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0024

Volume 2 ; Book 7

TOMBSTONE

Mining District

Cochise County

ARIZONA

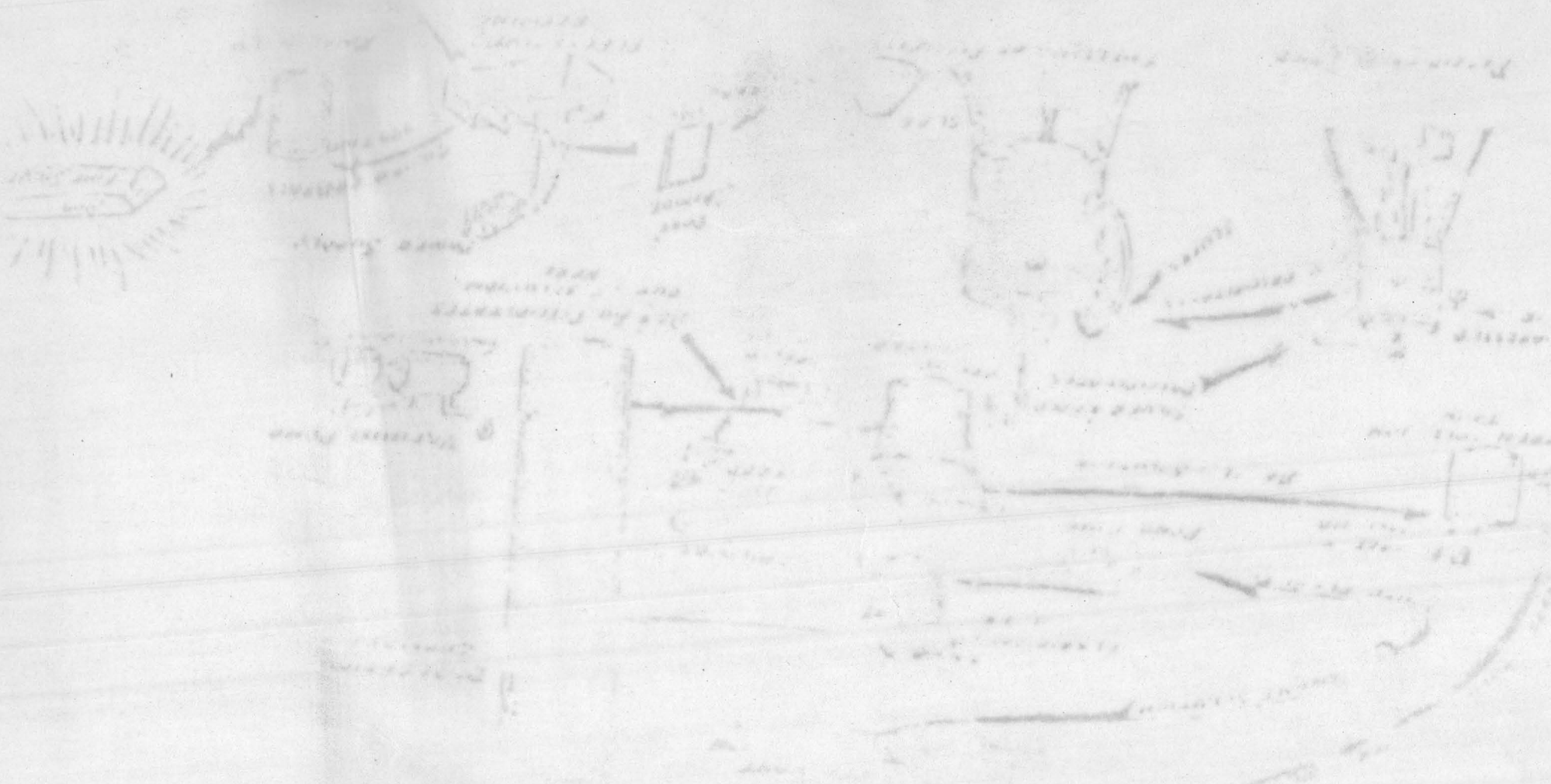
State of Maine Reports and Maps
1968 to 1979

Southwestern Exploration Associates

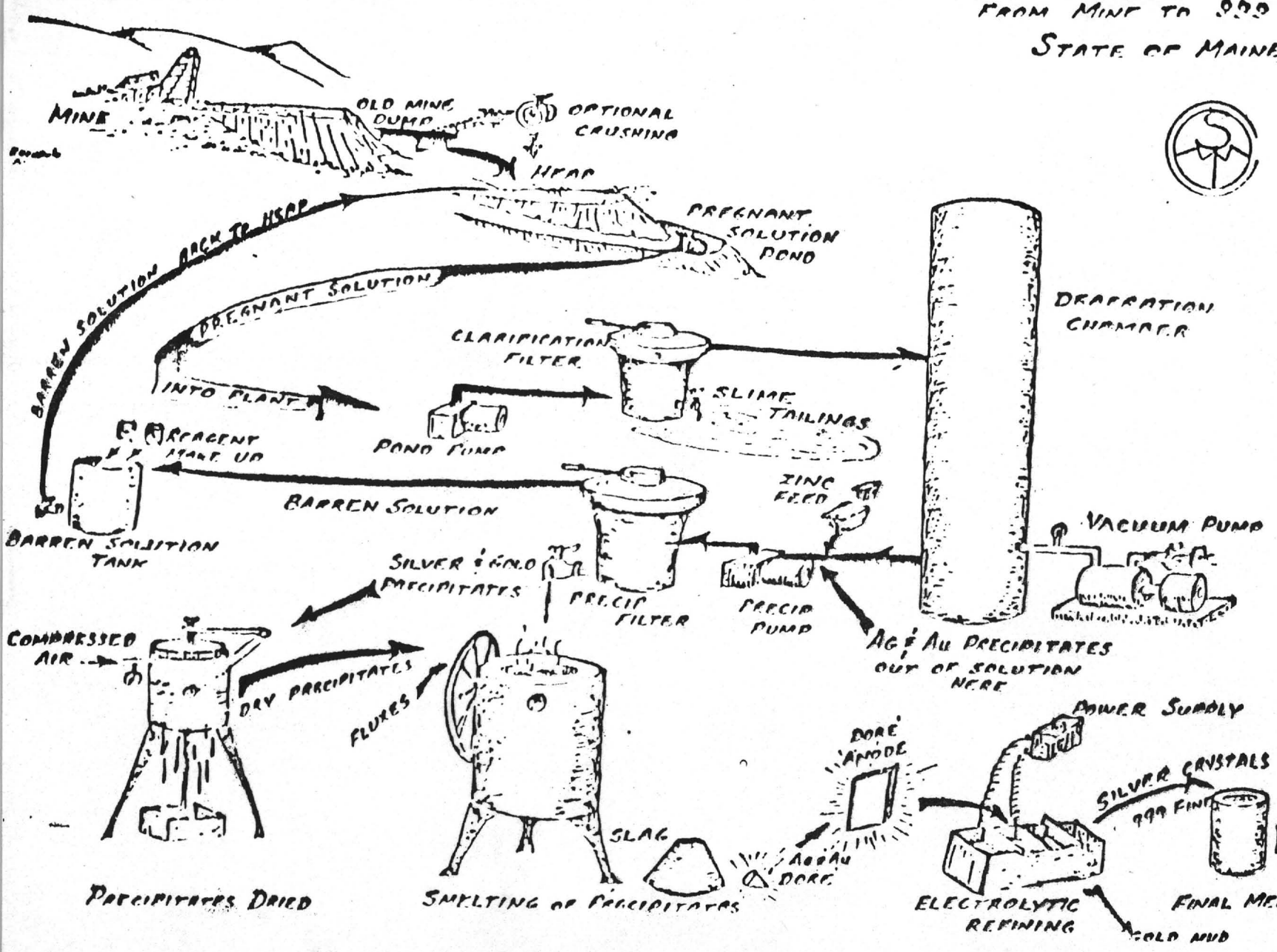
Mineral Exploration & Natural Resource Consultants

Tucson, Arizona

GENERAL NOTES



Flow Sheet of Heap Leach Operation From Mine to .999 Fine Silver
State of Maine Mining Co.



FILE

Tombstone F, & F, File Applicable State of Maine Mining Co.

State of Maine Mining Company

P.O. BOX 1016 TOMBSTONE, ARIZONA 85638 PHONE 457-3601
CHARLES ESCAPULE LOUIS ESCAPULE

Cyaniding silver and gold ores is not a new practice, however, some of the methods in use are comparatively new. One such method is to "heap leach" low grade ores. It is a cheap, fast way to recover precious metals from old dumps or open pit mining operations. The term "heap leaching" was probably coined by the copper mining industry, whereby low grade ore is stacked (heaped) on a prepared base (made impervious) and sprayed with a leaching agent, in the case of silver and gold, a dilute cyanide solution. The solution percolates down through the ore, dissolving the metal and collected for subsequent stripping.

Several methods of recovering the dissolved metals are used, such as carbon absorbtion, electrowinning, etc. but the simplest way is by use of powered zinc or aluminum metal. In order for this method to work efficiently certain criteria must be met, first, the solution must be filtered to remove all suspended particles and, second, all or nearly all dissolved oxygen must be removed before adding zinc dust to precipitate the silver and gold, at which time it is a simple matter to filter and collect the metal.

The precipitation plants we have designed and currently manufacturing for sale are rated at 12, 65, 100, 150 and 300 tons of solution per day (24 hours).

They are the Merrill-Crowe type, using zinc dust as the precipitant.

The 300 TPD plant comes complete with three 500 gallon reagent storage tanks, mix pump and 2 hp pump for the spray system. The 150 TPD plant comes with three 300 gallon reagent storage tanks and 1 1/2 hp pump for the spray system. The 65 TPD and 100 TPD plant do not come with tanks as 55 gallon drums can be used for this purpose. A 3/4 hp and 1 hp pump comes with a 65 TPD plant and a 100 TPD plant respectively, for the spray system.

Plants are built on a rigid steel skid type frame for easy handling and transporting. The largest plant weighs less than a ton and the 65 TPD plant around 900 pounds.

They are easily operated by one person, requiring very little attention.

All components are designed for outdoor use and a shelter, although recommended, is not necessary.

12 TPD	1,500.00	Completion time - 3 weeks
65 TPD	4,500.00	" " 60 days
100 TPD	5,400.00	" " " "
150 TPD	10,500.00	" " " "
300 TPD	20,000.00	" " " "

Terms - Half down at time of order - Balance at time of pick up.

State of Maine Mining Company

P.O. BOX 1016 TOMBSTONE, ARIZONA 85638 PHONE 457-3601
CHARLES ESCAPULE LOUIS ESCAPULE

THE 12 TPD PLANT

The 12 TPD Plant consists of one clarifier filter and one precipitation filter, deaeration system, zinc feeder and mixing cone, and a 1/3 hp pump used for circulating solutions, all mounted on a steel frame.

SPECIFICATIONS

A. Automatic and continuous deaeration.
B. Pressure monitored system.
C. 24 ounce zinc dust hopper capacity.
D. Corrosion proof pump with mechanical seal.
E. Variable rate zinc dust feeder.
F. Automatic internal liquid level control.
G. Steel frame mounted.
H. See-through filters with replaceable cartridges.
I. Power requirements: 1 KVA 110 volts 1 hp 60 hz.

The dimensions of this plant are 2 ft. x 2 ft. x 7 ft. 6 inches high. The weight of the plant is 130 pounds. This plant was designed for test work or for processing small amounts of very high grade ores. This machine is not intended for continuous operation.

F.O.B. State of Maine Mine
Tombstone, Arizona

State of Maine Mining Company

P.O. BOX 1016 TOMBSTONE, ARIZONA 85638 PHONE 457-3601
CHARLES ESCAPULE LOUIS ESCAPULE

The 65 TPD PLANT

The 65 TPD Plant consists of one clarifier filter and pump, one precipitate filter and pump, vacuum deaeration system, zinc feeder and mixing cone, all mounted on a steel frame. Also included is a 3/4 hp pump for pumping solution onto a heap. To save a cost to you, no tanks are provided, as 55 gallon drums can easily be adapted for this purpose.

SPECIFICATIONS

A. Automatic and continuous vacuum de-aeration.
B. Pressure monitored filter system.
C. Corrosion proof pumps with mechanical seals.
D. 4 pound zinc dust hopper capacity.
E. Variable rate zinc dust feeder.
F. Electronic liquid level control in vacuum chamber.
G. Steel skid mounted.
H. Folding vacuum chamber for easy transporting.
I. Rain tight electrical switch gear.
J. No lube vacuum pump.
K. Power requirements: 5 KVA 110/220 volts 1 ph 60 Hz. (or 50 Hz.)

The overall dimensions of this plant are 5' x 3'4" x 7'11" high. The vacuum tank is designed to fold down for transporting, reducing the height to about 4 ft., making it handy for transporting in a pickup or small trailer.

F.O.B. State of Maine Mine
Tombstone, Arizona

State of Maine Mining Company

P.O. BOX 1016 TOMBSTONE, ARIZONA 85638 PHONE 457-3601
CHARLES ESCAPULE LOUIS ESCAPULE

THE 100 TPD PLANT

The 100 TPD precipitation plant consists of one clarifier filter and pump, one precipitate filter and pump, vacuum de-aeration system, zinc feeder and mixing cone, all mounted on a steel frame. Also included is a 1 hp pump for pumping solution onto a heap. To save cost to you no tanks are provided, as 55 gallon drums can easily be adapted for this purpose.

SPECIFICATIONS

A. Automatic and continuous vacuum de-aeration.
B. Pressure monitored filter system.
C. Corrosion proof pumps with mechanical seals.
D. 4 pound zinc dust hopper capacity.
E. Variable rate zinc dust feeder.
F. Electronic liquid level control in vacuum chamber.
G. Steel skid mounted.
H. Folding vacuum chamber for easy transporting.
I. Rain tight electrical switch gear.
J. No lube vacuum pump.
K. Power requirements: 5 KVA 110/220 volts 1 ph 60 Hz. (or 50 Hz.)

The overall dimensions of this unit are 5'5" x 3'6" x 7'9" high. The vacuum tank is designed to fold down for transporting, reducing the height to about 4 ft., making it handy for transporting in a pickup or small trailer.

F.O.B. State of Maine Mine
Tombstone, Arizona

State of Maine Mining Company

P.O. BOX 1016 TOMBSTONE, ARIZONA 85638 PHONE 457-3601
CHARLES ESCAPULE LOUIS ESCAPULE

THE 150 TPD PLANT

The 150 TPD precipitation plant consists of clarification pump and filters, vacuum deaeration system, zinc dust feeder and mixing cone, precipitation pump and filters, all mounted on a steel skid. Also included are three 300 gallon steel tanks for reagent storage and spray mix tank plus a 1 1/2 hp pump for pumping the solution onto a heap.

SPECIFICATIONS

A. Automatic and continuous vacuum deaeration.
B. Pressure monitored filter system.
C. Non-corrosive pumps with mechanical seals.
D. 6 pound zinc dust hopper capacity.
E. Variable rate zinc feeder.
F. Electronic liquid level control in vacuum chamber.
G. Steel skid mounted.
H. Rain tight electrical switch gear.
I. Power requirements: 6 KVA 220 volts 1 ph 60 Hz. (or 50 Hz).

