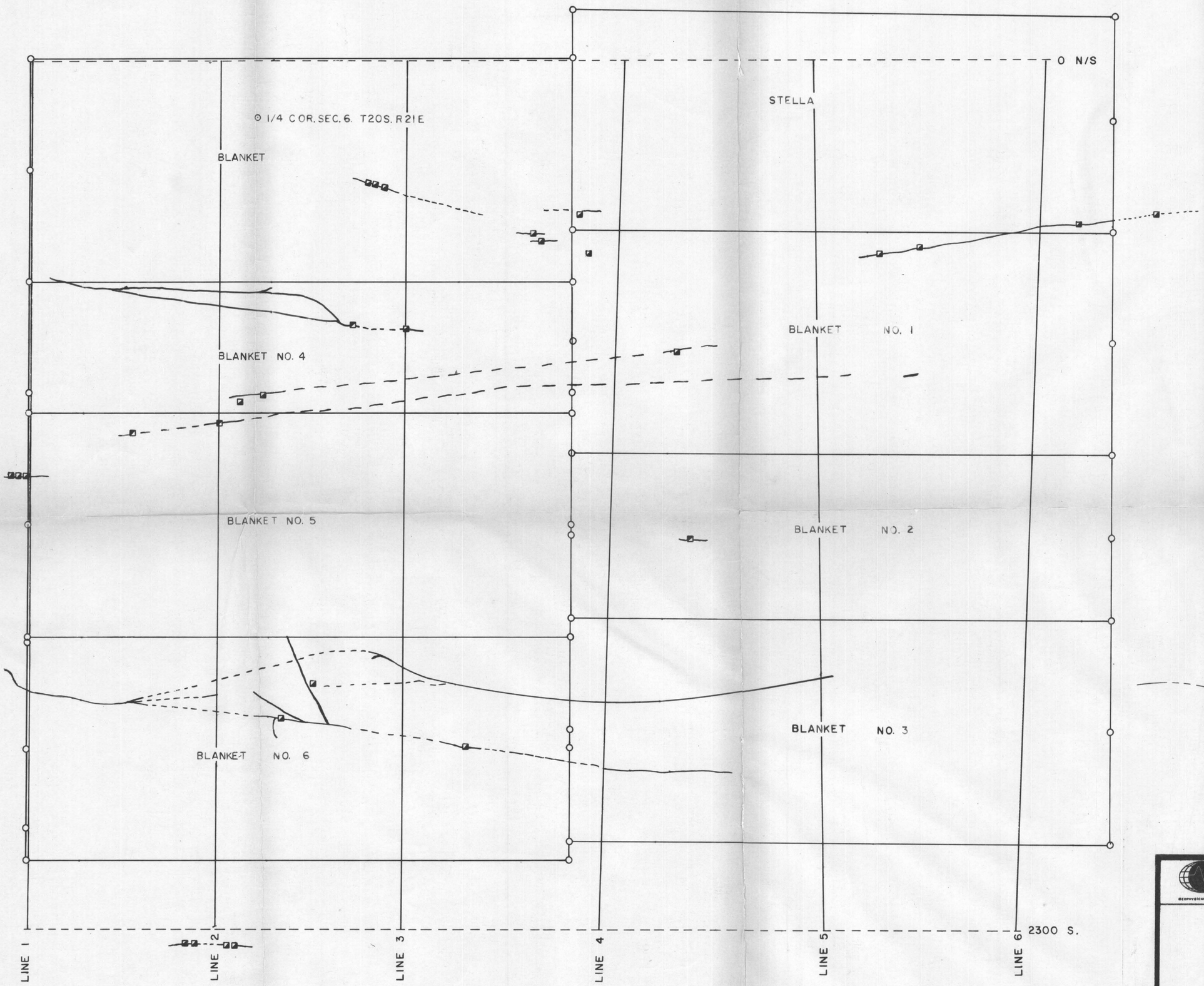
350'

CROSS-SECTION - LOOKING WEST

AN APPROXIMATE INTERPRETATION OF EXISTING EVIDENCE RELATING TO POSSIBLE MINERAL DEPOSITION AT THE CHARLESTON MINE - ALL MEASUREMENTS SHOWN ARE ESTIMATED BY VISUAL OBSERVATION AND CALCULATION - A STUDY BY A COMPETENT GEOLOGICAL ENGINEER IS RECOMMENDED.

