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TOMBSTONE MINING DISTRICT

Cochise County, Arizona

Charleston Mine
Geologic Reports
(In area of Mutual Interest)
Misc. Reports
Mill Tests &
Production Summaries

CHARLESTON MINE
RESOLUTION REPORT

CHARLESTON MINES:

Attached is a record of shipments and sales of bulk semi-concentrates of zinc, lead and copper sulphides. This ore was mined and milled at the Charleston mine over a period years in the course of annual assessment work and development work which consisted of sinking four shafts all under 80 ft depth and the driving of 600 feet of drifts that followed the footwall side of the course of the vein which varies in width from ten to 100 feet wide, and is exposed on the surface over 3000 feet long, through the center of the twelve Mary Jo claims.

This vein named the Sericite Vein is one of several veins contained in a highly altered zone that appears to be 800 to 1000 feet wide between walls of Quartz-Monzonit Granite known in the area as Uncle Sam Porphyry - the Sericite Vein being the most prominent was selected for development work. (It is known as the Gilluly Fault)

This vein gangue is a white clay which the Arizona Bureau of Mines indentified as "Sericite, a finely divided variety of Muscovite Mica" which they said should find some use in industry.

This clay gangue was produced by hydro-thermal action - it contains crystals of the sulphides Sphalerite, Galena, Pyrite and some nuggets of native copper having an assay value of 10 to 15 per cent. (See record of shipments assays)

For the reason that the smallest of sericite causes an uncontollable frothing in a flotation circuit, the crude sericite ore must be washed before the sulphides can be floated. This was a problem but after many tests and experiments my old partner H.L.Zebold who was a mill man and had solved many like problems, designed and we built in 1947, an ore bin and a washing plant that worked like a charm, it was this plant that produced the 1271 tons of sulphides shown on the shipping record attached, totally clay free. Un-fortunately the Stewart Company destroyed this plant maliciously in 1961. It can be rebuilt from my plans and my experience with a larger capacity for about $250,000.oo, which can include components to produce a clean marketable sericite product. (Whipple and Coppock have no exclusive ideas in this respect)

The drying process of the finished sericite product is the greatest problem. My efforts and my concern were to try to prove the extent of the ore vein - my production and sales of ore were purely incidential to my development work - the ground was hard to hold so I had to keep my drifts narrow but several augur holes proved the ore thirty feet and more wider than my drifts, in some cases. I was handicapped by ~~a~~ low metal prices and a lack of water for washing the ore and a lack of money, and for the last 17 years the mine has suffered from lack of competence and good faith on the part of the James Stewart Company.

1/15/1974

Chas. F. Sutter President

Charleston Mines

JAN
Phoenix, Arizona

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RECORD OF METAL SEMI-CONCENTRATES
MINED, WASHED AND SHIPPED BY THE
CHARLESTON MINES, TOMBSTONE, ARIZ.

AUG 30 1973

NOTE: The place of underground origin of each lot shipped is indicated on the attached map of the underground workings, by numbered circles corresponding to the lot number. This information should convey a general idea of the over-all quality of the ore as these shipments were mined from a number of widely separated places in the mine.

LOT NO.	DATE	DRY TONS	Ag. oz.	Cu. %	Pb. %	Zn. %	MILL PAYMENTS
1	10/47	125.50	1.30	0.70	7.40	12.7	$ 1855.70
2	5/48	44.32	1.32	0.80	10.60	14.4	1448.97
3	6/48	82.16	1.20	0.85	10.20	12.0	2283.18
4	7/48	51.57	1.00	0.75	9.40	10.2	1438.91
5	8/48	47.15	1.20	0.70	9.40	9.0	1328.24
6	9/48	38.97	1.05	0.60	8.90	11.2	1059.33
7	10/48	44.64	1.20	0.37	6.85	12.20	1108.00
8	10/48	49.65	1.80	0.60	9.70	15.60	1865.74
9	11/48	33.51	1.60	0.62	9.90	14.60	1431.90
10	12/48	42.95	1.20	0.60	7.30	9.00	1085.61
11	12/48	37.62	1.30	0.75	9.10	14.8	1472.74
12	2/49	33.06	1.20	0.61	7.15	10.0	927.18
13	3/49	39.74	0.80	0.40	5.65	8.55	742.61
14	4/49	34.86	0.80	0.32	5.50	9.45	409.24
15	5/49	41.47	1.40	0.55	7.75	12.90	873.15
16	6/49	55.81	3.40	1.25	15.50	22.30	2125.14
17	8/49	38.01	1.70	0.75	7.30	11.50	546.93
18	9/49	40.13	1.70	1.05	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	26.90	1.32	0.97	10.36	11.5	913.89
22	10/50	32.17	1.80	1.25	13.80	21.0	1854.19
23	12/50	27.12	0.90	0.45	5.40	9.8	844.10
24	6/51	122.04	1.56	0.20	7.80	11.8	3825.87
25	5/52	28.48	1.68	0.60	10.80	16.2	1377.42
26	6/52	25.40	1.25	0.92	10.00	15.8	762.00
27	6/52	100.00 crude	0.65	0.46	4.60	3.20	950.00
		1371.08 tons					$ 41243.27

Lot No. 27 was 100 tons of newly mined crude sericite ore that was sold to the Tombstone Flotation Mill at $10.00 per ton mine site less 5% for moisture, for the purpose of testing whether or not the unwashed crude ore could be milled by flotation - the test was not satisfactory for the reason that the talcose content caused uncontrollable frothing in the flotation circuit. The Sericite crude ore must be washed before the sulphides can be milled by flotation.

The other 26 lots totaling 1271 dry tons were washed bulk semi-concentrates resulting from approximately 4000 tons of crude sericite ore that was run through the washing plant and the sericite thus removed. These 26 shipments of washed semi-concentrates gave a NET mill return of $40,293.27, an average of $31.70 per ton, after deducts for freight, milling and smelting charges, which charges amounted to about 50% of the gross - the above figures represent about half the assay value of the ore shipped.

Lots 18 and 20 came from a winze sunk in the floor of the 72 foot level at a point about 30 feet east of the bottom of No. 5 Brother George shaft. It appears that the ore and the sericite improve in quantity and quality with depth.

The above shipments was ore that was produced from development work of a period of several years. A few other shipments made by Lessees were made in more recent years of which there is no record. It has been determined in recent years that the Sericite product of the Washing plant has a value of approximately $60--$70.00 per ton. It has been estimated that at least 500,000 tons of recoverable sericite ore exists in the vein.

Charleston Mines

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Lot #3

Shattuck Denn Mining Corporation

DENN BRANCH—BISBEE, ARIZONA

ORE SETTLEMENT

SHIPPER Charleston Lead Mines

SETTLEMENT DATE 7-15-48

NAME OF MINE:

MILL LOT NO. 54

Car Number	Date Received	Shippers Lot Number	Pounds of Ore Wet	% Moist	Dry	Net Dry Tons
S. P. 11227	6-24-48	2	92140	4.6	879.02 (87.40 ✓)	
S. P. 11251	6-24-48	3	79760	4.2	76410	
TOTALS			171900		164312	82.156

PAYMENTS: 5 15

Gross Assay			Gross Units of Metals		Per Cent Paid For	Units of Metal Paid For		Metal Prices	Amounts
Gold	.003	Ozs.	.246	Ozs.	—	—	Ozs.	$ —	$ —
Silver	1.20	Ozs.	98.59	Ozs.	74.78	73.73	Ozs.	.888	65.47
Copper	.85	%	1397	Lbs.	70.44	984	Lbs.	.1504	147.96
Lead	10.20	%	16760	Lbs.	70.06	11742	Lbs.	.1565	1837.62
Zinc	12.00	%	19717	Lbs.	67.70	13348	Lbs.	.1158	1545.70

TOTAL PAYMENTS		3596.75
DEDUCTIONS: Concentrates Freight	203.90	
Transportation Tax	11.10	
Concentrates Treatment	611.22	
Milling	410.78	
NET MILL VALUE		1237.00
Processing Fee (% of Net Mill Value)		2359.75
SETTLEMENT VALUE		
Ore Freight 85.950 Wet Tons @ $ .89		76.57
Ore Transportation Tax		
Umpire Penalty		
BALANCE DUE SHIPPER		2283.18

#3 charge on May 30 V50714

East + west diff - 80 lbs

@ 5.00 per ton -

Loading + hauling @ 1.50 per ton

Made By

Approved By

17541

#V15446

FORM H-32 EM 7-49 HB 188608

Lot 20

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FINAL SETTLEMENT
AMERICAN SMELTING AND REFINING COMPANY

ORE SETTLEMENT

Date October 16, 1950
Mill Lot No. EMC-2
Mine Lot No.
From Mine Brother George Claim (Charleston Lead Mines Company)

Bought of N. J. Eiden & A. E. McCrea Lessees
Address Box 634, Tombstone, Arizona
Shipping Point Tombstone, Arizona

Schedule Tr-15

WEIGHT

NET WET LBS.	Moisture %	NET DRY LBS.	NET DRY TONS
145770	3.2	141105	70.5525

METAL PRICES—of Settlement Date October 3, 1950

METAL	QUOTATION		DEDUCTION	NET QUOTATION	Percent Paid	NET PRICE PAID
Gold		$/oz.				
Silver	90.000	¢/oz.	1.500	88.500	100	$ .88500
Lead	16.000	¢/lb.	2.800	13.200	100	.13200
Copper	24.075	¢/lb.	8.920	15.155	100	.15155
Zinc	17.500	¢/lb.	7.375	10.125	100	.10125
		¢/lb.				