The overall dimensions of this plant are 7'2" x 4'4" x 7'10" high.

F.O.B. State of Maine Mine
Tombstone, Arizona

State of Maine Mining Company

P.O. BOX 1016 TOMBSTONE, ARIZONA 85638 PHONE 457-3601
CHARLES ESCAPULE LOUIS ESCAPULE

THE 300 TPD PLANT

The 300 TPD precipitation plant consists of clarifier pump and filters, vacuum deaeration system, zinc dust feeder and mixing cone, precipitation pump and filters, all mounted on a steel skid. Also included are three 500 gallon steel tanks for reagent storage and spray mix tank plus a 2 hp pump for pumping the solution onto a heap and a 1/2 hp pump for mixing reagents.

SPECIFICATIONS

A. Automatic and continuous vacuum deaeration.
B. Pressure monitored filter system.
C. Non-corrosive pumps with mechanical seals.
D. 10 pound zinc dust hopper capacity.
E. Variable rate zinc feeder.
F. Electronic liquid level control in vacuum chamber.
G. Steel skid mounted.
H. Rain tight electrical switch gear.
I. Oil lubed vacuum pump.
J. Power requirements: 8.5 KVA 220 vlts, 1 ph 60 hz. (or 50 Hz.)

The overall dimensions of this unit are 8' x 5' x 7'11" high. While this plant was designed for heap leaching operation, it can be used in any mill system that generates pregnant cyanide solutions.

F.O.B. State of Maine Mine
Tombstone, Arizona

THE AUGEMIN SYSTEM
IS A SURE IDEA

Aurifera Carolina S.A. the promotioning company of the Augemin System, is a solid company that counts on the human capital of Germans and Peruvians with high efficiency and wide experience in the mining field.
By being exclusive representatives of the STATE OF MAINI MINING Co. those associates of the AUGEMIN System will benefit also with Gold and Silver treatments, old deposits and sweepings. Finally, AURIFERA CAROLINA S.A. will promote job opportunities in Peru, contributing to the improvement of social-economic development of the country.

Augemin
EL SISTEMA

AURIFERA CAROLINA S.A.
Exclusive Representative of State of
Maine Mining Co., Tombstone, Arizona U.S.A.

Augemin
EL SISTEMA

Aurífera Carolina S. A.
AUCASA
Bajada Balta 131 2do. piso Of. 18
Miraflores Telf. 45-8533
Télex: 21002 CP – 25202 CP

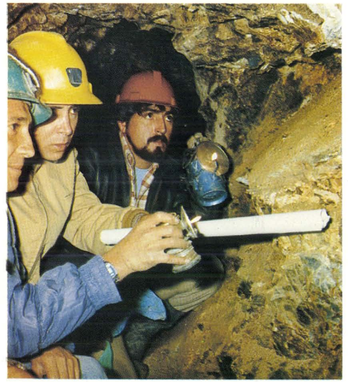
Representante Exclusivo
de State Of Maine Mining Co.
Tombstone, Arizona. U.S.A.

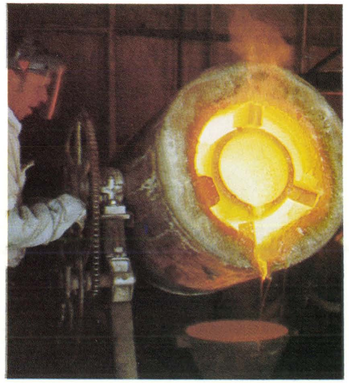
DISCOVER AND SHARE THE AUGEMIN SYSTEM

AUGEMIN is a dinamic system created by AURIFERA CAROLINA S.A. to give the miner and the investor the opportunity to achieve the highest rentability in the explotation of gold and silver, in a minimum amount of time.
This system is designed to make the miner the true owner of golder and silver mines, not merely owner of gold and silver deposits, using the most modern technology permanent advice and in the shortest time.

The AUGEMIN SYSTEM supports the exploitation of gold and silver even in distant and inaccessible regions.
The AUGEMIN System is a common endeavor of Peruvian, North American and German, technology and investment and the participation of highly trained personnel in the fields of mining, business, and financining.
AUGEMIN integrates national as well as foreign miners and investors, giving as a result that not only Peruvian mines are exploited, but that the exploitation of gold and silver mines in other Latin American countries can be also carried out with this new system, thus creating exchanges of valuable experiences.

This idea generated in Peru through AUGEMIN, will produce profities and gunds for our respective countries. The idea is to make miners conscious, especially in Peru, that for centuries this country was the best in mining. AUGEMIN is an endeavor to permanently erase the image of a poor man sitting on a bank of gold, and to convert the country, by means of its system, into a real bank of gold.
AUGEMIN invites all miners to join in the effort to make Peru the world leader in the production of gold and silver deserved position which correspond to us dueto the enourmous cuantities of precious metals scattered throughout our land.





AUGEMIN offers the investor the opportunity millenium business where one's money is reproduced in gold and silver, metals which do not suffer the effects of devaluation. Gold, being the symbol of wealth for more than 4,000 years is the most solid investment for the present and for the future.
Messrs. Miners and investors, it is very simple to participate in Augemin, simply pay us a visit.
For more information consult us in our company offices.

AN IDEAL EQUIPMENT FOR THE AUGEMIN SYSTEM

All the associates of Augemin will be able to benefit from MERRIL - CROWE (manufatured in the U.S.A.) plant of precipitation by zinc method of processing.
These plants are of 100, 400, 600, 800 and 2,000 ton capacity for periods of treatment of 15 to 20 days.
It has been prover that this equipment is economical, rentable and technically suitable to our difficult topography, in capable of being transported to previosly inaccessible zones.

Misc. Maps.

MSC Maps - Land

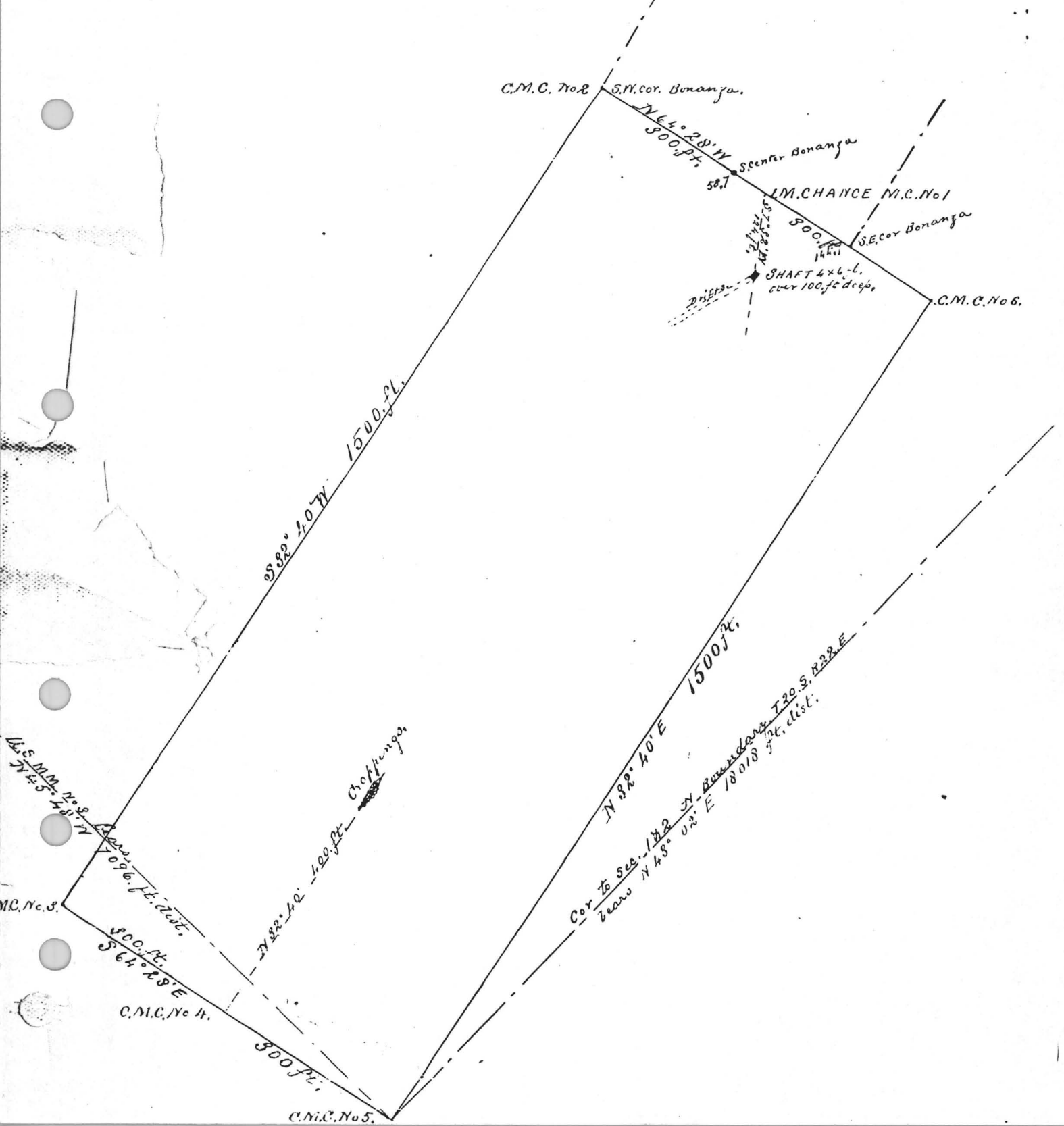
(some not copied from S.D.M. files - deemed not to be useful)

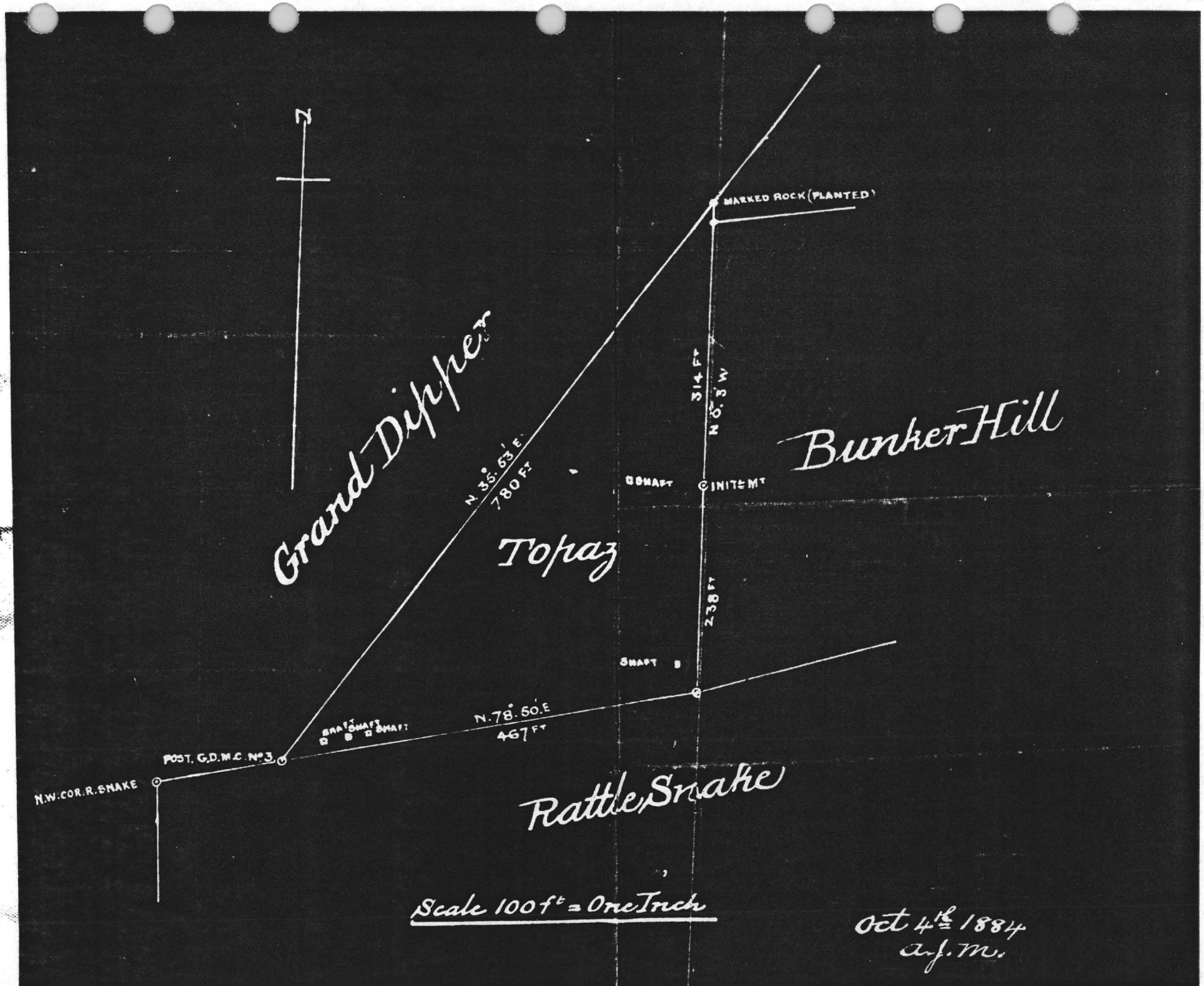
Chance Mine Claim
Tombstone Mining District
Cochise County Arizona.

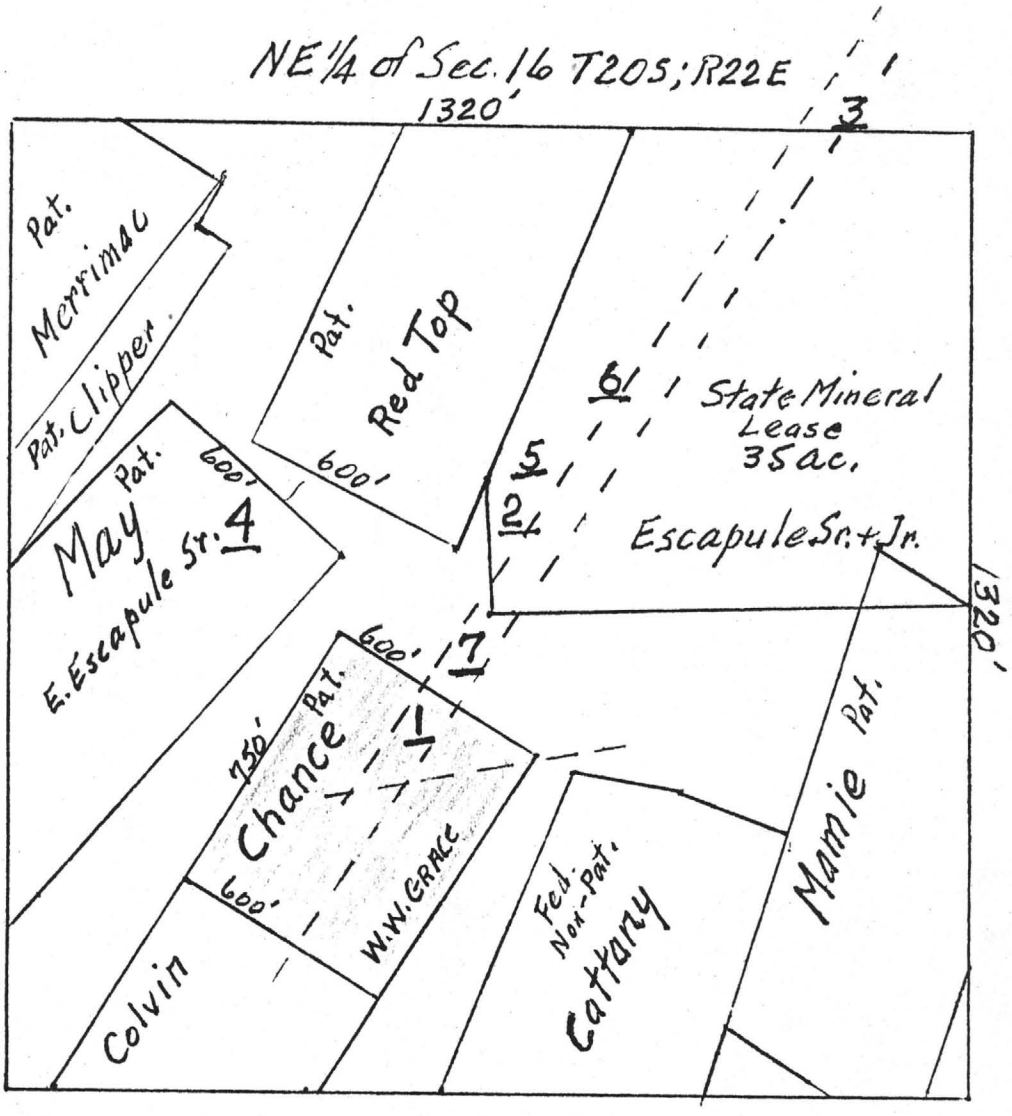
Containing. 20.66 Acres.