APPROX. SCALE - 1" = 20'

CHARLESTON MINE - CHAS. H. SUITER - MAY 14, 1958



N

Veins dashed where inferred

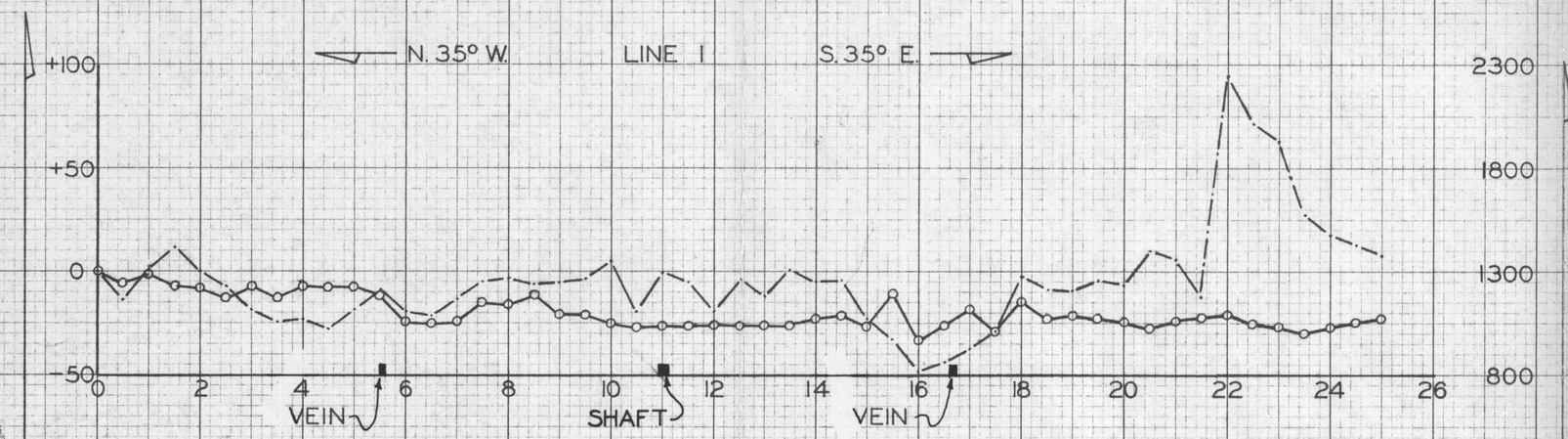
HEINRICHS GEOEXPLORATION CO.
GEOPHYSICAL ENGINEERS
POST OFFICE BOX 5671. TUCSON, ARIZONA. 85703