ASSAYS

	AU—oz.	AG—oz.	PB—%	CU—%	ZN—%
A. S. & R.	-	2.28	17.70	1.42	27.35
Non-Sulfide			0.60		
Bowley	.003				
FINAL SETTLEMENT					
Settlement	.003	2.28	17.10	1.42	27.35

CONTENTS

AU—oz.	AG—oz.	PB—lbs.	CU—lbs.	ZN—lbs.
0.212	160.86	24129	2004	38592

PAYMENTS FOR METALS

LIQUIDATION

METAL	ASSAY		DEDUCTED	NET ASSAY	EQUIVALENT IN LBS. OR OZS.	PERCENT PAID FOR	NET PAID FOR		RATE	PER DRY TON	TOTAL AMOUNT
Gold		Oz.			No Pay			Oz.	$	$	$
Silver	2.28	Oz.	0.50	1.78	1.78	80	1.424	Oz.	.88500	1.26	88.90
Lead	17.10	%	1.00	16.10	322.00	80	257.600	lbs.	.13200	34.00	2398.78
Copper	1.42	%	0.40	1.02	20.40	75	15.300	lbs.	.15155	2.32	163.63
Zinc	27.35	%	1.00	26.35	527.00	79.5	418.965	lbs.	.10125	42.42	2992.84
45.87	TOTAL PAYMENTS FOR METALS									80.00	5644.20

DEDUCTIONS

		AMOUNT	
Treatment	70.5525 Dry Tons @ $ 4.50 Per Dry Ton	$ 317.49	5326.52
Royalty:	Pay Charleston Lead Mines Company, Box 347, Tombstone, Arizona: 25% of $5326.71	1331.68	
Hauling:	Pay Joseph T. Castles III, Box 517, Tombstone, Arizona: 72.8850 wet tons @ $5.30 — 386.29; 3% Federal Transportation Tax — 11.59	397.88	
Other:	Pay American Smelting and Refining Company: Cash Advanced 10/6/50 — advanced →	3300.00	
	TOTAL DEDUCTIONS	5347.05	5347.05
BALANCE DUE SHIPPER	FINAL SETTLEMENT		297.15

5644.20
317.49
5326.71
1331.68

#5

Orig: & 2cc: EM cc: Vo, WCW, CPEM Tr-2.4, Tr-9.1.2 Correct /S/ K. V. D. Steinen Approved /S/ L. H. Chapman

Lot 27

AMERICAN SMELTING AND REFINING COMPANY

ORE SETTLEMENT

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Date June 22, 1951
Mill Lot No. S-1
Mine Lot No. 5
From Mine BROTHER GEORGE CLAIM
Schedule No. (Charleston Lead Mines C

Bought of Charleston Lead Mines Company
Address c/o Chas. H. Suiter, Box 347, Tombstone, Arizona
Shipping Point Tombstone, Arizona

Tr-20

WEIGHT

NET WET LBS.	Moisture %	NET DRY LBS.	NET DRY TONS
253980	3.9	244075	122.0375

METAL PRICES—of Settlement Date June 16, 1951

METAL	QUOTATION		DEDUCTION	NET QUOTATION	Percent Paid	NET PRICE PAID
Gold		$/oz.				
Silver	90.000	¢/oz.	1.500	88.500	100	$ .88500
Lead	17.000	¢/lb.	2.800	14.200	100	.14200
Copper	24.075	¢/lb.	6.900	17.175	100	.17175
Zinc	17.500	¢/lb.	6.595	10.905	100	.10905
		¢/lb.				

ASSAYS

BY	AU—oz.	AG—oz.	PB—%	CU—%	ZN—%
S.& R.	-	1.56	7.80	0.44	11.80
Settlement	-	1.56	7.80	0.44	11.80

CONTENTS

AU—oz.	AG—oz.	PB—lbs.	CU—lbs.	ZN—lbs.
-	190.38	19038	1074	28801

FINAL SETTLEMENT

PAYMENTS FOR METALS

LIQUIDATION

METAL	ASSAY		DEDUCTED	NET ASSAY	EQUIVALENT IN LBS. OR OZS.	PERCENT PAID FOR	NET PAID FOR		RATE	PER DRY TON	TOTAL AMOUNT
Gold	-	Oz.						Oz.	$	$	$
Silver	1.56	Oz.	0.20	1.36	1.36	75	1.02	Oz.	.88500	.90	109.83
Lead	7.80	%	0.30	7.50	150.	75	112.5	lbs.	.14200	15.98	1950.16
Copper	0.44	%	0.20	0.24	4.8	60	2.88	lbs.	.17175	.49	59.80
Zinc	11.80	%	0.50	11.30	226.	75	169.5	lbs.	.10905	18.48	2255.25
21.40	TOTAL PAYMENTS FOR METALS									35.85	4375.04

DEDUCTIONS

			AMOUNT
Treatment	122.0375 Dry Tons @ $ 4.50 Per Dry Ton		$ 549.17
TOTAL DEDUCTIONS			549.17
BALANCE DUE SHIPPER	FINAL SETTLEMENT		3825.87

$ 35.85
4.50
31.35
6.00 per ton trucking
25.35 - 70 miles to Mill
per ton net - before mining cost -
$ 25.35 net

Wash drift from #5 shaft
72' level

Orig: & 2cc: CPb.MCo. cc: Vo, WCW, Tr-2.4, Tr-9.1.2 Correct [signature] Approved [signature]

CHARLESTON MINE
MILLTEST PB/ZN

BUREAU OF MINES
CHARLESTON REFER

200

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

by

Maynard F. Ayler[1/]

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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.

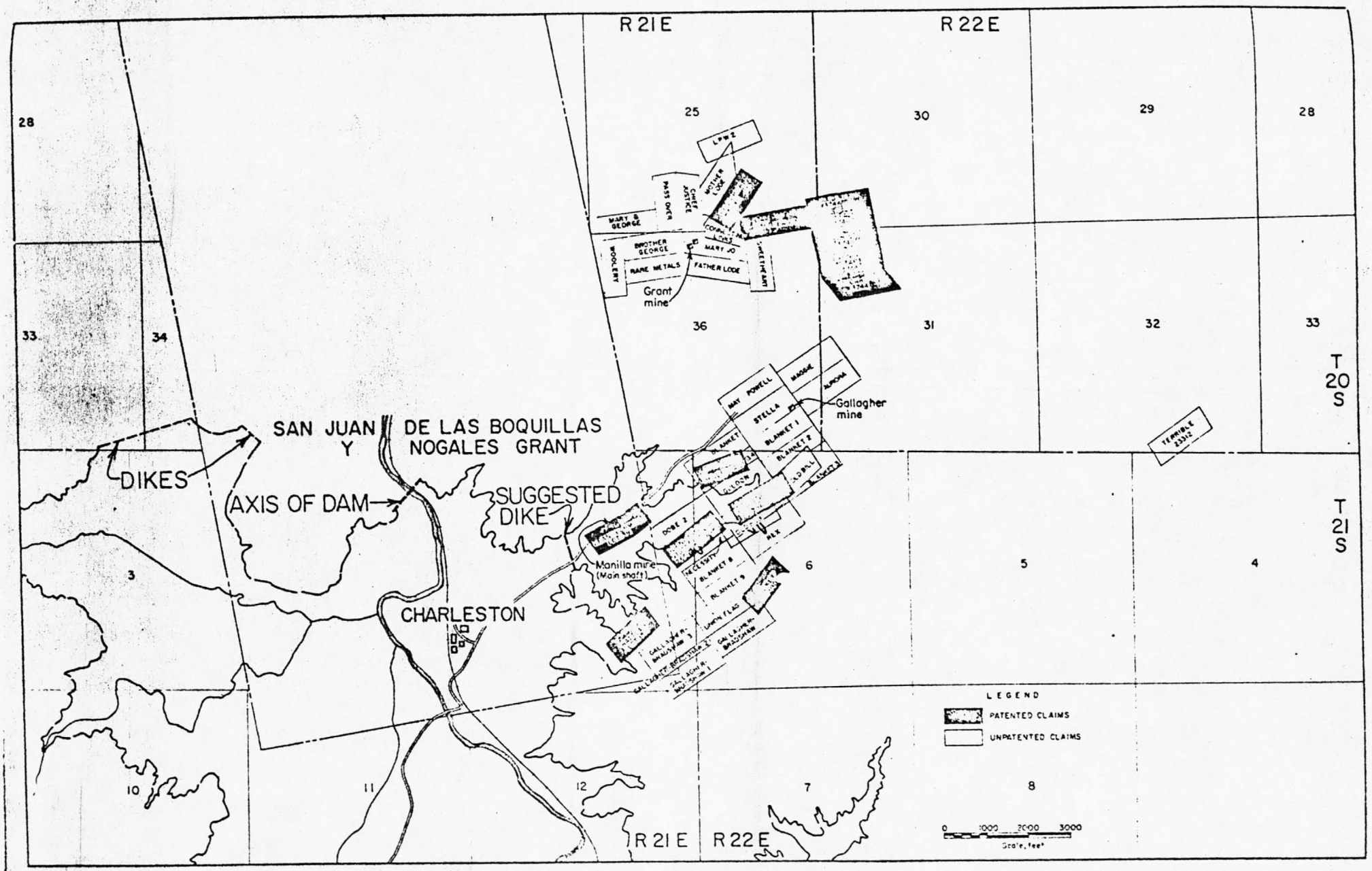


FIGURE 6. - Mining claims of Charleston district as related to reservoir limits and suggested dike.

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 Bureau of 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 Bateman 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.