Scale 200 ft = 1 inch.

Var 11° 43' East.




N
MARKED ROCK (PLANTED)
Grand Dipper
N. 35° 53' E.
780 Ft
314 Ft
N 0° 3' W
Bunker Hill
SHAFT
INIT. Mt
Topaz
238 Ft
SHAFT B
N. 78° 50. E
467 Ft
SHAFT
SHAFT
SHAFT
POST. G.D.M.C. No 3.
N.W. COR. R. SNAKE
Rattle Snake
Scale 100 ft = One Inch
Oct 4th 1884
a.f.m.

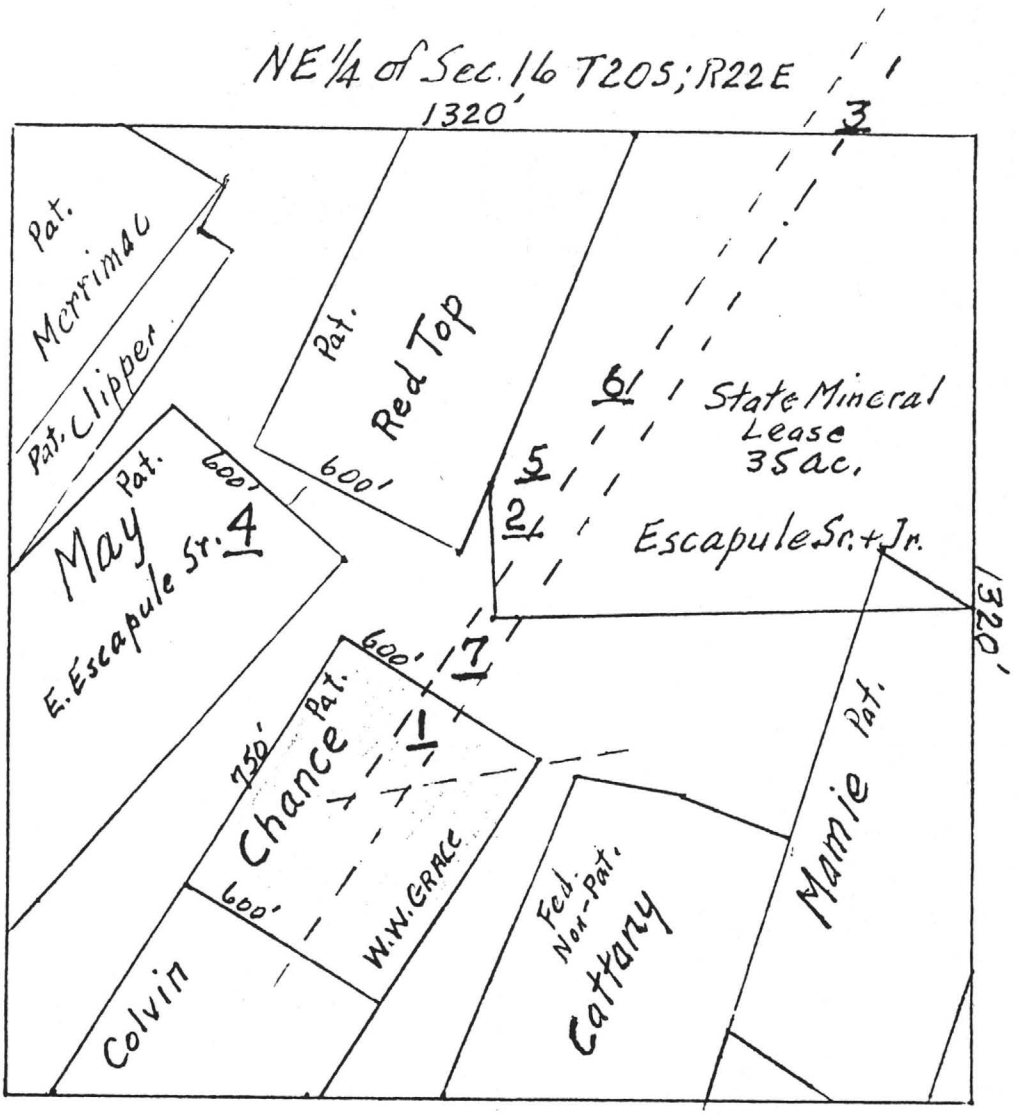


Approx. but not to scale .2 in = 100'

1. Page 8 of Sarle report shows ore 18'x22' by width of vein with assays from 100 to 1200 oz. silver
2. Approx. 500' N. of Chance is Santa Anna Mine that produced high grade
3. Solstice Mine now being worked by Escapules and processed at site 4.
4. Site of leaching for ore from Solstice Mine
5. Site of drill hole showing silver 10.06 and gold .52 at depth between 80 and 90 foot depth. (about 150' N of Santa Anna Mine
6. Site of North Bonanza Mine. See report page 33.
7. Twenty-two tons with value @ 2273 per ton smelter report.

Area between claims exc. Escapule 35 ac. lease is held under State mineral rights by Silver Bonanza Mining Co. Inc.

NE 1/4 of Sec. 16 T20S; R22E



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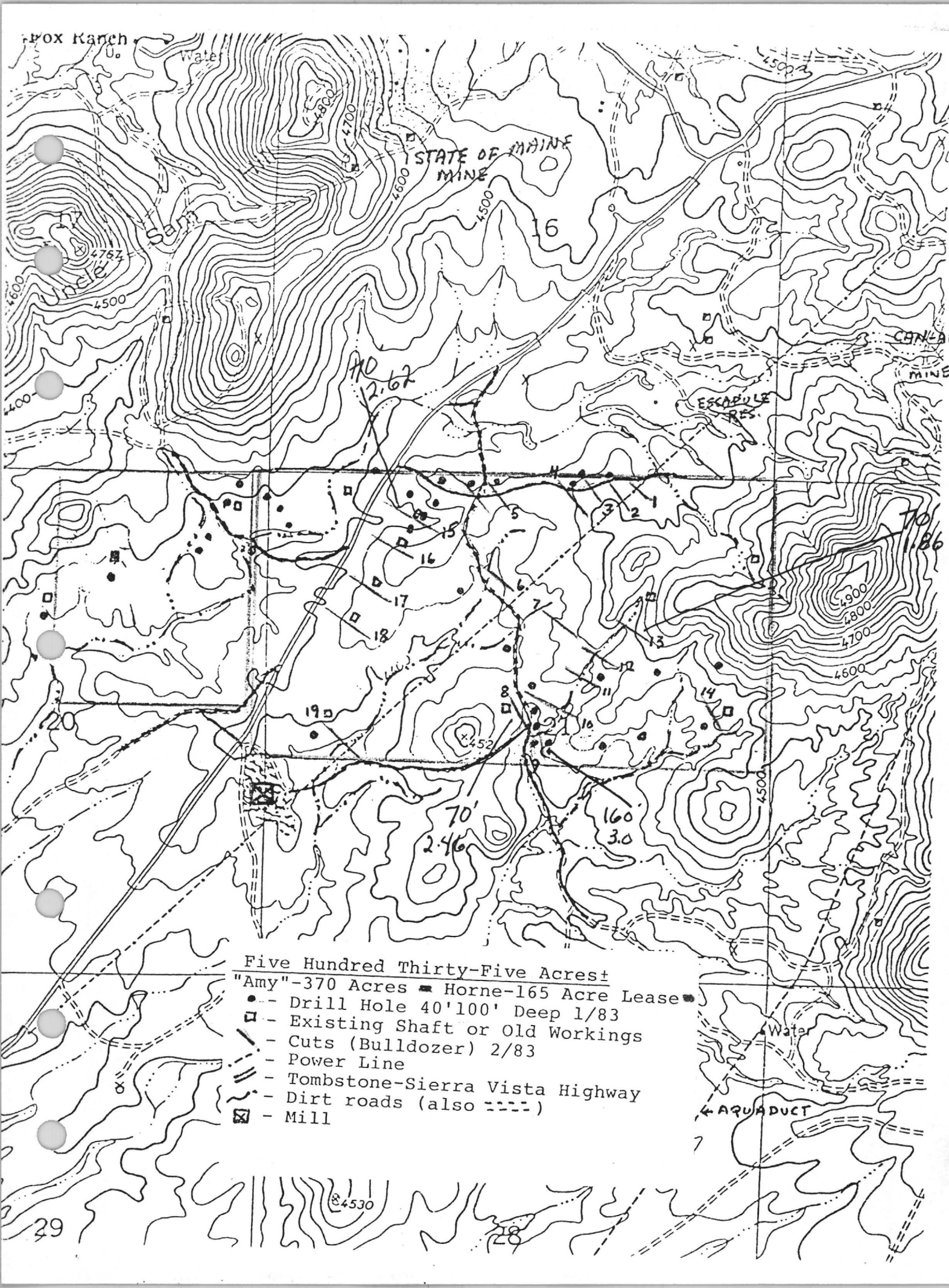

Box Ranch
Water
STATE OF MAINE MINE
16
17
Uncle Sam
4767
CANYON MINE
ESCAPULE RES.
110
2.62
70
1.86
20
70'
2.46
160
3.0
X452
Water
AQUADUCT
29
28
Five Hundred Thirty-Five Acres±
"Amy"-370 Acres ▬ Horne-165 Acre Lease
● - Drill Hole 40'100' Deep 1/83
□ - Existing Shaft or Old Workings
/ - Cuts (Bulldozer) 2/83
-·-·- Power Line
// - Tombstone-Sierra Vista Highway
~ - Dirt roads (also - - - -)
⊠ - Mill

Geol. - Drilling
(1968) Austral Oil

March 7, 1968

Austral Oil Company, Inc.
Houston, Texas

Tombstone Area, Cochise County, Arizona, Mining Dump surveyed for cubic yardage from February 22 to March 3, 1968 for Austral Oil Company, Inc., of Houston, Texas, with the following results:

1	North Bananza 1 dump	2,547.3	cu. yds
2	Southern 1 dump	2,493.5	" "
3	Santa Ana Numerous combined small dumps	280.7	" "
4	Red Top 2 dumps	105.2	" "
5	South Bananza Numerous combined dumps	2,497.4	" "
6	Chance Numerous combined dumps	1,329.2	" "
6a	Chance (Cyanide Talings)	178	" "
7	Brother John Numerous combined dumps	3,081.9	" "
8	Triple X 1 dump	392.3	" "
9	Earnest 1 dump	254.5	" "
10	May 1 dump	85.3	" "
11	Maine 3 dumps (large)	22,091.6	" "
12	Uncle Sam 3 dumps (small)	341.6	" "
13	South Fox Group 4 dumps (small)	316	" "
14	North Fox Group 3 dumps (small)	685	" "

March 11, 1968

Austral Oil Company, Inc.
Houston, Texas

Tombstone Area, Cochise County, Arizona, Mining Dump surveyed for cubic yardage from February 22 to March 3, 1968 for Austral Oil Company, Inc., of Houston, Texas, with the following results:

1	North Bananza		2,546.3 cu. yds.
2	Southern		2,493.5 " "
3	Santa Ana		
	A.	42.5	
	B.	10.3	
	C.	70.2	
	D.	157.7	
			280.7 " "
4	Red Top		
	A	70.7	
		34.5	
			105.2 " "
5	South Bonanza		
	A.		
	B.	36.8	
	C.	35.4	
	D.	80.2	
	E.	61.4	
	F.	40.2	
	G.	190.1	
	H.	195.6	
	I.	204.0	
	J.	182.4	
	K.	192.9	
	L.	336.2	
	M.	230.0	
	N.	276.7	
	O	435.5	
			2,497.4 " "
6	Chance		
	A.	306.0	
	B.	15.0	
	C.	20.0	
	D.	33.0	
	E.	4.0	
	F.	18.0	

6	Chance (Continued)		
	G.	28.0	
	H.	12.0	
	I.	24.00	
	J.	6.0	
	K.	266.0	
	L.	110.0	
	M.	125.0	
	N.	138.2	
	O.	49.0	
	P.	92.0	
	Q.	83.0	
			1,229.2 cu. yds.
6	Chance (Cyanide Tailings)		
	A.	178.0	178. " "
7	Brother John		
	A.	2,466.0	
	B.	11.0	
	C.	4.0	
	D.	30.0	
	E.	5.9	
	F.	3.1	
	G.	4.2	
	H.	5.5	
	I.	466.0	
	J.	5.7	
	K.	4.4	
	L.	4.2	
	M.	20.0	
	N.	20.0	
		6.0	
		5.8	
		3.0	
		4.8	
		6.0	
		6.3	
			3,081.9 " "
8	Triple X		392.3 " "
9	Earnist		254.5 " "
10	May		85.3 " "

11	Maine		
	A.	1,288.2	
	B.	13,703.0	
	C.	7,100.4	
			22,091.6 cu. yds.
12	Uncle Sam		
	A.	102.0	
	B.	232.0	
	C.	7.6	
			341.6 " "
13	South Fox		
	A.	104.0	
	B.	56.0	
	C.	72.0	
	D.	84.0	
			316.0 " "
14	North Fox		
	A.	52.0	
	B.	107.0	
	C.	526.0	
			685.0 " "

Trace Analysis Assays

ROCKY MOUNTAIN GEOCHEMICAL LABORATORIES

519 North Washington Ave. Phone: 445-4393

PRESCOTT, ARIZONA 86301

CHEMICAL ANALYSIS CERTIFICATE

Date May 11, 1968 Page 1 of 11

Client Mr. William Lundby
Austral Oil Company
Box 695
Tombstone, Arizona

Submitted by W. Lundby

Date Received 5/2/68

Report on 28 Rock Chip & 213 Soil Pulp Samples

Analysis COPPER, SILVER

Remarks Atomic Absorption method used.