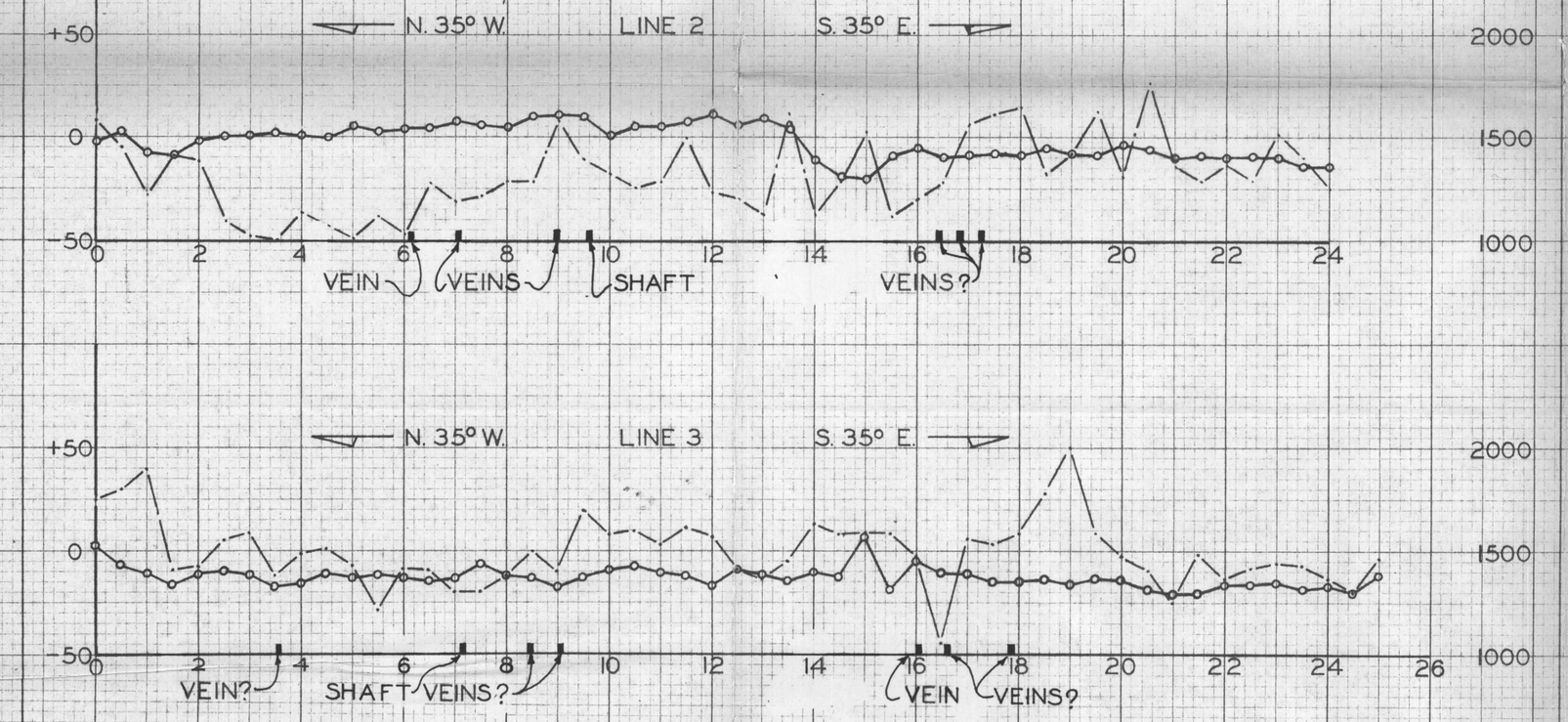
GEOPHYSICAL LOCATION PLAN
CHARLESTON AREA
COCHISE COUNTY, ARIZONA
FOR

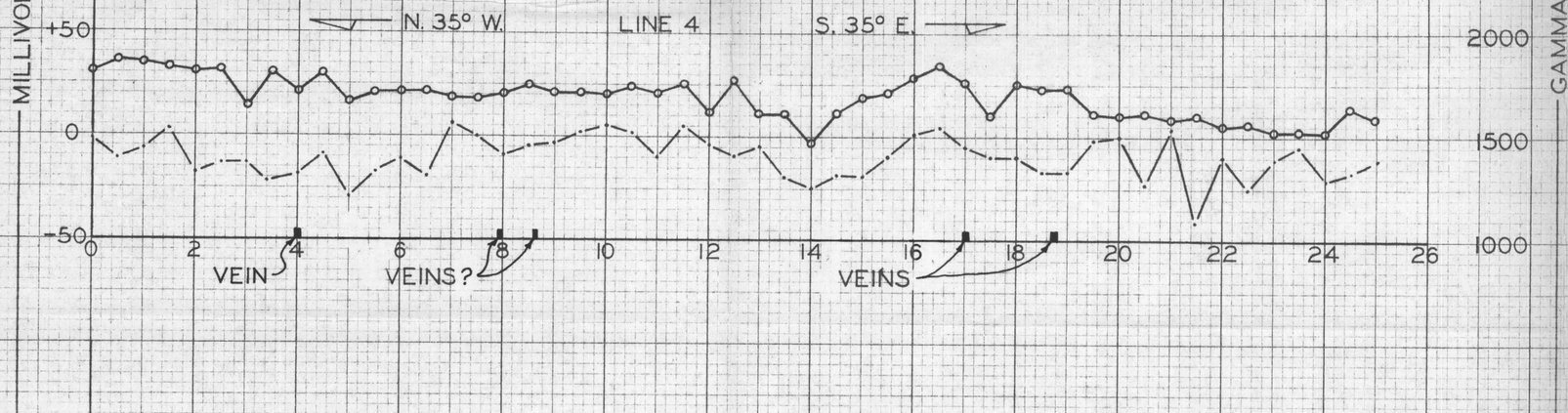
G. V. R. M.