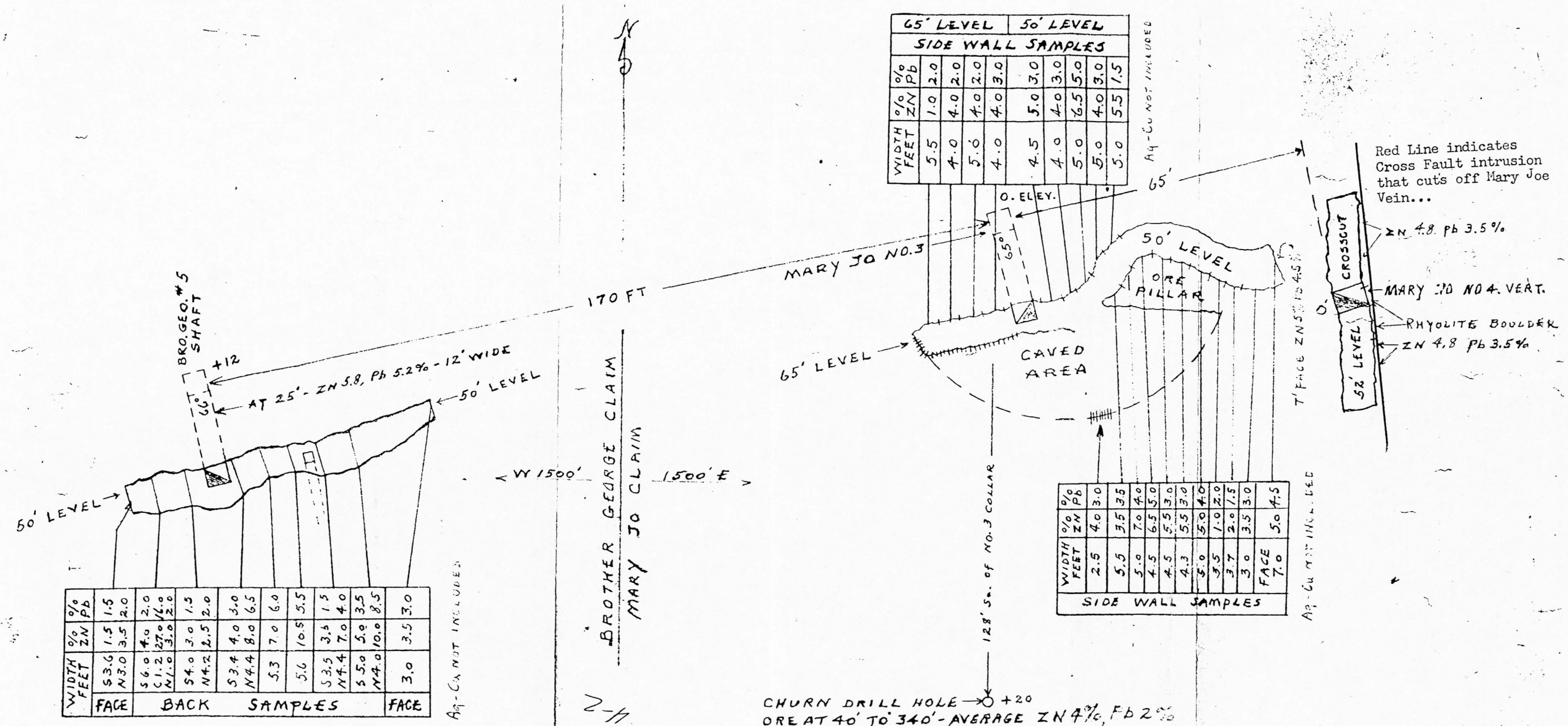
RECOMMENDATIONS

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.



Scale 1" = 20'-0"

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

C.H.S.

VI B2 P4224

UNIVERSITY OF ARIZONA
ARIZONA BUREAU OF MINES
ORE TESTING SERVICE

copies to file 275 mining Charleston

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.

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.

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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:kmh

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.

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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 ~~0.83~~						
Head Cleaner	2												
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

Metallurgical Products

Table 2

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.

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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.

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

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

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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	
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	

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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

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SUMMARY

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

7.364 dry ton lead concentrate	@ $ 74.39	103.29	$ 547.81	760.55
17.944 dry ton zinc concentrate	@ 52.98		950.67	950.67
Smelter Value per 100 ton crude			$1498.48	~~09.88~~ 1711.22
Less Milling Charge 100 ton @ $6.00			600.00	600
Net Value to Mine			$ 898.48	1111.22
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.

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

THE CHARLESTON [redacted] 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.~~

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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:

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

Interoffice to Mr Horne 9-29-1967

Charleston Mine - Sericite
Potential & Proposed Operation

Ore Reserves Indicated:

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

~~Net Materials Contained was Reported as:~~

~~Sericite 32610 Tons~~
~~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. During this operation more Drilling + exploration work can be accomplished to completely determine the limits of sericite ore, (This report

is not designed to cover any operations or forcast for the possible Copper-Silver ore body 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 easily 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 ~~[illegible]~~ ~~[illegible]~~ 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 shutdown 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 @ 1.00 48,000

Reserve for Contingency
48000 Tons @ 1.00 48,000

Overhead - Legal - Accounting 75,000

Marketing 75,000

Royalties. - (17,000 @ 3.00) 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 -

17000 Tons @ 100.00 — 1,700,000 →

Metals

Lead Concentrate - 55%
(Smelter Pay @ 963# x .145
Less .02 or .125) = 120.37
Credit - Pb over 36% = 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
= 86,400 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

CHARLESTON MINE
Tombstone, Arizona

1. General Information

2. Sales and Merchandising Program

3. Proposed Operating Budget

4. Expenditures to Date
   March 24, 1958

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.

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

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

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 rudeproduct contains approximately 2% impurities and I0% 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 = I7,000 Tons Gross Ore;

I. Whipple Contract 5,000 tons @ $25.00	$ I25,000	
2. Stucco Product 600 tons @ $ 35.00	2I,000	
3. Paint Products 2,500 tons @ $70.00	I75,000	
4. Electronics 80 tons @ $200.00	I6,000	
	337,000	
Royalty- 8,I80 @ 3.00	24,540	
	$ 3I2,460	$ 3I2,460

Sulphides- Lead and Zinc

I7,000 tons gross ore @ 4% = I,360,000#
(4% combined lead zinc is a conservative value)

I,360,000# @ $.06 per pound ---	$ 8I,600	
Royalty I0% ---	8,I60	
	73,440	
Not included in (I) and (2)		
(Milling Costs) ---	I8,000	
(Freight) ---	I2,000	
	$ 43,440	43,440
Total		$ 355,900

Summary

Income		$ 355,900
Item I. Labor ----	70,6I5	
2. Materials and Supplies ----	4I,080	
3. Development and Planning---	I5,000	
4. Depreciation II0,000 @ 6%, 5 years--	25,254	I5I,949
		203,95I
Overhead Expense and Marketing ----		$ 30,000
Net Before Taxes		$ I73,95I

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

GALLAGHER-BRAHMAN
REPORTS

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

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IN MAP POCKET: (2 Pieces)

Geophysical Location Plan
Magnetic and Self Potential Profiles
(Lines 1-6)

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

(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.

T 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

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 reach. 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.)

HISTORY

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.

LOCATION

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

MINING PROPERTY

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 oovering 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 Pent V_2O_5 Tech - 1.40
1.30 /lb

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	%MoO3
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% MoO3	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		GOLD		SILVER		LEAD		VANADIUM	
	Grams	%	oz Ton		oz Ton	% Metal	% Ton	% Metal	% Ton	% Metal
Heads, assay	1000				1.8		11.3		2.65	
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%

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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, wheh 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 dealing with 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 ~~potential~~ 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 muc h 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.125, 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 (Signe d) A. L. FLAGG
August 30, 1930

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 bod 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.

Mrs Louis Reuter
1 West 30th Street
New York City, N.Y.

August 6, 1947

Dear Mrs Reuter :

Yesterday, August 5th, 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 170'

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 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% V205, 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 V205; (b) 5.25% V205; and (c) 4.10% V205. 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 V205 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% V205.

(5) Composite of 8 openings on Blanket, north of telephone line. Only one assay was made on this: 1.20% V205.

(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 [illegible]ove material was shipped from the blanket & Stella Claims from Sh[illegible] and whose samples 112 and 114 [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	@ 12 ft
	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 6012	0.11	Vanadium Pentox. 0.48	22.13	4.889 = 2.741	
(15)	August 11, 1952, Jonathan Gordon- 6016	Tr	Vanadium Pentox. 0.60	12.01	5.052 = 2.832	1.09

16- Sept 17, 1952 - J Gordon. bors
Surface No 7 - side of Ditch 0.03 2.10 2.33%

(17) Oct 4- 1952 J Gordon bin
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%	

[illegible]

[illegible] was sent to Colorado Assaying Co., [illegible] Stella [illegible] Smelter [illegible] For [illegible] was submitted.

* 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.