All results given in parts per million.
-5 is read "less than 5 part per million."
-¼ is read "less than ¼ part per million."

Pulps to be saved for at least six months.

Rock & Soil
Grids over
State of maine
area sect
16
R = Rock
S = Soil
uncertain of
grid origin

SAMPLE NO.	COPPER	SILVER
GT-5-R	-5	-¼
GT-7-R	-5	-¼
GT-11-R	10	-¼

cc: Encl.
File

REGISTERED ASSAYER CERTIFICATE NO. 6847 EDWIN ADAM JOHNSON Date Signed 5/11/68 ARIZONA, U.S.A.

(All results given in parts per million)

SAMPLE NO.	COPPER	SILVER
GT-14-R	5	-¼
GT-22-R	10	-¼
GT-26-R	170	½
GT-29-R	30	-¼
GT-41-R	5	-¼
GT-42-R	10	¼
GT-44-R	-5	½
GT-48-R	10	-¼
GT-54-R	10	-¼
GT-61-R	20	¼
GT-72-R	5	-¼
GT-81-R	10	-¼
GT-84-R	10	-¼
GT-103-R	5	-¼
GT-109-R	20	-¼
GT-121-R	10	-¼
GT-123-R	10	-¼
GT-140-R	20	¼
GT-170-R	30	¼
GT-188-R	15	-¼
GT-317-R	10	-¼
GT-321-R	15	-¼
GT-329-R	20	-¼
GT-330-R	5	-¼
GT-332-R	10	-¼

(All results given in parts per million)

SAMPLE NO.	COPPER	SILVER
GT-1-S	110	12½
GT-2-S	55	2-3/4
GT-3-S	40	3/4
GT-4-S	25	1¼
GT-5-S	25	¼
GT-6-S	40	1
GT-7-S	25	3/4
GT-8-S	45	1½
GT-9-S	45	5½
GT-10-S	40	1-3/4
GT-11-S	50	½
GT-12-S	50	½
GT-13-S	55	11
GT-14-S	40	1¼
GT-15-S	60	2
GT-16-S	30	1¼
GT-17-S	50	1¼
GT-18-S	50	1¼
GT-19-S	30	1-3/4
GT-20-S	370	200
GT-21-S	35	½
GT-22-S	70	2
GT-23-S	60	2
GT-24-S	40	½
GT-25-S	50	2-3/4

(All results given in parts per million)

SAMPLE NO.	COPPER	SILVER
GT-26-S	40	3-3/4
GT-27-S	55	½
GT-28-S	25	¼
GT-29-S	60	¼
GT-30-S	40	½
GT-31-S	40	3/4
GT-32-S	45	2-3/4
GT-33-S	40	½
GT-34-S	50	½
GT-35-S	40	½
GT-36-S	40	-¼
GT-37-S	40	¼
GT-38-S	40	3/4
GT-39-S	40	5½
GT-40-S	25	¼
GT-41-S	50	¼
GT-42-S	40	¼
GT-43-S	45	1¼
GT-45-S	60	4
GT-46-S	600	85
GT-47-S	105	7
GT-48-S	60	4
GT-49-S	65	1½
GT-50-S	55	3-3/4
GT-51-S	50	4
GT-52-S	45	½

(All results given in parts per million)

SAM PLE NO.	COPPER	SILVER
GT-53-S	45	1½
GT-55-S	40	¼
GT-56-S	50	½
GT-57-S	700	380
GT-58-S	45	1½
GT-59-S	70	3
GT-60-S	140	15
GT-62-S	45	-¼
GT-63-S	55	3/4
GT-64-S	40	¼
GT-65-S	60	¼
GT-66-S	55	¼
GT-67-S	60	½
GT-68-S	50	¼
GT-69-S	40	½
GT-70-S	50	2
GT-71-S	55	¼
GT-73-S	55	½
GT-74-S	70	2-3/4
GT-75-S	45	½
GT-76(A)-S *	70	3
GT-76(B)-S *	45	1¼
GT-77-S	35	-¼
GT-78-S	45	-¼
GT-79-S	40	-¼
GT-80-S	35	-¼

* These two duplicate numbered samples were marked (A), (B), by us.

(All results given in parts per million)

SAMPLE NO.	COPPER	SILVER
GT-82-S	40	¼
GT-83-S	35	½
GT-85-S	240	22
GT-86-S	60	1
GT-87-S	50	½
GT-88-S	55	-¼
GT-89-S	40	¼
GT-90-S	45	-¼
GT-91-S	45	-¼
GT-92-S	40	-¼
GT-93-S	50	¼
GT-94-S	60	-¼
GT-95-S	60	½
GT-96-S	65	¼
GT-97-S	50	¼
GT-98-S	40	-¼
GT-99-S	45	-¼
GT-100-S	75	-¼
GT-101-S	40	-¼
GT-102-S	55	-¼
GT-103-S	45	¼
GT-104-S	70	-¼
GT-105-S	50	-¼
GT-106-S	35	-¼
GT-107-S	55	-¼
GT-108-S	45	-¼

(All results given in parts per million)

SAMPLE NO.	COPPER	SILVER
GT-109-S	45	-¼
GT-110-S	50	-¼
GT-111-S	55	½
GT-112-S	1300	210
GT-113-S	60	1
GT-114-S	40	-¼
GT-115-S	45	-¼
GT-116-S	50	-¼
GT-117-S	40	-¼
GT-118-S	65	-¼
GT-119-S	50	-¼
GT-120-S	45	16
GT-122-S	60	½
GT-124-S	40	-¼
GT-125-S	50	-¼
GT-126-S	50	1-3/4
GT-127-S	45	-¼
GT-128-S	40	-¼
GT-129-S	50	-¼
GT-130-S	65	-¼
GT-131-S	40	¼
GT-132-S	40	½
GT-133-S	50	-¼
GT-134-S	40	1
GT-135-S	160	65
GT-136-S	45	½
GT-137-S	50	¼

(All results given in parts per million.)

SAMPLE NO.	COPPER	SILVER
GT-138-S	50	½
GT-139-S	55	¼
GT-141-S	75	7
GT-142-S	45	-¼
GT-143-S	75	1¼
GT-144-S	55	¼
GT-145-S	55	-¼
GT-146-S	55	-¼
GT-147-S	65	2
GT-148-S	60	-¼
GT-149-S	50	-¼
GT-150-S	30	-¼
GT-151-S	45	½
GT-152-S	70	1¼
GT-153-S	20	¼
GT-154-S	40	-¼
GT-155-S	35	-¼
GT-156-S	30	-¼
GT-157-S	40	-¼
GT-158-S	40	-¼
GT-159-S	45	¼
GT-160-S	45	-¼
GT-161-S	30	-¼
GT-162-S	40	½
GT-163-S	35	-¼

(All results given in parts per million.)

SAMPLE NO.	COPPER	SILVER
GT-164-S	30	-¼
GT-165-S	40	-¼
GT-166-S	40	¼
GT-167-S	40	-¼
GT-168-S	30	-¼
GT-169-S	35	-¼
GT-171-S	55	½
GT-172-S	35	¼
GT-173-S	40	-¼
GT-174-S	30	-¼
GT=175-S	50	-¼
GT-176-S	40	-¼
GT-177-S	40	-¼
GT-178-S	45	¼
GT-179-S	50	2
GT-180-S	40	¼
GT-181-S	35	-¼
GT-182-S	40	¼
GT-183-S	35	-¼
GT-185-S	40	-¼
GT-186-S	110	4
GT-187-S	55	-¼
GT-189-S	20	-¼
GT-201-S	55	¼
GT-202-S	35	-¼

(All results given in parts per million.)

SAMPLE NO.	COPPER	SILVER
GT-300-S	50	$\frac{1}{4}$
GT-301-S	45	$\frac{1}{4}$
GT-302-S	40	$\frac{1}{4}$
GT-303-S	35	$-\frac{1}{4}$
GT-304-S	35	$-\frac{1}{4}$
GT-305-S	40	$-\frac{1}{4}$
GT-306-S	40	$-\frac{1}{4}$
GT-307-S	40	$-\frac{1}{4}$
GT-308-S	40	$-\frac{1}{4}$
GT-309-S	40	$\frac{1}{4}$
GT-310-S	35	$-\frac{1}{4}$
GT-311-S	45	$1\frac{1}{4}$
GT-312-S	60	$\frac{1}{4}$
GT-313-S	20	$-\frac{1}{4}$
GT-314-S	35	$-\frac{1}{4}$
GT-315-S	20	$-\frac{1}{4}$
GT-316-S	30	$-\frac{1}{4}$
GT-318-S	35	$-\frac{1}{4}$
GT-319-S	50	$-\frac{1}{4}$
GT-320-S	55	$-\frac{1}{4}$
GT-322-S	70	$-\frac{1}{4}$
GT-323-S	65	$\frac{1}{4}$
GT-324-S	45	$-\frac{1}{4}$
GT-325-S	35	$-\frac{1}{4}$
GT-326-S	65	$-\frac{1}{4}$

(All results given in parts per million.)

SAMPLE NO.	COPPER	SILVER
GT-327-S	40	-¼
GT-328-S	40	-¼
GT-331-S	60	1¼
GT-333-S	35	-¼
GT-334-S	35	-¼
GT-335-S	55	-¼
GT-336-S	40	¼
GT-337-S	60	¼

SOUTHWESTERN ASSAYERS & CHEMISTS, Inc.

Town 1 646

REGISTERED ASSAYERS

FELIX K. DURAZO
WIL WRIGHT
ARIZONA REG. NO. 5875

P. O. BOX 7517
TUCSON, ARIZONA 85713

710 E. EVANS BLVD.
PHONE 602-294-5811

Austral Oil Company Inc.
2700 Humble Building
Houston, Texas 77002

cc: Lundby

JOB # 002460
RECEIVED 5-1-68
REPORTED 5-4-68

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD %	COPPER %	ZINC %		MOLYBDENUM %
BC-1	Nil	.42					
2	Nil	.28					
3	.010	.75					
4	.005	.88					
B-5	Nil	1.24					
6	NIl	.66					
7	Nil	.54					
8	.008	1.13					
9	.007	2.55					
10	.012	7.25					
11	Trace	.56					
12	Trace	1.60					
13	Trace	2.04					
14	.004	1.08					
15	.003	1.14					
16	.003	2.12					
17	Nil	.48					
18	Trace	.40					
19	.010	1.35					
20	Nil	.52					
21	.003	.34					
22	.003	2.86					
23	.012	1.43					
24	.020	52.38					
25	.014	12.13					
26	No sample						
27	.020	23.08					
28	.008	7.64					

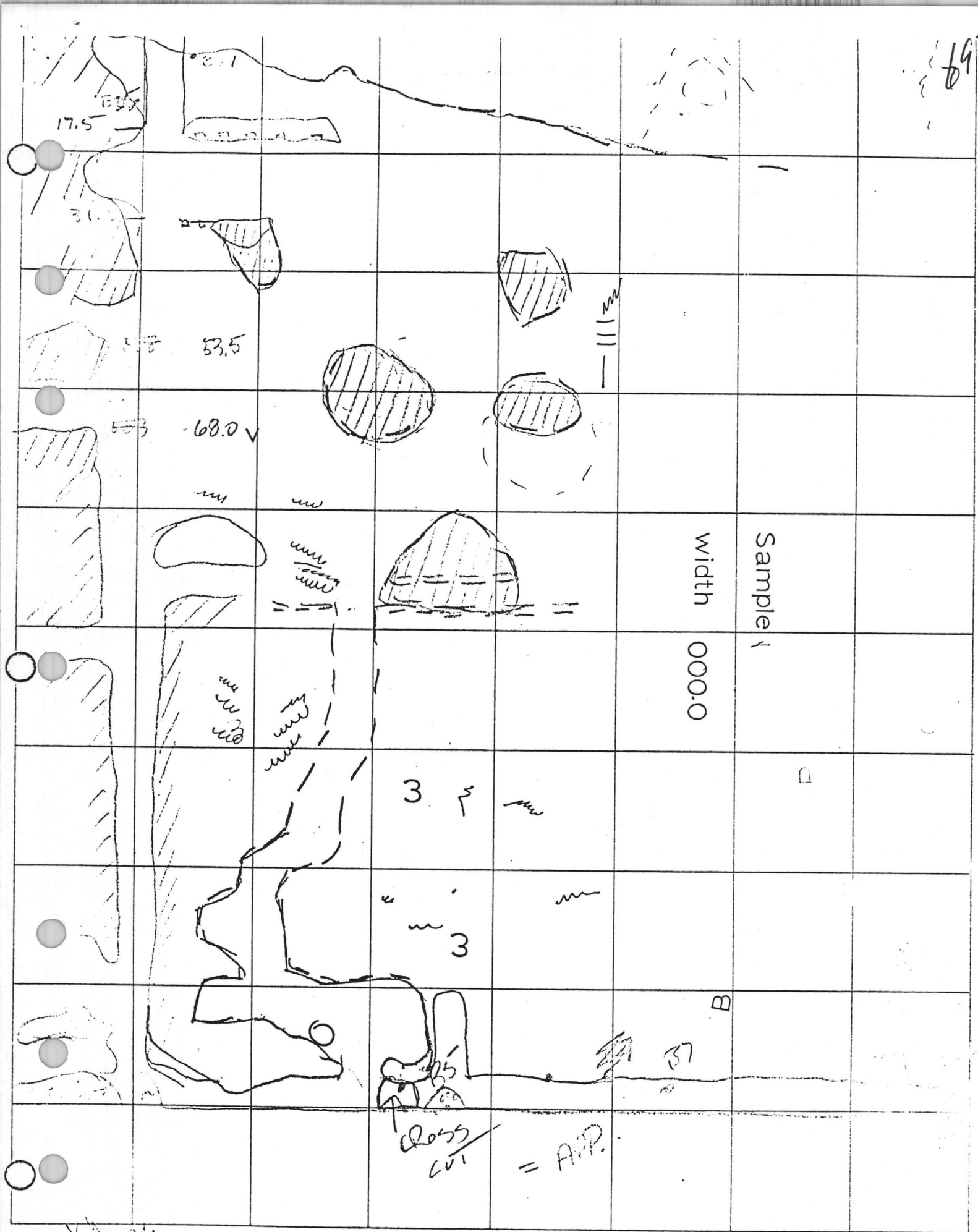
So. Bonanza

RECEIVED
APR 2 1969
JAMES STEWART COMPANY
PHOENIX, ARIZONA

CHARGE $ 101.25

* Gold and Silver reported in troy oz. per 2,000 lb. ton.