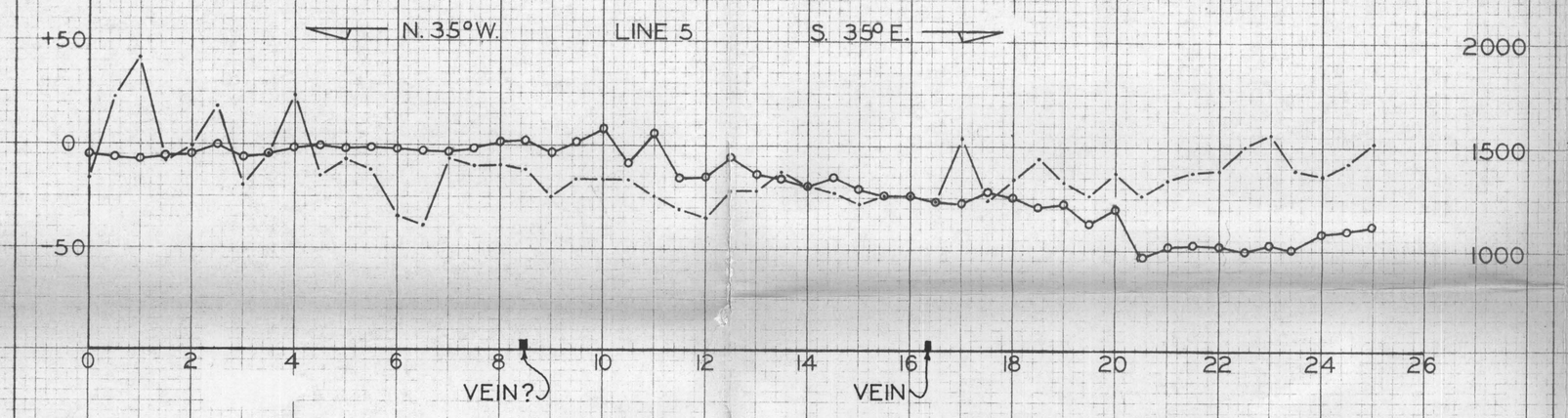
Scale 1" = 200'

Date SEPT. 1966









LEGEND

MAGNETICS IN GAMMAS

SELF POTENTIAL IN MILLIVOLTS

HEINRICHS GEOEXPLORATION COMPANY
P.O. Box 5671 Tucson, Arizona

MAGNETIC AND SELF POTENTIAL PROFILES
CHARLESTON AREA — COCHISE CO., ARIZ.

FOR

G.V.R.M.

SCALE: 1"=200' HORIZ.	CONTOUR INTERVAL:	REVISIONS
	DATA BY: F. H.	
DATE: SEPT. 1966	SHEET OF	
DRAWN BY: J.C.D.	DRAWING NO.:	FILE:

MAY POWELL

MAGGIE

STELLA

Main Power line

3 phase power

AURORA

BLANKET

1200' Pat. Claim

1/4 Cor Sec 6, T 20 S, R 21 E

START Line #1

WATER HOLE

SAN ANTONIO SHAFT

STELLA SHAFT

BLANKET No. 1

BLANKET No. 4

BLANKET No. 5

BLANKET No. 2

BLANKET No. 3

BLANKET No. 6

BLANKET No. 7

BLANKET No. 8

NECESSITY

1500' Pat. Claim

1500' Pat. Claim

No. 1 SHAFT

No. 4 SHAFT S-138 TO 149

True North

Magnetic North

LEGEND

- ANDESITE
- RHYOLITE
- BIRDSEYE PORPHYRY
- VEINS

NUMBERS FOLLOWING LETTER S INDICATE LOCATIONS OF SAMPLES AND IN TURN ARE FOLLOWED BY WIDTH SAMPLED IN INCHES AND THE PERCENT OF VANADIUM PENTOXIDE CONTAINED. "D" INDICATES DUMP SAMPLES.

NUMBERS FOLLOWING LETTERS A AND B ARE REFERENCE POINTS ONLY.

PROJECTIONS OF UNEXPOSED PORTIONS OF VEINS, AND BREAKS ARE INDICATED BY BROKEN LINES WHEREVER THERE IS SUFFICIENT EVIDENCE TO JUSTIFY SUCH PROJECTIONS.

GALLAGHER VANADIUM & RARE MINERALS CORPORATION

AREAL GEOLOGY AND ASSAY MAP

SHEET (1)

SCALE 1 INCH TO 100 FEET