[illegible]	[illegible]
[illegible]	[illegible]
[illegible] with part of lead)	[illegible]
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

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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	V205	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

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12-50 Cairns

AMERICAN SMELTING AND REFINING COMPANY

EL PASO SMELTING WORKS

BOUGHT OF C. N. Vogel
ADDRESS Tombstone, Arizona
SHIPPING POINT Tombstone, Arizona
NAME OF MINE

EL PASO, TEXAS 11/14/51 19
SMELTER LOT 3284
SHIPPERS LOT -/-
CLASSIFICATION Ore

RATES, EXCEPT ON CONTRACTS, SUBJECT TO CHANGE WITHOUT NOTICE

Arrival Date	Car Number	RR	Gross Weight	Containers No.	Containers Weight	Wet Weight	% H_2O	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

Assays	Oz. per Ton Gold	Oz. per Ton Silver	Wet Lead %	Copper %	Insol %	SiO_2 %	Iron %	Mn %	Lime %	Zinc %	S %	Al_2O_3 %	As %	Sb %	Bi %	%
Smelter	0.035	3.2	28.8	0.20						0					0	
Copper	0.4	3.3	30.1	.33												
Fire			29.4													
Pallics																
Tale	.0375	3.25	29.4													

Values Per Ton

	Pay Content	Price	Amount	Freight (Fixed)
.03 2% Payment 20.3			1.21	
	.0375	$2.3185	1.21	1.21
Per, Less % Min. oz.	2.25	.885	1.99	1.99
Lead, Less 30# @ 90 %	502.2	.17	85.37	25.11
Copper, Less @ %				
Gross Value			88.57	28.31
Less Deductions (Net Charge)			5.88	5.88
Net Value			x x x	22.43
Net Value			82.69	@41.4055

Deductions	Charge	Credit
Base, Incl. Labor Adj.	5.50	
Excess Value Over $		
10 ¢ per unit Pb + − 30 %	.21	
Lead—Copper Price Escalator		
Bullion Freight Tax @ .00034	.17	
Insol—Silica		
Iron—Lime		
Zinc		
As: Sb: Bi:		
Net Charge	5.88	—
−21.47 Wet Ton		
Dry Tons		

Debits	Credits
	3431.26
211.61	
11.19	
83.93	
13.00	
1.66	
312.68	
2314.13	
3431.26	3431.26

Wet Tons @ 4.47+65 P.T. 205.45 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 $

Amount Withheld Pending Receipt of Silver Affidavit (10% - .17) H 4397

Royalty 10%

Balance Due Shipper

Checked Correct Approved

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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 12-14-1951
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
11-3	151645	SP				95740	4.8	91144

Quotations		
Coinage Silver	90.0	¢ per oz.
Foreign "	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 %	%
.035	2.8	29.1	0.30						0					0	
[illegible]	3.1	29.1	.44												
.06	2.95	29.1													

Values Per Ton	Pay Content	Price	Amount	Freight (Fixed)
	.06	32.3185	1.94	1.94
% Min. 1 oz.	1.95	.885	1.73	1.73
30# @ 90 %	496.8	.17	84.46	24.84
@ %				
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
Less Freight: 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 Smelting @ 1.50 P.W.T. 71.81 + 2.15 Tax	73.96	
Less Representation $ 9.00 Umpire $ Sampling $	9.00	
Amount Withheld Pending Receipt of Silver Affidavit (10% − .18) H 4435	1.82	
Less Royalty 10%	341.73	
Balance Due Shipper	3075.61	
	3746.93	3746

Correct

Approved

328

50 Cairns

AMERICAN SMELTING AND REFINING COMPANY

EL PASO SMELTING WORKS

UGHT OF C. N. Vogel
DRESS Tombstone, Arizona
IPPING POINT " "
AME OF MINE

EL PASO, TEXAS 1-17 19 52
SMELTER LOT 54
SHIPPERS LOT
CLASSIFICATION Pb Ox

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
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 %	%
Melt	0.05	2.0	24.8	0.30						-0					0	
Shipper	.06	2.3	24.7	.18												
Metallics	.055	2.15	24.75													

Values Per Ton	Payment Pay Content	Payment Price	Amount	Freight (Fixed)
	.055	32.3185	1.78	1.78
Ger. Legs % Min. 10z.	1.15	.885	1.02	1.02
Y. Legs 30# @ 90 %	418.5	.17	71.15	20.93
Per. Less @ %				
Less			73.95	23.73
S Deductions (Net Charge)			6.32	6.32
Igh Value			x x x	17.41
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
Smelting 4.26 + .13 = 4.39 Less Reset 6.60 + .20 = 6.80
Ha @ 1.50 p.w.t. 55.49 + 1.66 Tax
Representation $ 9.00 Umpire $ Sampling $
Unt Withheld Pending Receipt of Silver Affidavit (10% - .10) H4524
Ro lty 10%

Balance Due Shipper

Correct Approved

329

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

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	.055	2.45	20.5												

Values Per Ton

Payment	Pay Content	Price	Amount	Freight (Fixed)
Gold	.055	32.3185	1.78	1.78
Silver, Less % Min. 1 oz.	1.45	.885	1.28	1.28
Pb. Less 30# @ 90 %	342.0	.17	58.14	17.10
Copper Less @ %				
Gross Value			61.20	20.16
Less Deductions (Net Charge)			6.72	6.72
Net Value			x x x	13.44
Value			54.48	@ 50.87

Deductions	Charge	Credit
Base, Incl. Labor Adj.	5.50	
Excess Value Over $ 10 ¢ per Unit Pb + − 30 %	1.10	
Lead—Copper Price Escalator		
Bullion Freight Tax @ .00034	.12	
Insol—Silica		
Iron—Lime		
Zinc		
As: Sb: Bi:		
Net Charge	6.72	—

= 12.88 Wet Ton

Dry Tons

Freight: 53.1 Wet Tons @ 2.79 + 6% P.T. 157.04 Tax 4.71

Switching 4.26 + .13 = 4.39 Less Reset 6.60 + .20 = 6.80

Hauling @ 1.50 p.w.t. 79.65 + 2.39 Tax

Representation $ 9.00 Umpire $ Sampling $

Amount Withheld Pending Receipt of Silver Affidavit (10% − .15) H4690

Royalty 10%

Debits	Credits
	2771.40
161.75	
11.19	
82.04	
9.00	
1.53	
250.59	
2255.30	
2771.40	2771.40

Balance Due Shipper

Correct

Approved

330

12-50 Cairns

AMERICAN SMELTING AND REFINING COMPANY

EL PASO SMELTING WORKS

BOUGHT OF C. N. Vogel

DRESS 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

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												
Umpire																
Metallics	.0625	1.65	13.05													

Values Per Ton

Payment	Pay Content	Price	Amount	Freight (Fixed)
	.0625	32.3185	2.02	2.02
Less % Min. 1 Oz.	.65	.885	.58	.58
Less 30# @ 90 %	207.9	.17	35.34	10.40
Less @ %				
Values			37.94	13.00
Deductions (Net Charge)			7.42	7.42
Net Value			x x x	5.58
Balance			30.52 @	46.4045

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	—
Wet Ton		
Dry Tons		

	Debits	Credits
		1416.27
	128.27	
	11.19	
	75.63	
	9.00	
	.93	
	119.13	
	1072.12	
	1416.27	1416.27

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

Sampling @ 1.50 P.W.T. 73.43 + 2.20 Tax

Representation $ 9.00 Umpire $ Sampling $

Not Withheld Pending Receipt of Silver Affidavit (10% - .09) H 4699

Royalty 10%

Balance Due Shipper

Correct Approved

331

3M 12-50 Caltos

AMERICAN SMELTING AND REFINING COMPANY

7

EL PASO SMELTING WORKS

CHT OF C. N. Vogel
ADDRESS Tombstone, Ariz.
SHIPPING POINT " "
NAME OF MINE

EL PASO, TEXAS 5-2- 1952
SMELTER LOT 1300
SHIPPERS LOT 6
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	% H_2O	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

Assay	Oz. per Ton Gold	Oz. per Ton Silver	Wet Lead %	Copper %	Insol %	SiO_2 %	Iron %	Mn %	Lime %	Zinc %	S %	Al_2O_3 %	As %	Sb %	Bi %	%
Delt	.015	0.9	14.7	0.10						0					0	
Shipp	.045	1.1	15.0	.18												
Umpire	.033	1.05														
Metallics																
Settl	.033	1.05	14.85													

Values Per Ton

Payment	Pay Content	Price	Amount	Freight (Fixed)
	.033	32.3185	1.07	1.07
Ver. Less % Min. 1 oz.	.05	.885	.04	.04
Lead 30# @ 90 %	240.3	.17	40.85	12.02
Per. less @ %				
Gross Value			41.96	13.13
Deductions (Net Charge)			7.25	7.25
Gross Value			x x x	5.88
Value			34.71	@ 49.899

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
Dry Tons		1731.99

Freight: 52.36 Wet Tons @ 2.40 + 6% P.T. 133.20 Tax 4.00 — 137.20
Sw ing 4.26 + .13 = 4.39 Less Reset 6.60 + .20 = 6.80 11.19
Ha ing @ 1.50 78.54 + 2.36 Tax 80.90
Representation $ 9.00 Umpire $ Sampling $ 9.00
Unt withheld Pending Receipt of Silver Affidavit H 4712
Ro lty 10% 149.37

Balance Due Shipper 1344.33
1731.99 1731.99

Checked Correct Approved

332

Form 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

Arrival Date	Car Number	Car RR	Gross Weight	Containers No.	Containers Weight	Wet Weight	% H2O	Dry Weight
/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																
Settle	.0375	1.0625	15.2													

Values Per Ton

Payment	Pay Content	Price	Amount	Freight (Fixed)
	.0375	32.3185	1.21	1.21
Lead less % Min. 1 Oz.	.0625	.885	.06	.06
Lead 30# @ 90 %	246.6	.15833	39.04	12.33
Silver less @ %				
Gross Value			40.31	13.60
Deductions (Net Charge)			7.21	7.21
Net Value			x x x	6.39 = 6.06 Wet Ton
Value			39.10 @ 48.5375	Dry Tons