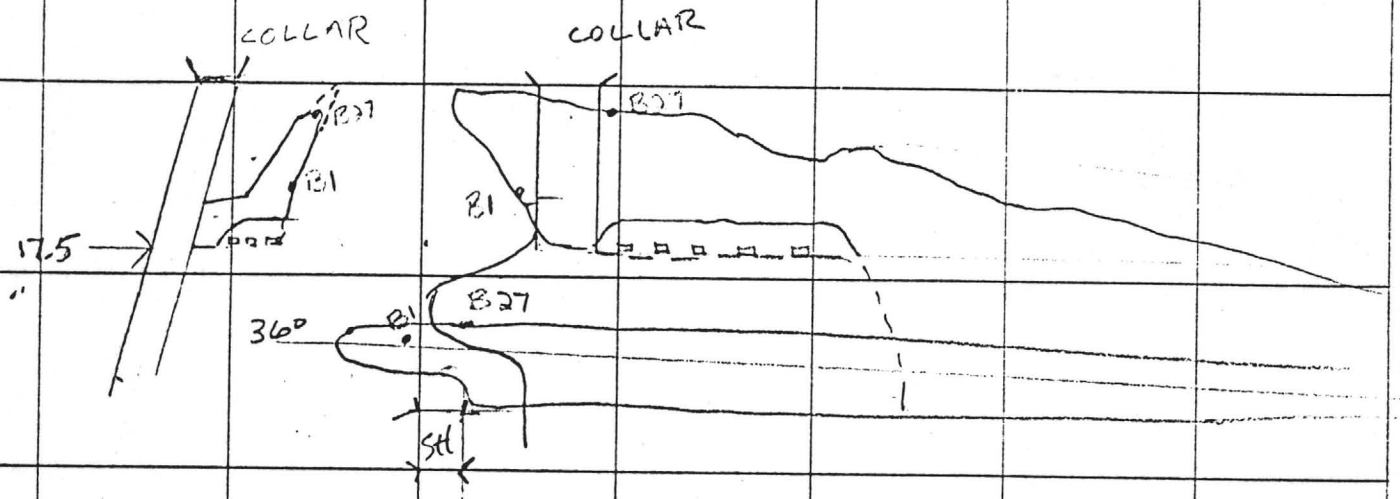
INVOICE



MINE _____ LOCATION _____ LEVEL _____

GEOLOGY BY _____ SURVEY _____ DATE _____ SCALE _____

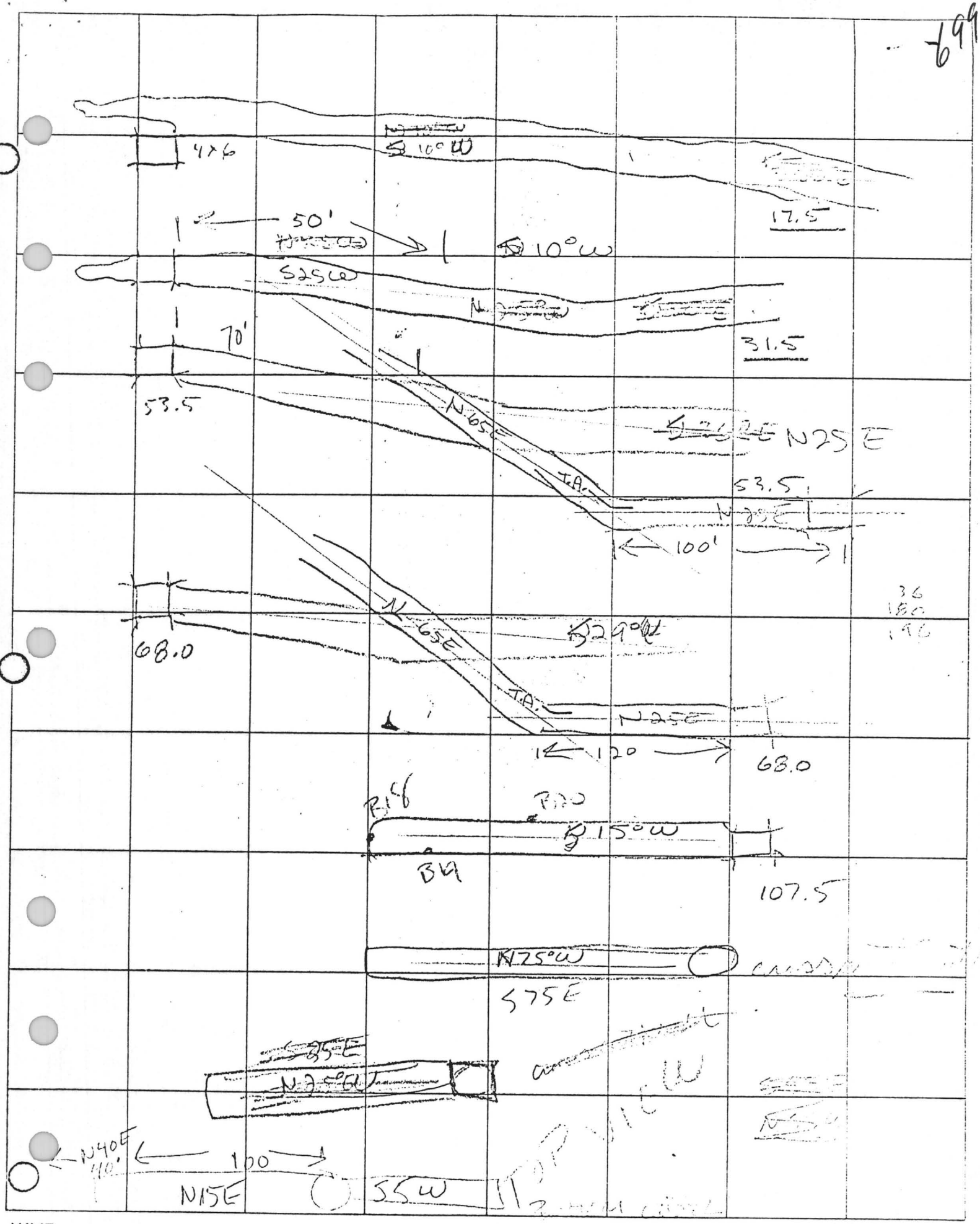
_____ E _____ EL. _____



MINE _____ LOCATION _____ LEVEL _____

GEOLOGY BY _____ SURVEY _____ DATE _____ SCALE _____

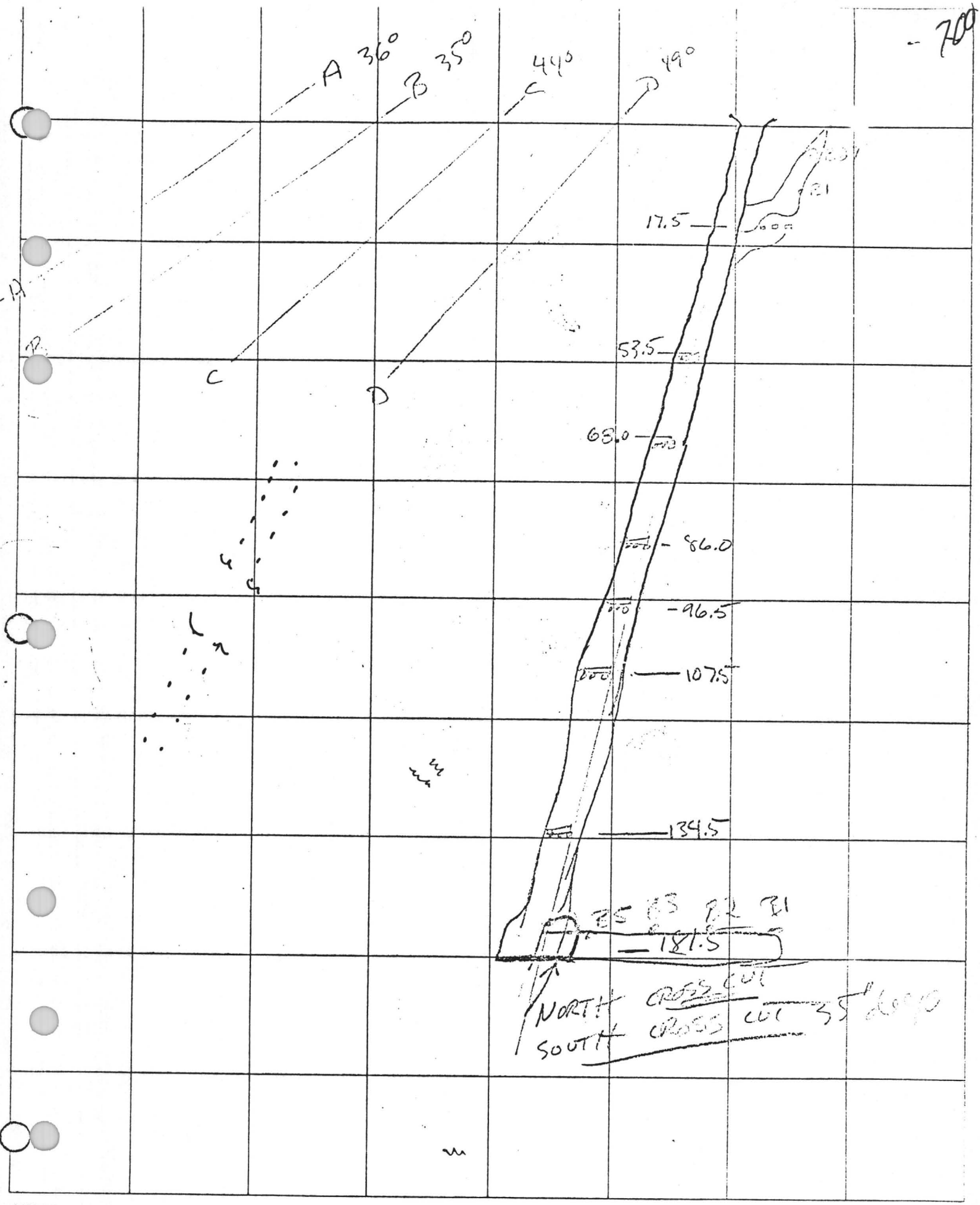
N _____ E _____ EL. _____



MINE _____ LOCATION _____ LEVEL _____

GEOLOGY BY _____ SURVEY _____ DATE _____ SCALE _____

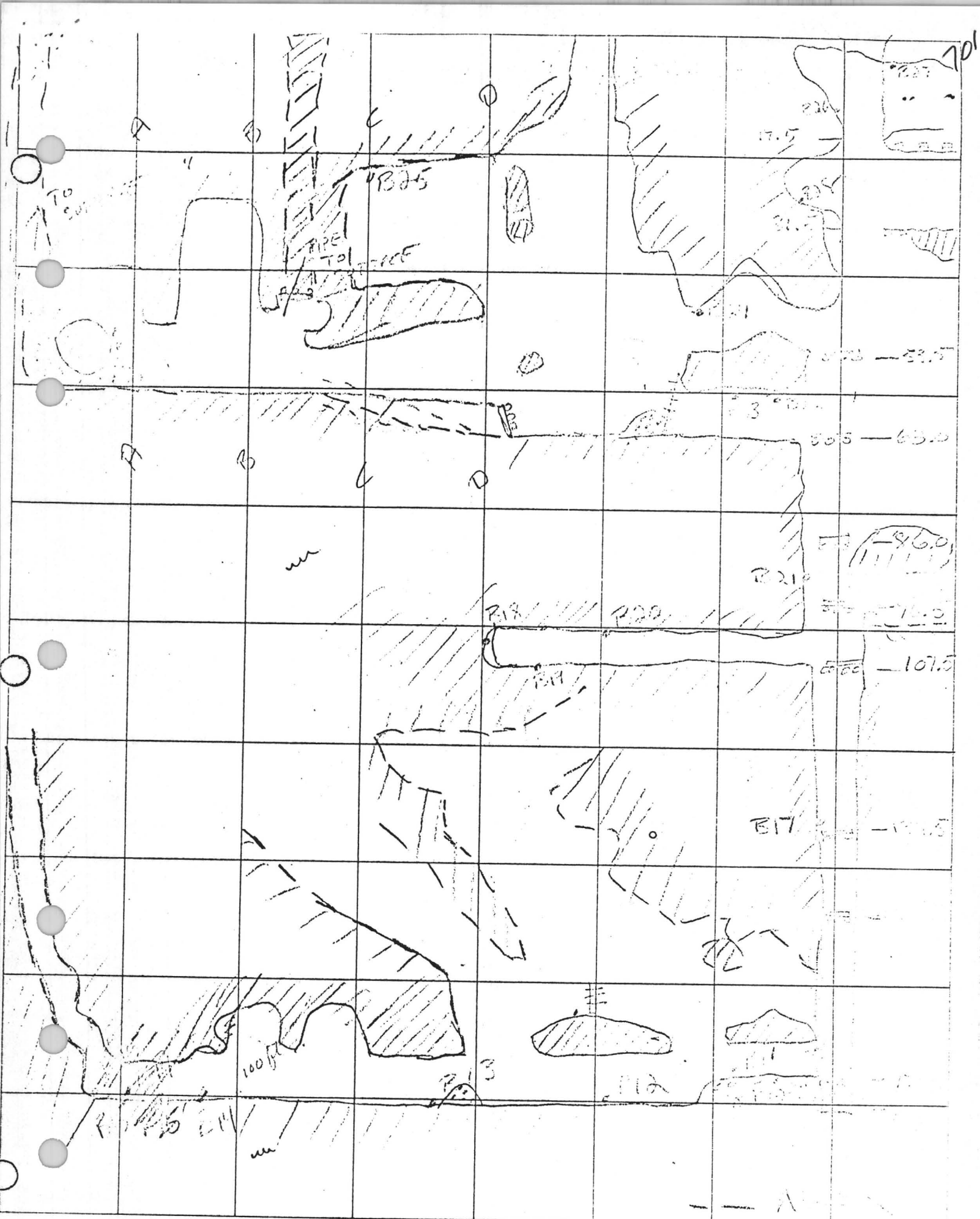
N _____ E _____ EL. _____



MINE _____ LOCATION _____ LEVEL _____

GEOLOGY BY _____ SURVEY _____ DATE _____ SCALE _____

N _____ E _____ EL. _____



MINE _____ LOCATION _____ LEVEL _____

GEOLOGY BY _____ SURVEY _____ DATE _____ SCALE _____

N _____ E _____ EL. _____

SOUTHWESTERN ASSAYERS & CHEMISTS, Inc.

REGISTERED ASSAYERS

FELIX K. DURAZO
WIL WRIGHT
ARIZONA REG. NO. 5875

P. O. BOX 7517
TUCSON, ARIZONA 85713

710 E. EVANS BLVD.
PHONE 602-294-5811

Austral Oil Company
2700 Humble Building
Houston, Texas

JOB # 002740
RECEIVED 7-2-68
REPORTED 7-7-68

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD %	COPPER %	ZINC %		MOLYBDENUM %
95L:							
190 NO.		.06					
30 S.	Nil	3.00					
50 W.		.34					
433 L:							
105 NW	Nil	2.34					
60 S	Nil	5.24					
175N50W	Nil	.62					
195L:							
76 S.	Nil	7.26					
105 NO.	Nil	8.66					
356L 136NO.	Nil	9.28					
356L100 NO.	Nil	1.52					
300L 77NO. 41W	Nil	8.12					
141L-30S	.003	21.06					
161L 35 NO.	Nil	6.32					
480L 164S 117W	Nil	Trace					

REGISTERED ASSAYER CERTIFICATE NO. 5875 WILL WRIGHT Date Signed Arizona U. S. A.

CHARGE $ 52.00

* Gold and Silver reported in troy oz. per 2,000 lb. ton.

VOICE

B 18 North
4' across face
East of vein
60 ft to face

B ~~22~~ 25
180' approx
12 in vein
near surface

B 23
16 ft from shaft
8 ft deep in crosscut
to ~~South~~ West
14 in vein

B 19
across vein
in hanging wall
2 ft. across
to ft 4 19

B 27
2 ft vein
South of shaft
near surface

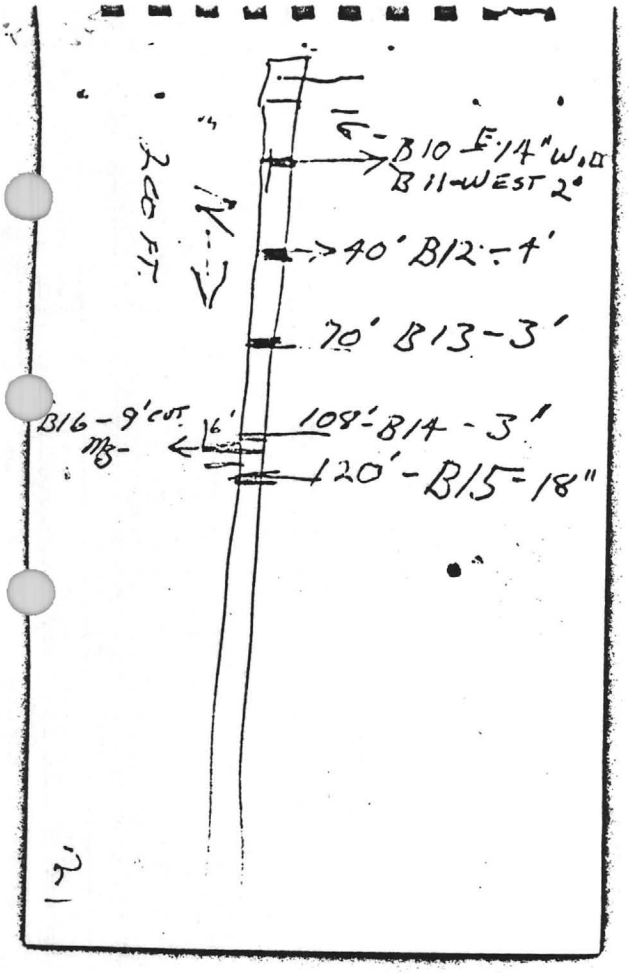
B 24
28 ft from shaft
12 in vein overhead
30 ft.

B 20
across vein
overhead
5 ft. across
34 ft from shaft

B 28
10 ft South of
shaft
30 ft. from Surface
3 ft vein

B 21
3 ft. across vein
down shaft

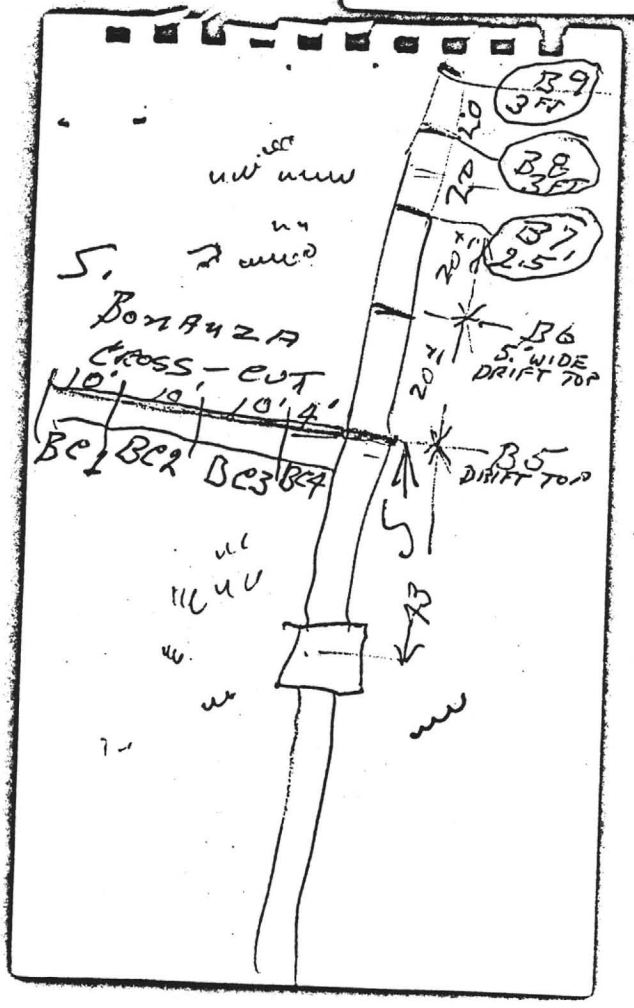
B 22
8 ft from shaft
2 ft vein start
of ~~South~~ West crosscut



B20
45 ft to pilar
12 in min
15 ft from level

#24
B22

B20 26



SOUTHWESTERN ASSAYERS & CHEMISTS, Inc.

706

REGISTERED ASSAYERS

FELIX K. DURAZO
WIL WRIGHT
ARIZONA REG. NO. 5875

P. O. BOX 7517
TUCSON, ARIZONA 85713

710 E. EVANS BLVD.
PHONE 602-294-5811

Austral Oil Company
2700 Humble Building
Houston, Texas

JOB # 002771
RECEIVED 7-10-68
REPORTED 7-13-68

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD %	COPPER %	ZINC %		MOLYBDENUM %
	CaO %	MgO %	Fe %	S %	SiO_2 %	Insol %	Al_2O_3 %
Dump #: 1	.56	.22	3.95	.49	73.3	9.9	3.9
2	1.25	.30	4.37	.10	70.3	8.3	4.1
3	.91	.29	3.25	.33	71.9	8.1	4.7
4	.70	.27	4.85	.41	66.6	13.3	4.5
5	.56	.23	4.25	.38	79.8	1.8	3.7

SOUTHWESTERN ASSAYERS & CHEMISTS, Inc.

REGISTERED ASSAYERS

FELIX K. DURAZO
WIL WRIGHT
ARIZONA REG. NO. 5875

P. O. BOX 7517
TUCSON, ARIZONA 85713

710 E. EVANS BLVD.
PHONE 602-294-5811

Austral Oil Company
2700 Humble Building
Houston, Texas

JOB # 002771
RECEIVED 7-10-68
REPORTED 7-13-68

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD %	COPPER %	ZINC %		MOLYBDENUM %	
	CaO %	MgO %	Fe %	S %	SiO_2 %	Insol %	Al_2O_3 %	Ag
Dump #: 1	.56	.22	3.95	.49	73.3	9.9	3.9	6.10
2	1.25	.30	4.37	.10	70.3	8.3	4.1	5.78
3	.91	.29	3.25	.33	71.9	8.1	4.7	2.46
4	.70	.27	4.85	.41	66.6	13.3	4.5	2.60
5	.56	.23	4.25	.38	79.8	1.8	3.7	1.24
6	.52	.30	2.79	.34	72.5	2.8	4.5	1.60
7	.56	.27	3.06	.22	75.0	11.1	3.9	4.54
8	.65	.22	2.30	.16	73.5	12.7	3.5	4.94
9	.93	.23	3.50	.14	76.5	.80	3.4	1.84
10	3.95	.39	3.45	.07	70.0	11.7	3.0	2.80
11	16.6	.98	3.40	.05	47.50	7.7	4.1	1.02
12	1.99	.65	2.97	.04	67.7	13.1	3.9	1.94
13	2.07	.44	3.01	.09	70.7	8.8	5.1	2.34

70.4 Av.

REGISTERED ASSAYER
PERMANENT NO. 5395
WILBUR D. WRIGHT
Date Signed
Arizona U. S. A.

$ 481.00 less 10% quantity discount of 48.10

CHARGE $ 432.90

* Gold and Silver reported in troy oz. per 2,000 lb. ton.

INVOICE

SOUTHWESTERN ASSAYERS & CHEMISTS, Inc.

REGISTERED ASSAYERS

FELIX K. DURAZO
WIL WRIGHT
ARIZONA REG. NO. 5875

P. O. BOX 7517
TUCSON, ARIZONA 85713

710 E. EVANS BLVD.
PHONE 602-294-5811

Austral Oil Company
2700 Humble Building
Houston, Texas

JOB # 002771
RECEIVED 7-10-68
REPORTED 7-13-68

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD %	COPPER %	ZINC %		MOLYBDENUM %
	CaO %	MgO %	Fe %	S %	SiO_2 %	Insol %	Al_2O_3 %
Dump #: 1	.56	.22	3.95	.49	73.3	9.9	3.9
2	1.25	.30	4.37	.10	70.3	8.3	4.1
3	.91	.29	3.25	.33	71.9	8.1	4.7
4	.70	.27	4.85	.41	66.6	13.3	4.5
5	.56	.23	4.25	.38	79.8	1.8	3.7
6	.52	.30	2.79	.34	72.5	2.8	4.5
7	.56	.27	3.06	.22	75.0	11.1	3.9
8	.65	.22	2.30	.16	73.5	12.7	3.5
9	.93	.23	3.50	.14	76.5	.80	3.4
10	3.95	.39	3.45	.07	70.0	11.7	3.0
11	16.6	.98	3.40	.05	47.50	7.7	4.1
12	1.99	.65	2.97	.04	67.7	13.1	3.9
13	2.07	.44	3.01	.09	70.7	8.8	5.1

REGISTERED ASSAYER
PERMANENT CERT. NO.
5875
WILBUR D. WRIGHT
Date Signed
Arizona U. S. A.

$ 481.00 less 10% quantity discount of 48.10

CHARGE $ 432.90

* Gold and Silver reported in troy oz. per 2,000 lb. ton.

INVOICE

SOUTHWESTERN ASSAYERS & CHEMISTS, Inc.

REGISTERED ASSAYERS

FELIX K. DURAZO
WIL WRIGHT
ARIZONA REG. NO. 5875

P. O. BOX 7517
TUCSON, ARIZONA 85713

710 E. EVANS BLVD.
PHONE 602-294-5811

Austral Oil Company
2700 Humble Building
Houston, Texas

JOB # 002739
RECEIVED 7-2-68
REPORTED 7-8-68

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD %	COPPER %	ZINC %		MOLYBDENUM %
Dump Samples:							
# 9	.003	1.84	North Bonanza				
10	.004	2.80	Solstice				
11	Trace	1.02	Joseph				
12	Nil	1.94	Brother Jonathan				

REGISTERED ASSAYER
CERTIFICATE NO.
5875
WILBUR D.
WRIGHT
Date Signed
Arizona U. S. A.

CHARGE $ 16.00

* Gold and Silver reported in troy oz. per 2,000 lb. ton.

INVOICE

SOUTHWESTERN ASSAYERS & CHEMISTS, Inc.

REGISTERED ASSAYERS

FELIX K. DURAZO
WIL WRIGHT
ARIZONA REG. NO. 5875

P. O. BOX 7517
TUCSON, ARIZONA 85713

710 E. EVANS BLVD.
PHONE 602-294-5811

Austral Oil Company
2700 Humble Building
H ouston, Texas

JOB # 002751
RECEIVED 7-5-68
REPORTED 7-9-68

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD %	COPPER %	ZINC %		MOLYBDENUM %
Dump # 13	Nil	2.34	— Mamie				

$ 4.00

* Gold and Silver reported in troy oz. per 2,000 lb. ton.

INVOICE

SOUTHWESTERN ASSAYERS & CHEMISTS, Inc.

REGISTERED ASSAYERS

FELIX K. DURAZO
WIL WRIGHT
ARIZONA REG. NO. 5875

P. O. BOX 7517
TUCSON, ARIZONA 85713

710 E. EVANS BLVD.
PHONE 602-294-5811

Austral Oil Company
2700 Humble Building
Houston, Texas

JOB # 002703
RECEIVED 6-27-68
REPORTED 6-27-68

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD %	COPPER %	ZINC %		MOLYBDENUM %
# 7 State Maine	Nil	4.54					
# 8 State of Maine (course:	Nil	4.94					

REGISTERED ASSAYER
CERTIFICATE NO.
5875
WILBUR D.
WRIGHT
Date Signed 6-27-68
Arizona U. S. A.

CHARGE $ 8.00

* Gold and Silver reported in troy oz. per 2,000 lb. ton.

INVOICE

SOUTHWESTERN ASSAYERS & CHEMISTS, Inc.

REGISTERED ASSAYERS

FELIX K. DURAZO
WIL WRIGHT
ARIZONA REG. NO. 5875

P. O. BOX 7517
TUCSON, ARIZONA 85713

710 E. EVANS BLVD.
PHONE 602-294-5811

Austral Oil Company Inc.
2700 Humble Building
Houston, Texas 77002

JOB # 002618
RECEIVED 6-11-68
REPORTED 6-13-68

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD %	COPPER %	ZINC %		MOLYBDENUM %
Dump #6	Nil	1.60					

Uncle Sam

REGISTERED ASSAYER CERTIFICATE NO. 5875 WILBUR D. WRIGHT Date Signed 6/13/68 Arizona U. S. A.

CHARGE $ 3.75

* Gold and Silver reported in troy oz. per 2,000 lb. ton.

INVOICE

SOUTHWESTERN ASSAYERS & CHEMISTS, Inc.

REGISTERED ASSAYERS

FELIX K. DURAZO
WIL WRIGHT
ARIZONA REG. NO. 5875

P. O. BOX 7517
TUCSON, ARIZONA 85713

710 E. EVANS BLVD.
PHONE 602-294-5811

Austral Oil Inc.
2700 Humble Building
Houston, Texas 77002

CC; Lundby

JOB # 002574
RECEIVED 5-29-68
REPORTED 6-4-68

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD %	COPPER %	ZINC %		MOLYBDENUM %
Dump: 3	Nil	2.46					
4	Nil	2.60					
5	.003	1.24					

Chance - So. Bonanza

REGISTERED ASSAYER
CERTIFICATE NO.
5875
WILBURN D.
WRIGHT
Date Signed 6-4
Arizona U. S. A.

CHARGE $ 11.25

* Gold and Silver reported in troy oz. per 2,000 lb. ton.

INVOICE

SOUTHWESTERN ASSAYERS & CHEMISTS, Inc.

REGISTERED ASSAYERS

FELIX K. DURAZO
WIL WRIGHT
ARIZONA REG. NO. 5875

P. O. BOX 7517
TUCSON, ARIZONA 85713

710 E. EVANS BLVD.
PHONE 602-294-5811

Austral Oil Company
2700 Humble Building
Houston, Texas 77002

JOB # 002542
RECEIVED 5-21-68
REPORTED 5-24-68

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD %	COPPER %	ZINC %		MOLYBDENUM %
SA# 7	.200	838.80					
8	.080	210.92					
9	.040	32.96					

Santa Ana

REGISTERED ASSAYER
CERTIFICATE NO.
5875
WILBUR D.
WRIGHT
Date Signed 3/24
Arizona U. S. A.

CHARGE $ 11.25

* Gold and Silver reported in troy oz. per 2,000 lb. ton.

INVOICE

SOUTHWESTERN ASSAYERS & CHEMISTS Co., Inc.