Deductions	Charge	Credit
Base. Incl. Labor Adj.	5.50	
Excess Value Over 6		
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	—

Freight: 51.2 Wet Tons @ 2.40 + 6% P.T. 130.25 Tax 3.91

Swing 4.26 + .13 = 4.39 Loss Post 6.60 + .20 = 6.80

Haulage @ 1.50 76.80 + 2.30 Tax

Representation $ 9.00 Umpire $ Sampling $

Amt Withheld Pending Receipt of Silver Affidavit (10% - .05) H 4755

Royalty

Balance Due Shipper

Debits	Credits
	1606.59
124.16	
11.19	
73.10	
9.00	
.49	
137.27	
1235.33	
1606.59	1606.59

Correct Approved

333

FOM 2-50 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 %	%
SILVER	0.04	1.4	15.7	0.15						0					0	
COPPER	.05	1.6	16.4	.16												
PIPS			16.3													
FALLS																
TLC	.045	1.5	15.3													

VALUES PER TON

	PAYMENT PAY CONTENT	PAYMENT PRICE	AMOUNT	FREIGHT (FIXED)
	.045	32.3185	1.45	1.45
SILVER % MIN. 1 oz.	.5	.885	.44	.44
LEAD 30# @ 90 %	266.4	.13	34.63	13.32
COPPER Less @ %				
GROSS VALUE			36.52	15.21
DEDUCTIONS (NET CHARGE)			7.11	7.11
NET VALUE			x x x	8.10
FREIGHT			29.41	@ 50.1025
SWITCHING	52.19	WET TONS @ 2.40 + 15%	P.T. 144.05	TAX 4.32
HAULING	@ 1.50 p.w.t.		4.62 + .14	
REPRESENTATION $ 9.00		UMPIRE $	78.29 + 2.35 Tax	SAMPLING $
ROYALTY	10%		(10% - .10)	111.759

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	
WET TON 7.78		
DRY TONS		

DEBITS	CREDITS
	1473.51
143.37	
4.75	
89.64	
9.00	
1.00	
122.97	
1106.77	
1473.51	1473.51

BALANCE DUE SHIPPER

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 1832
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	.895	.13	.13
Lead, Less 30# @ 90 % 250.2		.13	32.53	12.51
Copper, Less @ %				
Gross Value			34.03	14.01
Less Deductions (Net Charge)			7.20	7.20
Freight Value			x x x	6.81
Net Value			26.83 @ 40.621	
Less Freight: 44.01	Wet Tons @ 2.40 + 15%		P.T. 121.46	Tax 3.64
Less Switching			4.62 + 14	
Less Hauling @ 1.50	66.02 + 1.93 Tax			
Less Representation $ 9.00	Umpire $ 4.00		Sampling $	
Amount Withheld Pending Receipt of Silver Affidavit (10% — .04)				
Less Royalty 10%			H 4819	
Balance Due Shipper				

Deductions	Charge
Base, Incl. Labor Adj.	5.50
Excess Value Over $	
10 # Per Unit Pb + — 30 %	1.61
Copper Under 8#	
Lead—Copper Price Escalator	
Bullion Freight Tax 0.00035	.09
Insol—Silica	
Iron—Lime	
Zinc	
As: Sb: Bi:	
Net Charge = 6.29 Wet Ton	7.20
Dry Tons	

Debits	Credit
125.10	1057.
4.76	
63.00	
13.00	
.41	
67.56	
770.73	
1039.66	1039.6

Correct

Approved

335

UM 12-50 Cairns

AMERICAN SMELTING AND REFINING COMPANY

EL PASO SMELTING WORKS

BOUGHT OF C. Neil Vogel
ADDRESS Tombstone, Arizona
SHIPPING POINT Tombstone, Arizona
NAME OF MINE

EL PASO, TEXAS 7-31 1952
SMELTER LOT 2380
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
	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

Assay	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																
Settle	.0375		9.05													

Values Per Ton	Pay Content	Price	Amount	Freight (Fixed)
Gold	.0375	32.3135	1.21	1.21
Silver Less % Min. 30% @ 90 %	135.9	.14	19.03	6.00
Silver Less @ %				
Gross Value			20.24	8.01
Deductions (Net Charge)			7.00	7.00
Net Value			x x x	.21
Value			12.14 @ 53.456	
Freight 55.28	Wet Tons @2.40 + 15%	P.T. 152.57	Tax 4.58	
Switching	4.62 + .14			
Hauling @ 1.50 p.w.t.	82.92 + 2.49 Tax			
Representation $ 9.00	Umpire $	Sampling $		
Amount Withheld Pending Receipt of Silver Affidavit				
Royalty 10%				

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 0.00035	.05	
Insol—Silica		
Iron—Lime		
Zinc		
As: Sb: Bi:		
Net Charge	7.80	—
− .22 Wet Ton		
Dry Tons		

	Debits	Credits
	157.15	
	4.76	
	85.41	
	7.00	
	40.87	
Balance Due Shipper	367.80	
	40.87	
	664.99	664.99

Checked Correct Approved

336

Claims

AMERICAN SMELTING AND REFINING COMPANY

EL PASO SMELTING WORKS

CHT 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

ASSAY	OZ. PER TON GOLD	OZ. PER TON SILVER	WET LEAD %	COPPER %	INSOL %	SiO2 %	IRON %	MN %	LIME %	ZINC %	S %	AL2O3 %	As %	Sb %	Bi %	%
MELT	0.045	1.0	13.6	0.03						0					0	
SHIPP	.06	1.3	14.0	.26												
EMPIRE																
METALLICS																
TTL	.0525	1.15	13.8													

VALUES PER TON

PAYMENT	PAY CONTENT	PRICE	AMOUNT	FREIGHT (FIXED)
D	.0525	32.3185	1.70	1.70
ER: LESS % MIN. 1 Oz.	.15	.885	.13	.13
: LE 30# @ 90 %	221.4	.14	31.00	11.07
PER. SS @ %				
GS VALUE			32.83	12.90
S: DEDUCTIONS (NET CHARGE)			7.35	7.35
IGH VALUE			x x x	5.55
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
	1147.56
135.75	
4.76	
73.79	
9.00	
.45	
92.33	
831.42	
1147.56	1147.56

FREIGHT: 47.75 WET TONS @ 2.40 + 15% P.T. 131.31 TAX 3.95

SW S 4.62 + .14

HA ING @ 1.50 Power 71.64 + 2.15 Tax

REPRESENTATION $ 9.00 UMPIRE $ SAMPLING $

UNT ITHHELD PENDING RECEIPT OF SILVER AFFIDAVIT (10% − .05) H 4919

RO LTY 10%

BALANCE DUE SHIPPER

CORRECT NER APPROVED

337

AMERICAN SMELTING AND REFINING COMPANY

EL PASO SMELTING WORKS

BOUGHT OF C. N. Vogel
ADDRESS Tombstone, Arizona
SHIPPING POINT Tombstone, Arizona
NAME OF MINE

EL PASO, TEXAS 2-13 195
SMELTER LOT 373
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	% H_2O	Dry Weight
	2/4	95411	SP				78640	3.9	75573

QUOTATIONS

Coinage Silver	.90	¢ per o
Foreign "	.8525	¢ per o
Lead $	13.50	per cw
Copper		¢ per l

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											
Jump															
Met															
Settle	.045	1.3	11.9												

Values Per Ton

Payment	Pay Content	Price	Amount	Freight (Fixed)
Lo	.045	32.3185	1.45	1.45
Ver less % min. 1 oz.	.3	.885	.27	.27
Ad. Less 30# @ 90 %	187.2	.1150	21.53	9.36
Per 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	Cre.
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

	Debits	Credits
Dry Tons		594.0
Tax 3.26	111.79	
	9.95	
	60.75	
	9.00	
H 5166		
	40.25	
Balance Due Shipper	362.26	

S Freight: 39.32 Wet Tons @ 2.40 + 15% P.T. 108.53
S Switching 4.62 + .14 = 4.76 Reset 5.04 + .15 = 5.19
S H 39.320 Wet tons @ 1.50 per wt. plus 3% Tax
Sampling $ 9.00 Umpire $ Sampling $
Amount Withheld Pending Receipt of Silver Affidavit.
S Royalty 10%

Check 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.