REGISTERED ASSAYERS

FELIX K. DURAZO
WIL WRIGHT
ARIZONA REG. NO. 5075

P. O. BOX 7517
TUCSON, ARIZONA 85713

710 E. EVANS BLVD.
PHONE 602-293-5011

Anatol Oil Company
2700 Humble Building
Houston, Texas

cc: Jaudig

JOB #. 032512
RECEIVED 5-14-58
REPORTED 5-16-58

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD %	COPPER %	ZINC %		MOLYBDENUM %
DD-1: 80-90	Nil	Trace					
Dump # 2	Nil	5.73					

THIS IS ASSAY REPORT ON DUMP OF CHANCE CLAIM
5.78 oz. per ton

CHARGE $ 7.50

* Gold and Silver reported in troy oz. per 2,000 lb. ton.

INVOICE

SOUTHWESTERN ASSAYERS & CHEMISTS, Inc.

REGISTERED ASSAYERS

FELIX K. DURAZO
WIL WRIGHT
ARIZONA REG. NO. 5875

P. O. BOX 7517
TUCSON, ARIZONA 85713

710 E. EVANS BLVD.
PHONE 602-294-5811

Austral Oil
2700 Humble Building
Houston, Texas 77002

cc: Lundby

JOB # 002489
RECEIVED 5-9-68
REPORTED 5-9-68

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD %	COPPER %	ZINC %	Manganese %	MOLYBDENUM %
D-1	.020	6.10				.20	

"Chance" area

CHARGE $ 6.75

* Gold and Silver reported in troy oz. per 2,000 lb. ton.

INVOICE

SOUTHWESTERN ASSAYERS & CHEMISTS, Inc.

REGISTERED ASSAYERS

FELIX K. DURAZO
WIL WRIGHT
ARIZONA REG. NO. 8675

P. O. BOX 7517
TUCSON, ARIZONA 85713

710 E. EVANS BLVD.
PHONE 602-294-5311

Austral Oil
2700 Humble Building
Houston, Texas 77002

cc: Lundy

JOB # 002459
RECEIVED 5-9-63
REPORTED 5-9-63

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD %	COPPER %	ZINC %	MANGANESE %	MOLYBDENUM %
D-1	.020	6.10				.20	

THIS IS ASSAY REPORT ON DUMP OF CHANCE CLAIM
SHOWING 6.10 oz. in silver

(APPROXIMATELY 10,000 tons)

CHARGE $ 6.75

* Gold and Silver reported in troy oz. per 2,000 lb. ton.

INVOICE

Dump # 2	Nil	5.78

"Chance" area

CHARGE $ 7.50

* Gold and Silver reported in troy oz. per 2,000 lb. ton.

INVOICE

SOUTHWESTERN ASSAYERS & CHEMISTS, Inc.

REGISTERED ASSAYERS

FELIX K. DURAZO
WIL WRIGHT
ARIZONA REG. NO. 5875

P. O. BOX 7517
TUCSON, ARIZONA 85713

710 E. EVANS BLVD.
PHONE 602-294-5811

Austral Oil Company Inc.
2700 Humble Building
Houston, Texas 77002

cc: W. Lumdby

JOB# 002423
RECEIVED 4-22-58
REPORTED 4-24-68

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD %	COPPER %	ZINC %		MOLYBDENUM %
SA-1	Nil	3.04					
SA-2	.016	1.63					
SA-3	Nil	2.40					
SA-4	.010	20.39					
SA-5	Trace	.64					
SA-6	Trace	.54					

CHARGE $ 22.50

(please hold payment until statement is received)

* Gold and Silver reported in troy oz. per 2,000 lb. ton.

INVOICE

METCON LABORATORY

PROJECT CT-15

FOR

AUSTRAL OIL COMPANY

TOMBSTONE, ARIZONA

July 22, 1968

SUMMARY

Preliminary work only has been done. Due to misunderstanding no further work was carried on until Mr. Carouso came in during the first week in July and indicated the urgency. Since then additional work has been done, the results of which are not all available. Cyanide assays of pregnant liquor, obtained at a custom assay office failed to check expected results within credibility figures.

PROCEDURE

A large sample of ore (over a thousand pounds) from the Tombstone, Arizona area was delivered to METCON LABORATORY by the Austral Oil Company. This was thoroughly mixed by coning several times after which coning and quartering continued until a small enough sample was achieved for screen analysis and an aliquot portion for head assay.

SCREEN ANALYSIS AND ASSAY OF SCREEN FRACTIONS

No.	SCREEN	WGT. %	ASSAY OZ/TON Au	ASSAY OZ/TON Ag	UNITS Au	UNITS Ag	% DISTRIBUTION Au	% DISTRIBUTION Ag
525	1.050	29.73	0.008	3.18	0.0024	0.945	35	29.8
526	0.742	10.10	0.010	3.21	0.0010	0.324	15	10.3
527	0.525	9.52	0.006	2.31	0.0006	0.220	9	6.9
528	0.371	8.08	0.008	2.35	0.0006	0.190	8	6.0
529	3 MESH	6.20	0.005	1.94	0.0003	0.120	4	3.8
530	4 "	5.11	0.004	2.18	0.0002	0.111	3	3.5
531	6 "	4.30	0.004	3.62	0.0002	0.156	3	4.9
532	10 "	4.87	0.004	3.84	0.0002	0.187	3	5.9
533	20 "	5.26	0.003	2.18	0.0002	0.115	3	3.6
534	35 "	4.35	0.008	4.53	0.0003	0.197	4	6.2
535.	48 "	1.71	0.005	6.28	0.0001	0.107	1	3.4
536	65 "	2.49	0.005	6.02	0.0001	0.150	1	4.7
537	100 "	1.36	0.004	6.27	0.0001	0.085	1	2.7
538	200 "	3.69	0.010	4.83	0.0004	0.178	6	5.6
539	-200 "	3.23	0.010	2.59	0.0003	0.084	4	2.7
	Calculated Screen Head				0.007	3.169		
	Actual Assay of Screen Feed				0.010	2.82		

Looking at the silver distribution in the screen analysis, it appears there is little to be gained by screening or classifying since the silver distribution follows the fraction weights very closely.

Three alkalinity checks were made to determine if acid generating minerals were in evidence.

TEST No. 1

200 grams of ore - minus 9 mesh

200 ml of water

Rolled for 1 hour Final pH 6.0

TEST No. 2

Same as above but with the addition of

2 grams CaO. Final pH 11.2

TEST No. 3

Same as above but with the addition

of 1 gram of CaO and rolled for

20 hours. Final pH 11.0

It appears that once sufficient lime has been added to raise the pH substantially on the alkaline side there is little degradation. Apparently there are not many sulfides available for creating acid.

Additional tests, Nos. 4 through 9 were completed to determine the protective alkalinity as follows:

400 grams of ore - each charge

0.645 grams of 77.5% available CaO (equal to 0.5 grams on a 100% basis)

1000 ml of water

	TIME ON ROLLS (HRS.)	MESH OF ORE	LIME TITRATION OF FINAL LIQUOR
4	1	-10	0.0050% CaO
5	2	-10	0.0060% "
6	3	-10	0.0055% "
7	4	-10	0.0050% "
8	1	-100	0.0030% "
9	4	-100	0.0030% "

The final liquor was titrated with 0.1 N HNO_3.

Four preliminary tests were run to compare mesh size with leach capabilities.

Make-up of each charge as follows (differing only in screen size):

500 grams of ore assaying Au 0.010 Ag 2.82

500 ml of water

5 grams CaO

1.885 grams NaCN (KCN equivalent to 0.5%)

All were rolled for 20 hours and tailing assayed.

SAMPLE No.	100 % MINUS SCREEN MESH	Au	Ag	% RECOVERY
603	9	Nil	0.73	74.12
604	20	"	0.64	77.31
605	35	"	0.60	78.73
606	48	"	0.52	81.57

No further gold assays will be obtained since obviously 100 % recovery of the gold is evidenced.

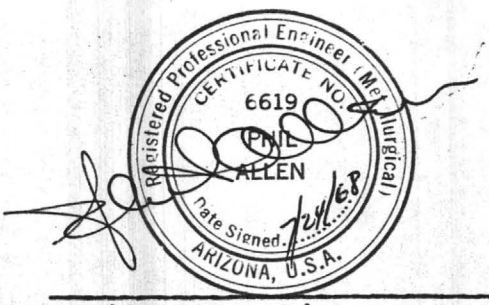
It could well be that finer grinds might be even more easily leached however in reducing to all minus 48 mesh in a mill a lot of very fine material would be created. In this test the samples were screened before each additional pass through the pulverizer (loose plates) so not too much in fines above the next smaller mesh screen could be created.

Cyanide consumption is not known at this point since the assay results were not credible. These will be rerun.

We will fabricate some laboratory size tanks for counter-current

leaching (probably of the pachuca type) and proceed with tank type leaching as soon as possible.

We are nearly set up to do our own assaying of Cyanide and available lime. Since this appears to be something the assay offices are not readily able to slot into their line-up, quite probably we can do a better job.



Phil Allen, Director
METCON Laboratory

PA/vi

Rocky Mountain Geochemical Corporation

2050 EAST 14TH STREET
TUCSON, ARIZONA 85719

Phone 622-5702
Area Code: 602

CERTIFICATE OF ANALYSES

Date September 20, 1969

Client Mr. William Lundby
225 West Flores
Tucson, Arizona

Colvin - Grace

Report on: 55 Samples

Submitted by: William Lundby

Date Received: 9/10/69

Analysis: Molybdenum and Silver

Remarks: Molybdenum determined Colorimetrically; Silver determined by Atomic Absorption.

Job No. 69-21-10T

cc: Enclosed
RMGC-Salt Lake
file

AB:sh

ND = Non Detected | 1 ppm = 0.0001% | 1 Troy oz./ton = 34.28 ppm | % Mo. x 1.6683 = $\%MoS_2$

Sample No.	ppm Molybdenum	ppm Silver
1-0	1	-1
1-3N (S)	-1	-1
1-3S (S)	-1	-1
1-6N	-1	-1
1-6S (S)	-1	-1
1-9S (S)	-1	-1
1-12S (S)	-1	-1
1-15S (S)	1	-1
2-6N(S)	-1	-1
2-12N (S)	-1	-1
2-15S (S)	-1	-1
4-0	-1	-1
4-1	-1	-1
4-2	1	-1
4-3	1	-1
4-4	1	-1
4-5	-1	-1
4-6	-1	-1
4-7	-1	-1
4-8	-1	-1
4-9	1	-1
4-10	1	-1
5-0	1	-1
5-1	-1	-1
5-2	1	-1

Sample No.	ppm Molybdenum	ppm Silver
5-3	1	-1
5-4	-1	-1
5-5	-1	-1
5-6	-1	-1
5-7	1	-1
5-8	1	1
5-9	-1	-1
5-10	-1	-1
6-0	-1	-1
6-1	-1	-1
6-2	1	-1
6-3	-1	-1
6-4	-1	-1
6-5	-1	-1
6-6	-1	-1
6-7	-1	-1
6-8	-1	-1
6-9	1	-1
6-10	1	-1
7-0	-1	-1
7-1	-1	-1
7-2	-1	-1
7-3	-1	-1
7-4	-1	-1
7-5	-1	-1

Sample No.	ppm Molybdenum	ppm Silver
7-6	-1	-1
7-7	-1	-1
7-8	1	-1
7-9	-1	-1
7-10	-1	-1

ROCKY MOUNTAIN GEOCHEMICAL CORPORATION

Tucson, Arizona September 20, 1969

By Anita Bradshaw

Anita Bradshaw

APPENDIX B

METCON LABORATORY

PROJECT CT-15

FOR

AUSTRAL OIL COMPANY

TOMBSTONE, ARIZONA

July 22, 1968

SUMMARY

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646

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1000 ml of water

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Phil Allen, Director
METCON Laboratory

PA/vi

I.P. Austral
1969

7-24-68

601

APPENDIX A

REPORT ON THE
INDUCED POLARIZATION SURVEY
ON THE
AUSTRAL OIL CO. HOLDINGS, TOMBSTONE AREA
COCHISE COUNTY, ARIZONA

RECEIVED
APR 2 1969
JAMES STEWART COMPANY
PHOENIX, ARIZONA

602

REPORT ON THE
INDUCED POLARIZATION SURVEY
ON THE
AUSTRAL OIL CO. HOLDINGS, TOMBSTONE AREA
COCHISE COUNTY, ARIZONA

I
INTRODUCTION

At the request of Mr. Bill Lundby, representing Austral Oil Co., a reconnaissance induced polarization survey was conducted on the Austral Oil Co. holdings near Tombstone, Arizona. The property is situated several miles Southwest of Tombstone.

The induced polarization survey was attempted to assist in locating any zones of mineralization that might be present at depth.

II
PRESENTATION OF RESULTS

The induced polarization and resistivity results are shown on the following enclosed data plots.

Seven lines with a bearing of N 45° W were run using dipole spacings of five hundred (500) feet.

LINE NO. 1	500' electrode spacing
LINE NO. 2	500' electrode spacing
LINE NO. 3	500' electrode spacing
LINE NO. 4	500' electrode spacing
LINE NO. 5	500' electrode spacing
LINE NO. 6	500' electrode spacing
LINE NO. 7	500' electrode spacing

A plan map of the surveyed area is included to exhibit the orientation and spacing of the lines run.

III

DISCUSION OF RESULTS

The apparent resistivities measured during the reconnaissance survey are in most cases moderately low. All lines run exhibit that the area surveyed is structurally quite complex.

The percent frequency effect (PFE) values range from usually excepted background to marginally anomalous. The metallic conducting factor (MCF) values exhibit a range which one would expect to find unmineralized to disseminated sulfides in the subsurface structures.

LINE NO. 1, has three possible weakly anomalous zones which are near the areas of 0.5 N to 1.5 N, 1.5 S to 2.5 S and 4.5 S to 5.0 S.

LINE NO. 2, has possible near surface and deeper marginally anomalous zones between 0.5 S and 2.5 S.

LINE NO. 3 is in a higher resistivity area, however, lower resistivity zones in the region of 2.0 N to 2.5 N and 0.5 S to 1.0 S, offer the slim possibility of bedded mineralization.

LINE NO. 4, has a weakly anomalous area between 0.5 N and 1.5 N.

LINE NO. 5, has several possible weakly anomalous zones, from 4.0 N to 5.0 N, 1.5 N to 2.5 N and 0.5 S to 1.0 S.

LINE NO. 6, has two weakly anomalous areas, 4.5 N to 5.0 N and 0.0 NS to 0.5 S.

LINE NO. 7, is not too interesting except for a possible anomalous zone from 0.5 N to 1.0 N.

Since the induced polarization measurement is essentially an averaging process, as are all potential methods, it is frequently difficult to exactly pinpoint the source of an anomaly. Certainly, no anomaly can be located with more accuracy than the spread length; i.e. when using 500' spreads, the position of a narrow sulfide body can only be determined to lie between two stations 500' apart. In order to locate sources at greater depth, larger spreads must be used, with a corresponding increase in the

uncertainties of location. Therefore, while the center of the indicated anomaly probably corresponds fairly well with the source, the length of the indicated anomaly along the line should not be taken to represent the exact edges of the anomalous material.

It should be mentioned that a mineralized body having dimensions of less than 0.1 the dipole spacing of 500 feet could go undetected.

IV

CONCLUSIONS AND RECOMMENDATIONS

The reconnaissance induced polarization survey of this area indicates that zones of weak mineralization exist. A detailing of the weakly anomalous zones, using shorter dipole spacings, might prove advantageous if future drilling is being considered.