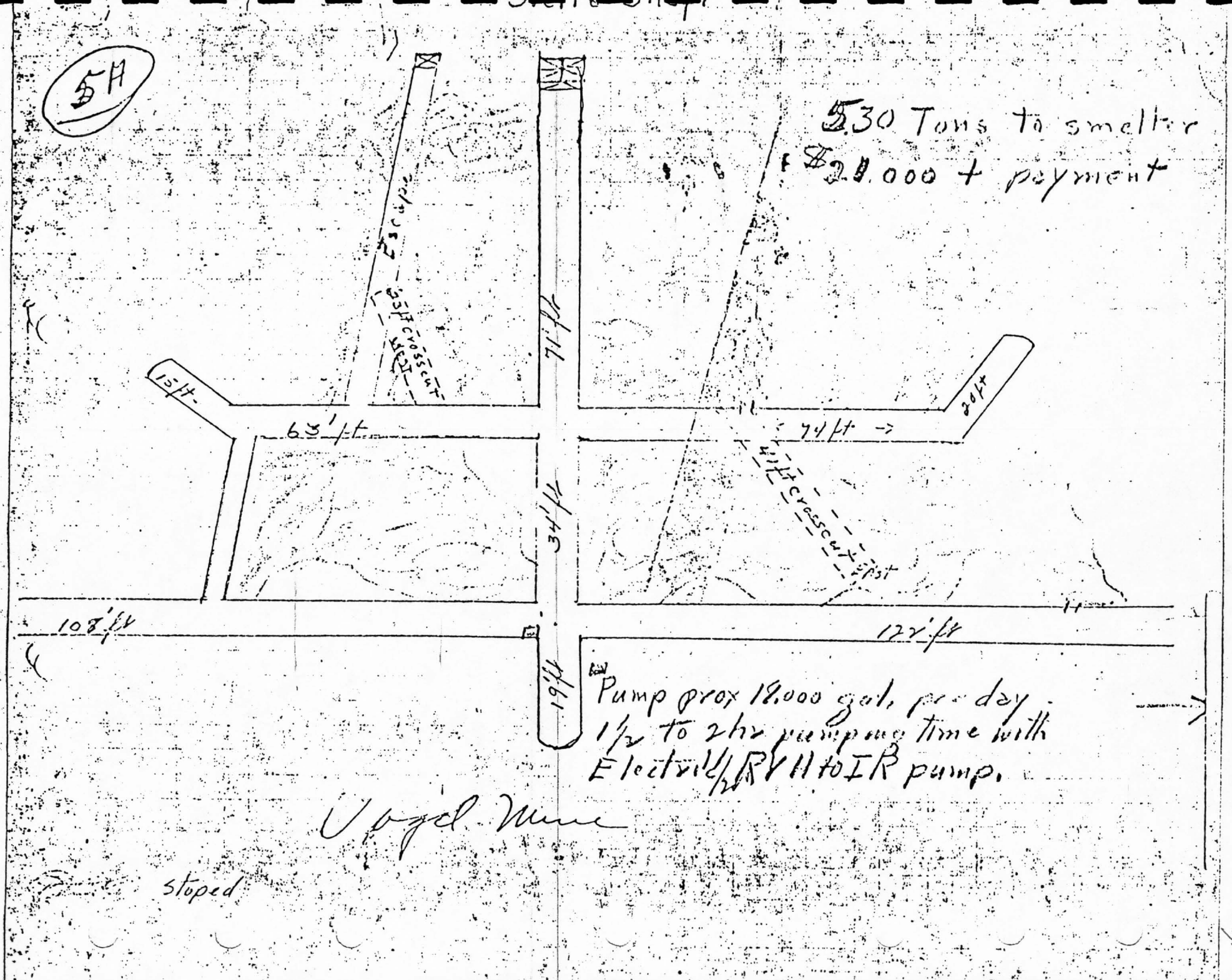
Very truly yours,

Paul Luff

PAUL LUFF
Commodity Specialist
Region IV

Encl.

VICTORY
BUY


5A
530 Tons to smelter
$20.000 + payment
15 ft
65 ft
71 ft
34 ft
74 ft
20 ft
108 ft
121 ft
19 ft
Pump prox 18.000 gal. per day
1½ to 2 hr pumping time with
Electric 1½ RV 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	2380	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
21,497.78

W. L.M. VOGEL MINES

TOMB TOWN, ARIZONA

PARTIAL BUT REPRESENTATIVE RECORD OF SHIPMENTS AND ASSAYS OF MINERALS FOUND ON PROPERTIES CONTAINED IN THE ATTACHED REPORT

	Gold Oz.	Silver Oz	Lead	VZ05
1. No. 100128, Nov.18,1921 Lecoux & Co. New York				
Sample F	.06	42.4	53.5	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, 15,810 #		20.7	56.0	
4. Smelter Lot 685, April 25,1924 Kansas City Smelting & Refining Company, El Paso, 2430 #		21.1	39.1	
5. Smelter Lot 1719, July 2, 1924 Kansas City Smeltin & Refining Company, El Paso, 3531 #	.07	21.4	41.0	
6. Smelter Lot 201, Apr.2, 1929 Phelps-Dodge Corp. Douglas, Ariz. Concentrates, 20913 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. All 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
Conc	.04	2.88	51.5	8.4	8.5
Middlings	Tr	1.46	14.4	2.1	
Slimes	Tr	.62	6.0	.9	
9. Mill run on Blanket ore Jan. 25, 1929 Heads	.02	1.05	4.2	.5	
Concentrates	.22	5.06	50.2	3.08	
10. Experimental conc. direct to mill, Feb.14,1929 Heads	tr.	1.7	5.1	.78	
Concentrates-1- 48 mesh	.04	3.7	21.5	3.16	
2- 65 mesh	.41	2.5	25.4	3.10	
3- 100 mesh	.90	3.1	11.4	2.47	
4- 150 mesh	.83	1.9	11.4	2.09	
5- 200 mesh	.5	1.3	10.6	2.55	
6- 200 mesh	.05	3.4	29.8	6.39	

	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

Not Balance of Shipments

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
Mean of Shipments	.043	2.[illegible]		

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%	

Translation Image

Location?

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.
Cu304 1.0 lb.
Z 0.1511b.
15 minutes

This sample marked "BBB" on Assay plate.

****

OIL CODE

NaCN- Sodium Cyanide: 2B- Crespylic 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

7 345

mine location

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

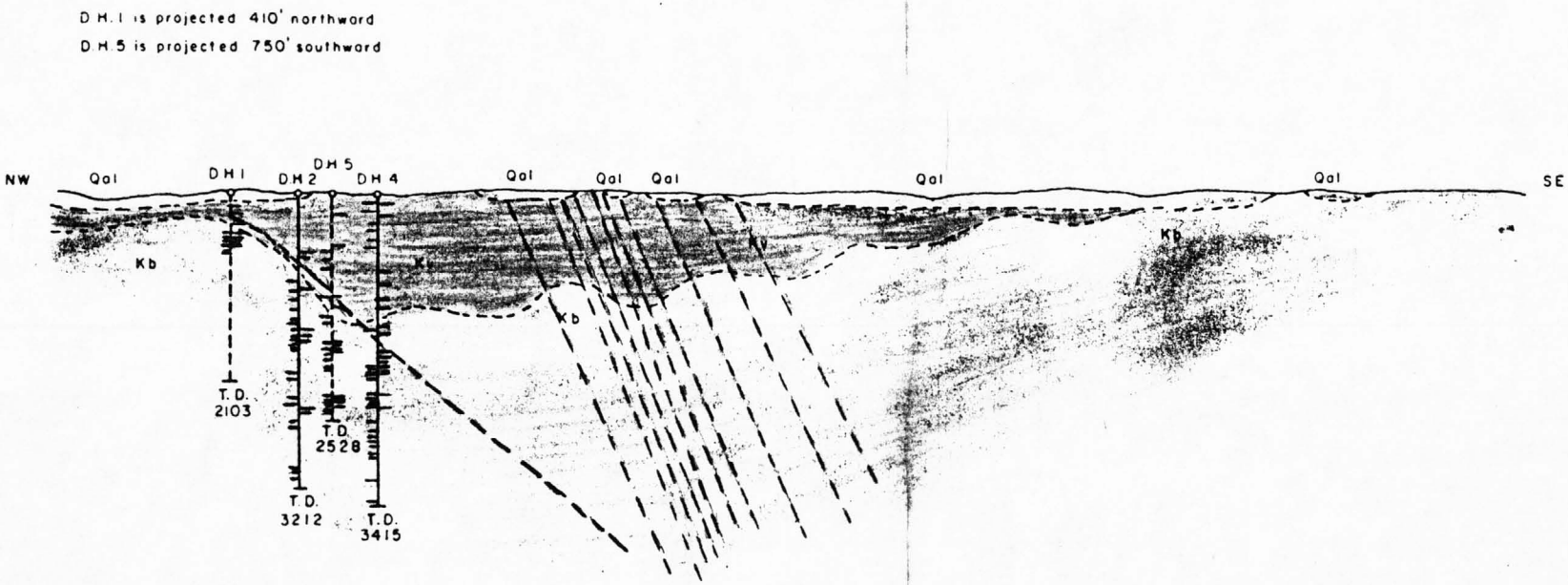
12- A metal roofed shed to accomodate to three vehicles.

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 600-1500 feet North of this mine shaft, values favorable, a part of this mine.



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:

4-64 DIETERICH-POST CLEARPRINT 1000H-10

346

Charleston Mine
Cochise County, Az
Howry Holdings Also

EXPLANATION

A-Geochemical Sample

348

Thomas W. Mitcham
Exploration Manager,
International Ranwick Limited.
First National Bank Bldg.
Denver, Colorado.

November 10, 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 tested 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. Mitcham)

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

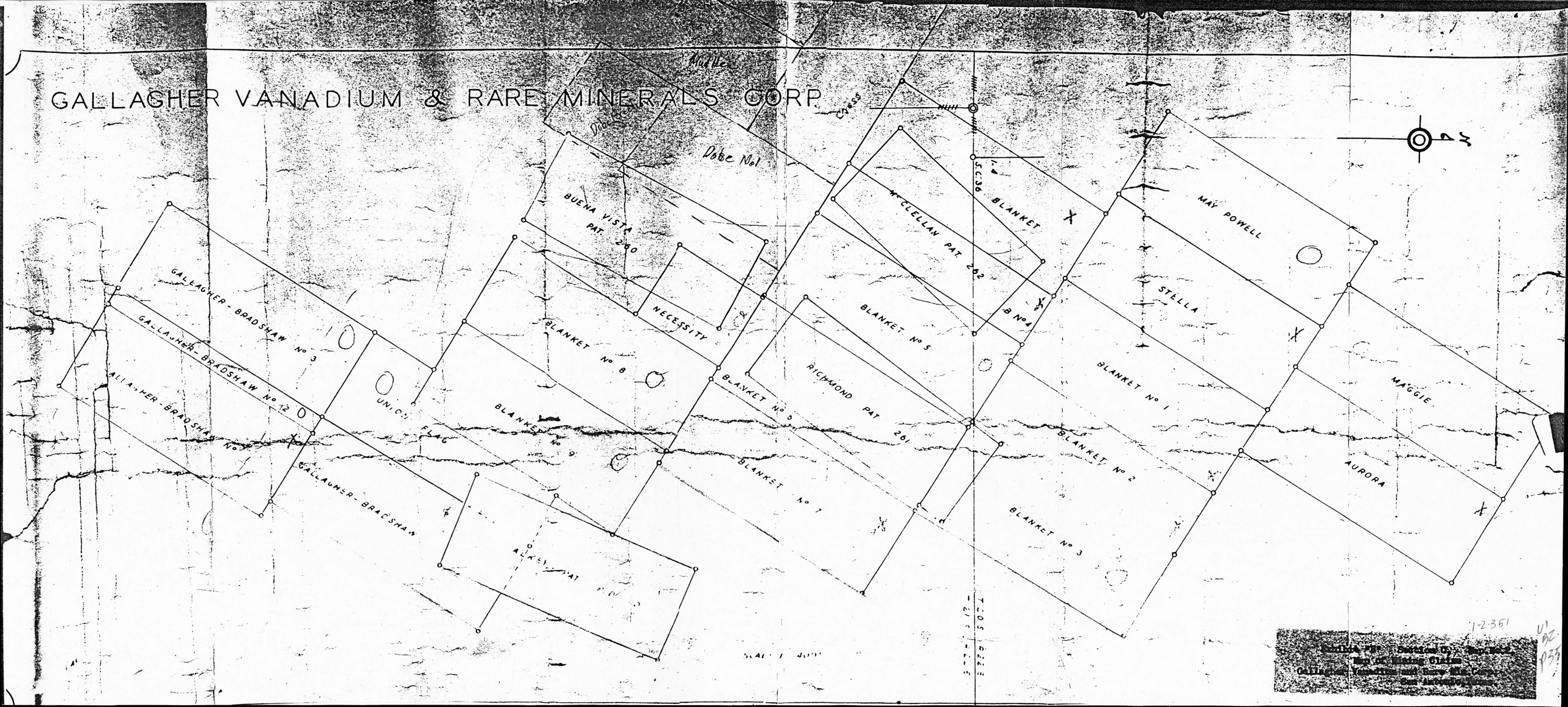
Return to

C Neil Vogel
1820 E Hampton St.
Tucson, Arizona.

6- All dozer cuts - mineralized

Mines Hand Book "Lead" XIII Page 542
Refers to this "War Horse Copper"

GALLAGHER VANADIUM & RARE MINERALS CORP



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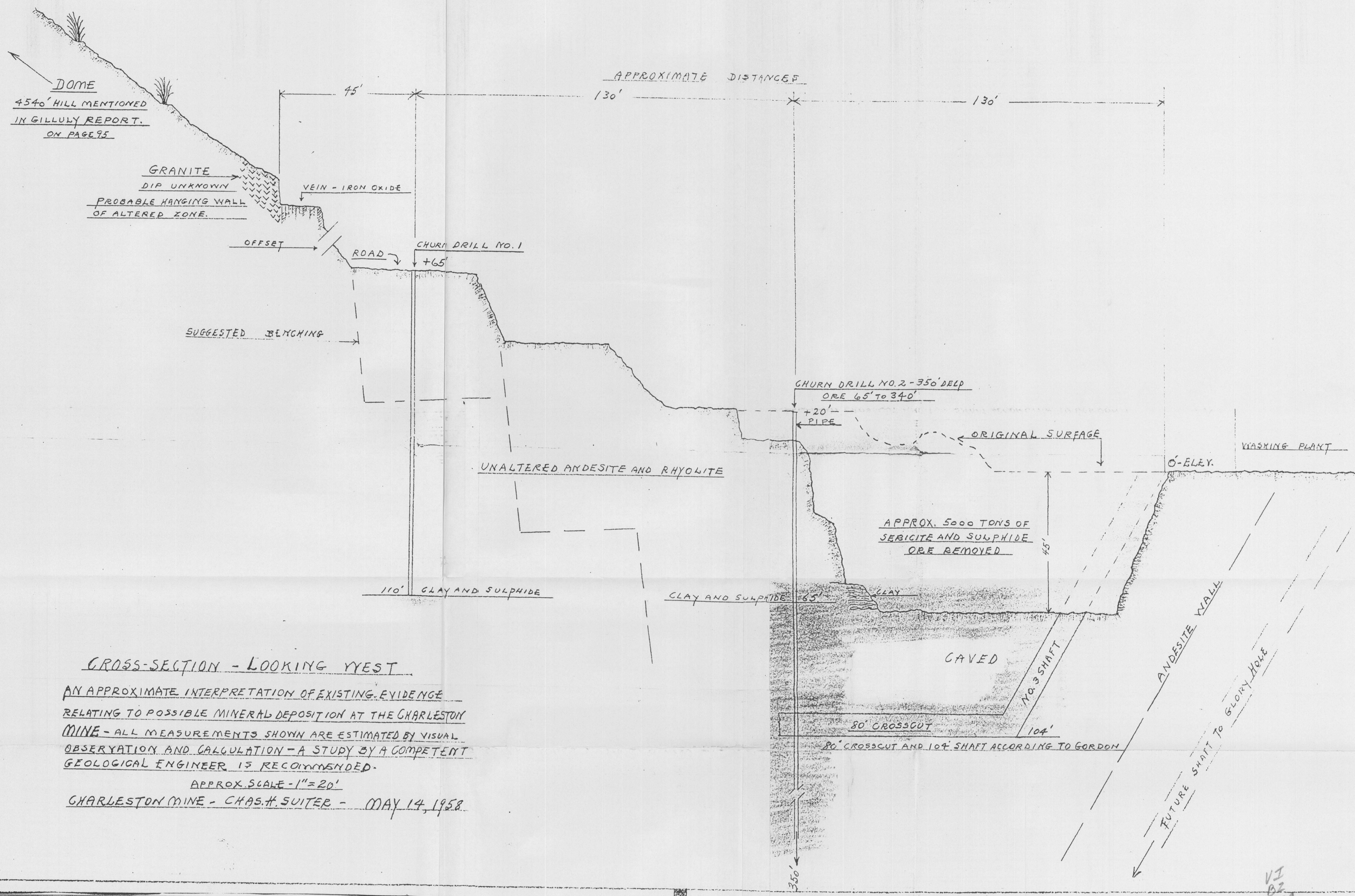
Sandia File Section 03 Map No.
Map of Mining Claims
Gallagher Vanadium and Rare Min. Corp.
San Juan County, Utah



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

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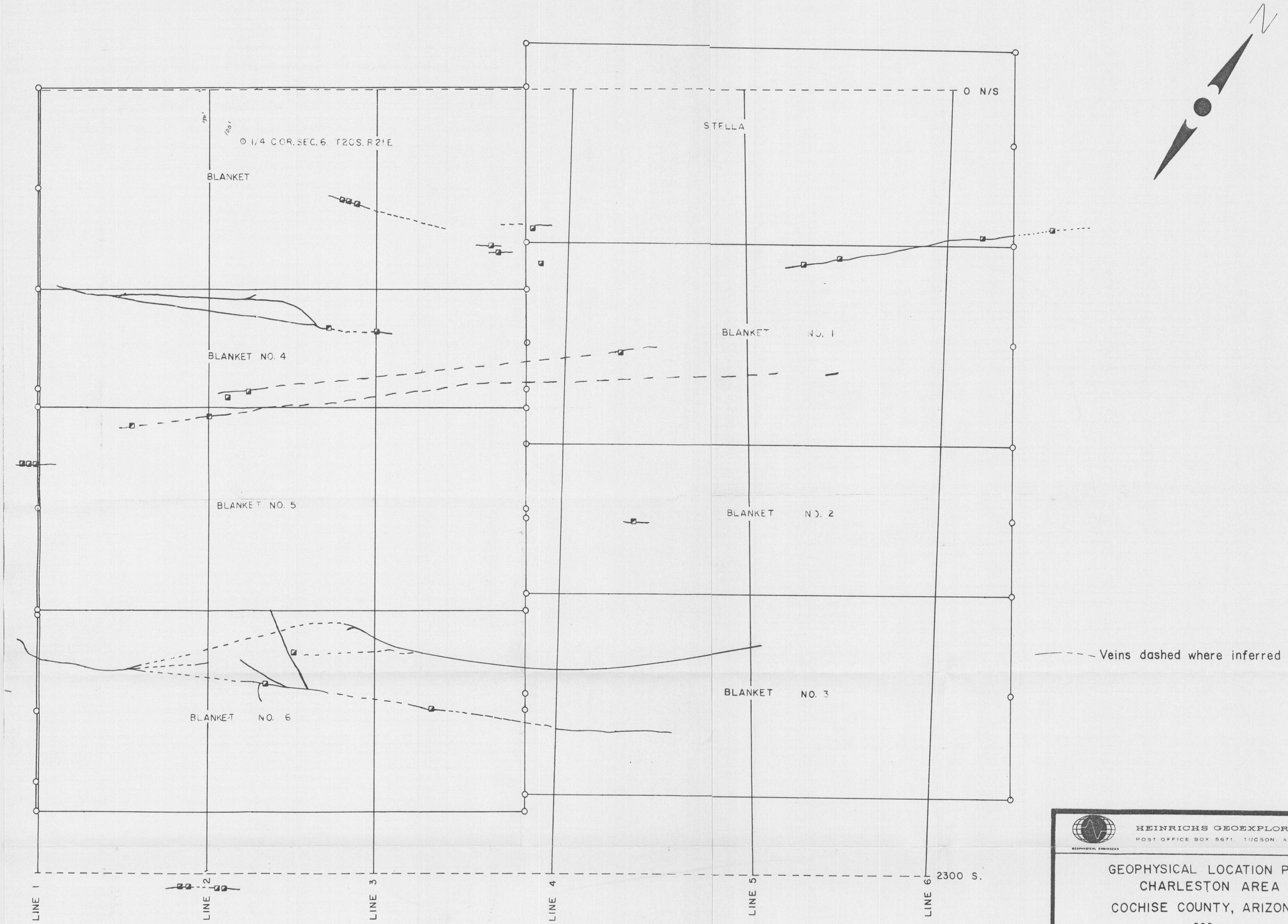
A227



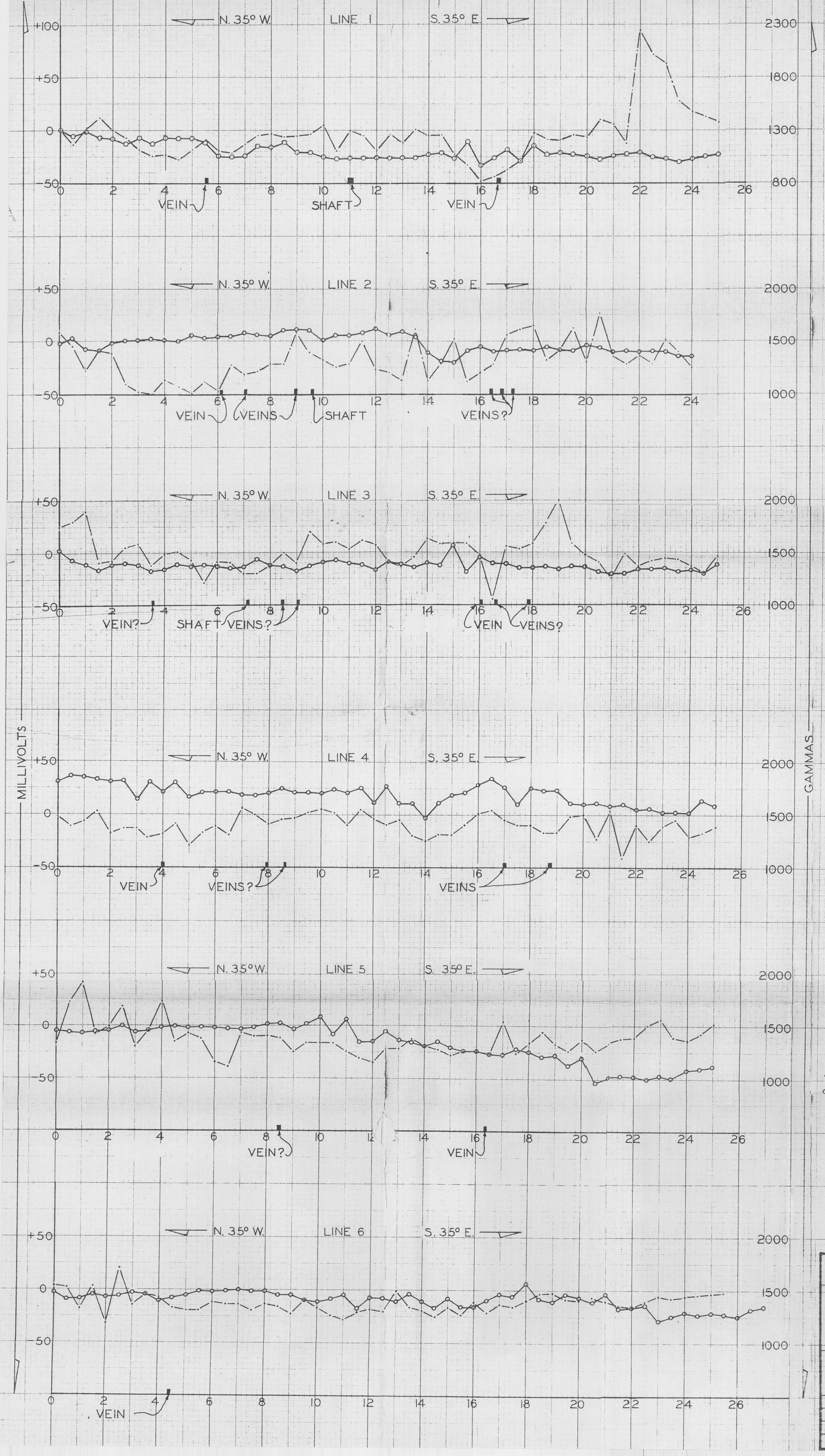
HEINRICHS GEOEXPLORATION CO.
GEOPHYSICAL ENGINEERS
POST OFFICE BOX 5671, TUCSON, ARIZONA 85703

GEOPHYSICAL LOCATION PLAN
CHARLESTON AREA
COCHISE COUNTY, ARIZONA
FOR

G. V. R. M.

1-2-262

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.

12-262

SCALE: 1"=200' HORIZ.	CONTOUR INTERVAL:	REVISIONS
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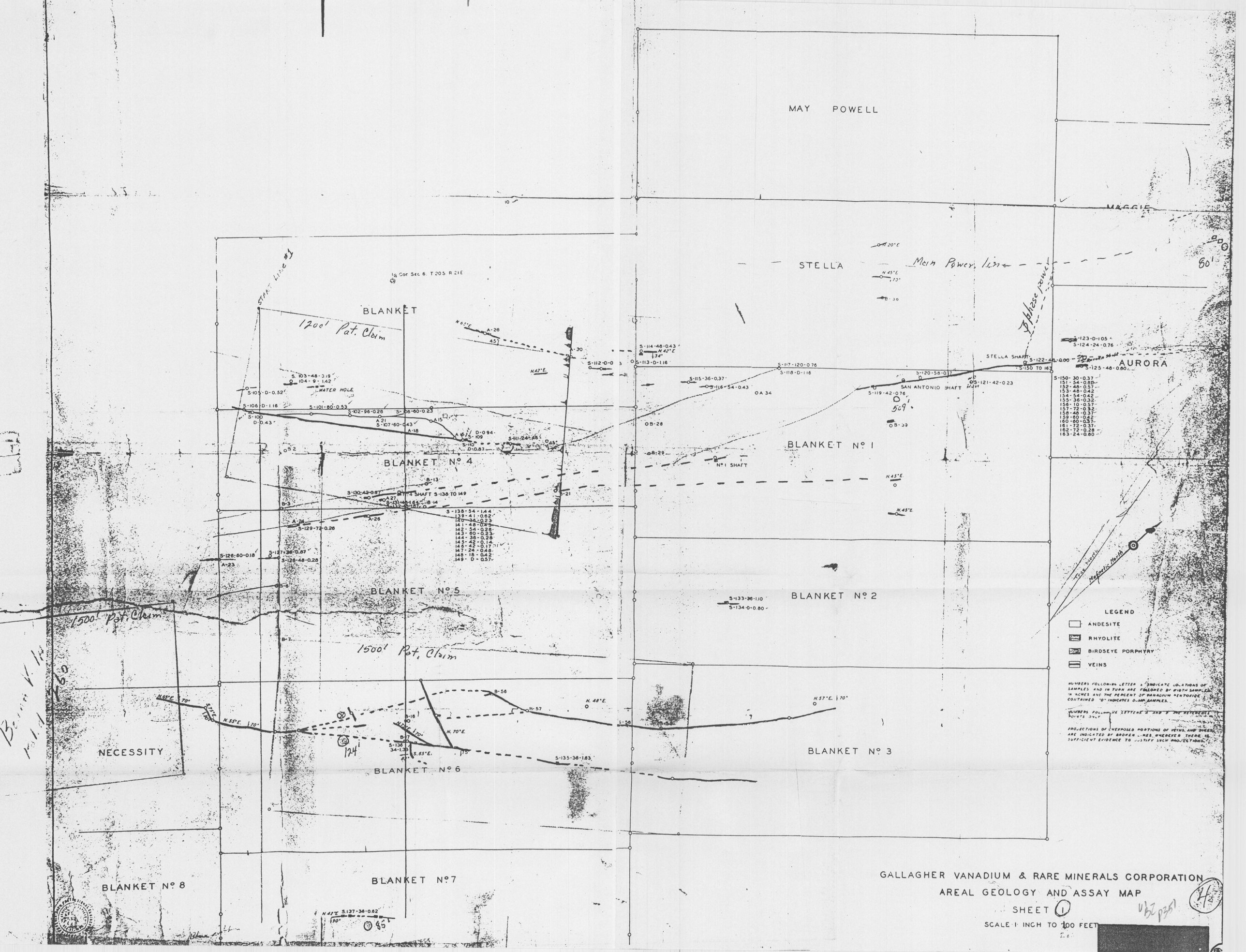
DATE: SEPT. 1966	SHEET OF	
DRAWN BY: J.C.D.	DRAWING NO.:	FILE:



GALLAGHER VANADIUM & RARE MINERALS CORPORATION

AREAL GEOLOGY AND ASSAY MAP

SHEET 1

SCALE 1 INCH TO 100 FEET

[redacted]