Respectfully submitted,

Nicholas H. Carouso

Nicholas H. Carouso 7-24-68

THE INDUCED POLARIZATION METHOD

Induced Polarization as a geophysical measurement refers to the blocking action or polarization of metallic or electronic conductors in a medium of ionic solution conductors.

This electro-chemical phenomenon occurs wherever electrical current is passed through an area which contains electronic conductors such as base metal sulfides. Normally, when current is passed through the ground, as in resistivity measurements, all of the conduction takes place through ions present in the water content of the rock or soil; i. e. by ionic conduction. This is because almost all minerals have a much higher specific resistivity than ground water. The minerals commonly described as "metallic", however, have specific resistivities much lower than ground waters. The induced polarization effect takes place at those interfaces where the mode of conduction changes from ionic in the solutions filling the interstices of the rock to electronic in the metallic minerals present in the rock.

The blocking action or induced polarization described above, which depends upon the chemical energies necessary to allow the ions to give up or receive electrons from the metallic surface, increases with the time that a D. C. current is allowed to flow through the rock; i. e. as ions pile up against the metallic interface the resistance to current flow increases. Eventually, there is enough polarization in the form of excess ions at the interfaces to effectively stop all current flow through the metallic particle. This polarization takes place at each of the infinite number of solution-metal interfaces in a mineralized rock.

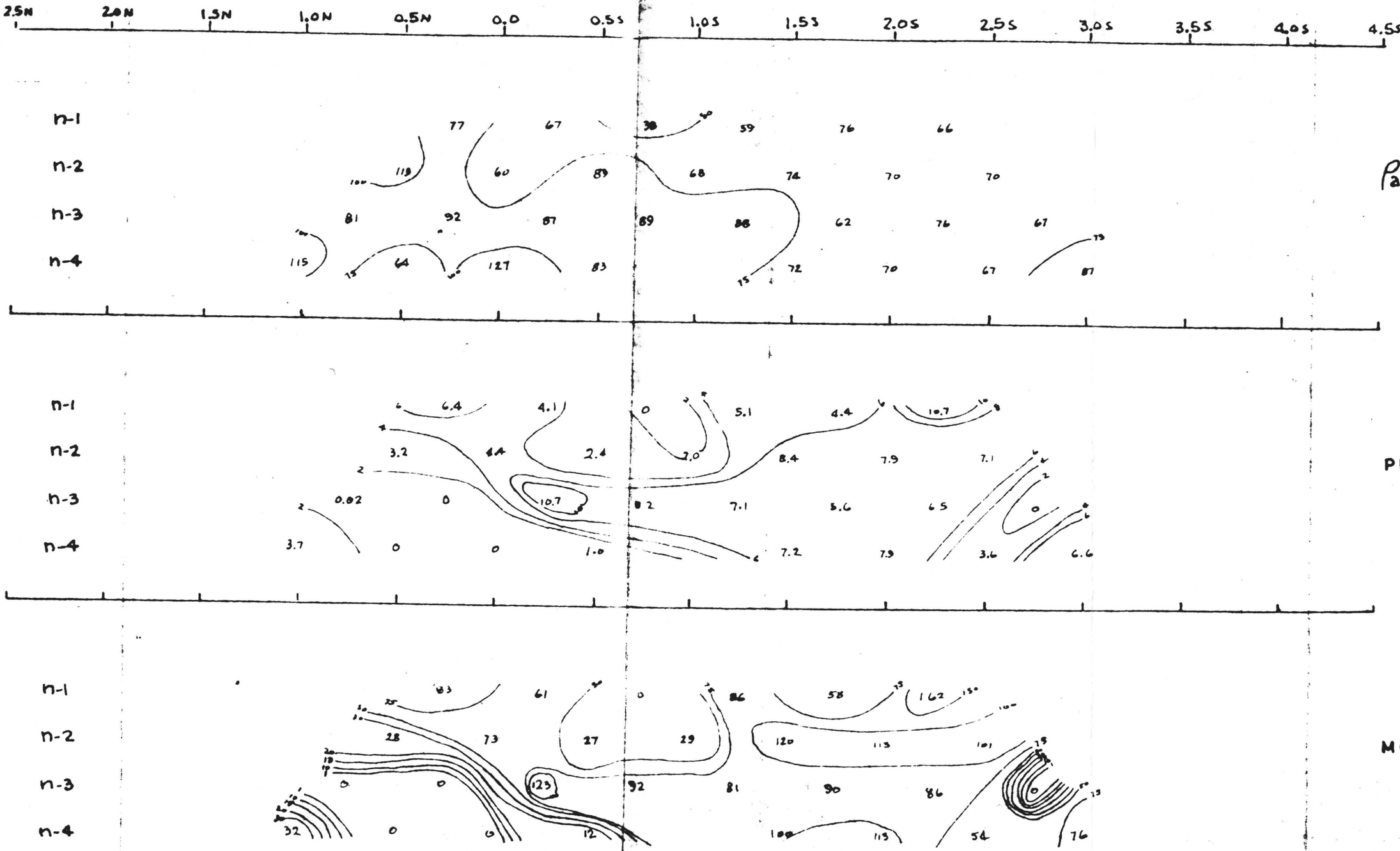
When the D. C. voltage used to create this D. C. current flow is cut off, the Coulomb forces between the charged ions forming the polarization cause them to return to their steady state. This movement of charge creates a small current flow which can be measured on the surface of the ground as a decaying potential difference.

Now if the direction of the current through the system is reversed repeatedly before the polarization occurs, the effective resistivity of the system as a whole will change as the frequency of the switching is changed.

In this induced polarization reconnaissance survey, five equally spaced co-linear current electrodes were placed in the ground by

burying aluminum foil in pits wetted with brine. Observations were made in accordance with a symmetrical dipole-dipole configuration where the distance between the receiver or potential electrodes was kept equal to the distance between adjacent electrode pairs. Generally the receiving dipole is separated by one to six dipole units ("n" separation) from the sending dipole. A precisely controlled square wave current was sent through a sending dipole at 0.05 and 3.0 cycles per second from which, at the receiving dipole, a D. C. and an A. C. voltage was measured, respectively. By knowing the geometry involved (the dipole length or spacing and the separation distance between the two receiving-sending dipole pairs), along with the two voltages, an apparent D. C. and an A. C. resistivity was calculated. From these apparent resistivities, their percentage difference was determined, thus giving the Percent Frequency Effect (PFE). A third quantity proportional to PFE and inversely proportional to D. C. resistivity, called Metallic Conduction Factor (MCF) was computed in order to somewhat normalize PFE for variations in ground conductivity purely as a technical interpretational aid.

The IP technique was developed primarily for porphyry type deposits and is perhaps the only reliable means of detecting hidden disseminated sulfides. However, the IP method works just as well or perhaps better on semi-massive to massive sulfides, contrary to some of the earlier thinking, for it gives increased response with increased volume percentage of sulfides.



I.P. SURVEY

AUSTRAL OIL CO.

TOMBSTONE AREA, COCHISE CTY.–ARIZ.

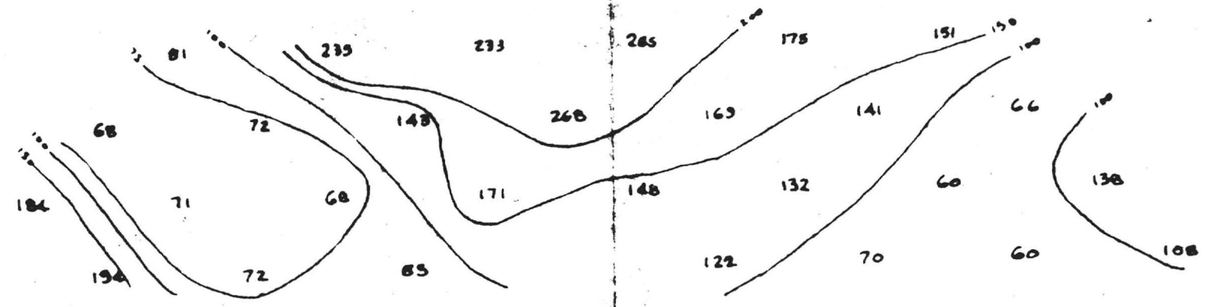
LOOKING - NE

SCALE – ONE INCH = 500'

JULY 1968

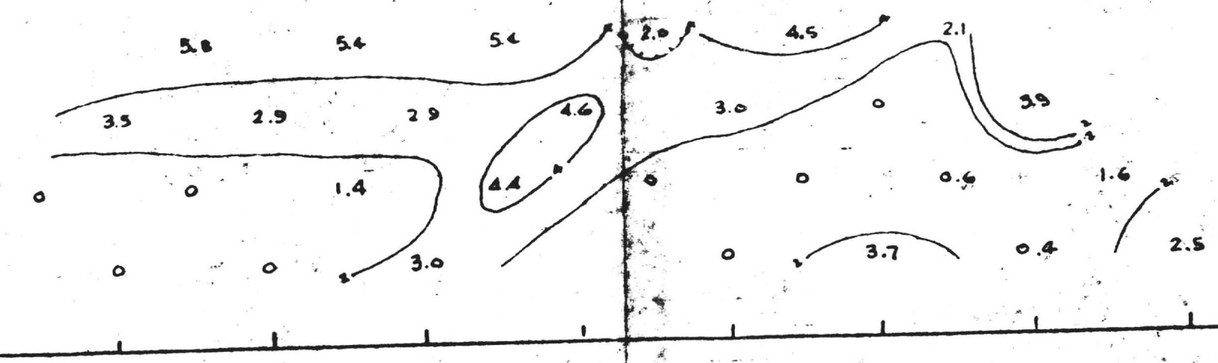
4.0N 3.5N 3.0N 2.5N 2.0N 1.5N 1.0N 0.5N 0.0 0.5S 1.0S 1.5S 2.0S 2.5S 3.0S

n-1
n-2
n-3
n-4



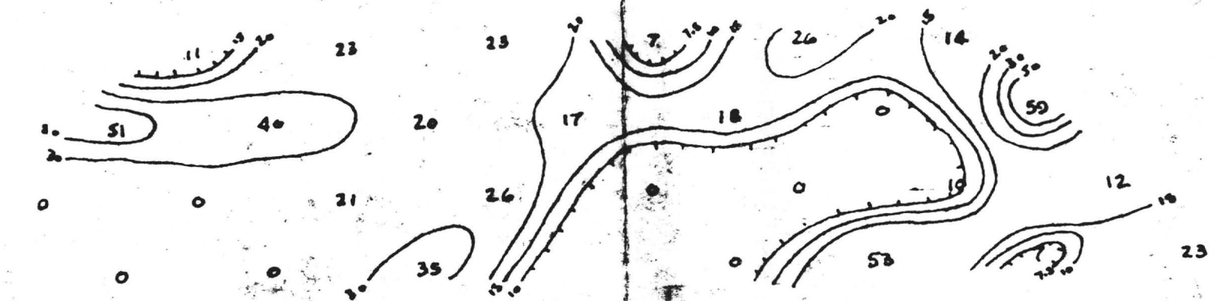
Pd

n-1
n-2
n-3
n-4



PFE

n-1
n-2
n-3
n-4



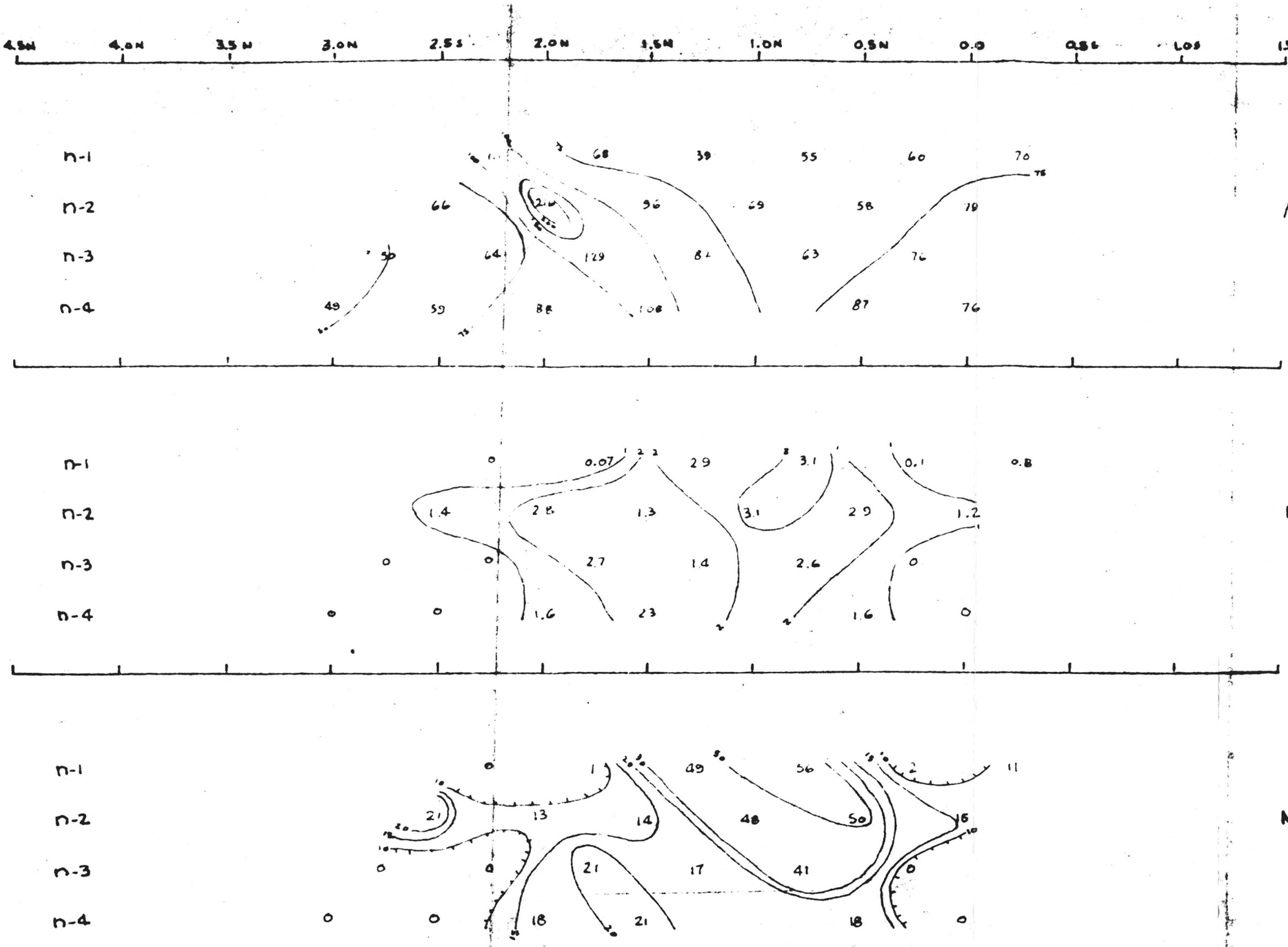
MCF

LINE NO. 3

I.P. SURVEY
AUSTRAL OIL CO.
TOMBSTONE AREA. COCHISE CTY.- ARIZ.

LOOKING - N E
SCALE- ONE INCH = 500'

JULY 1968



ρ_a

PFE

MCF

LINE NO. 4

I.P. SURVEY

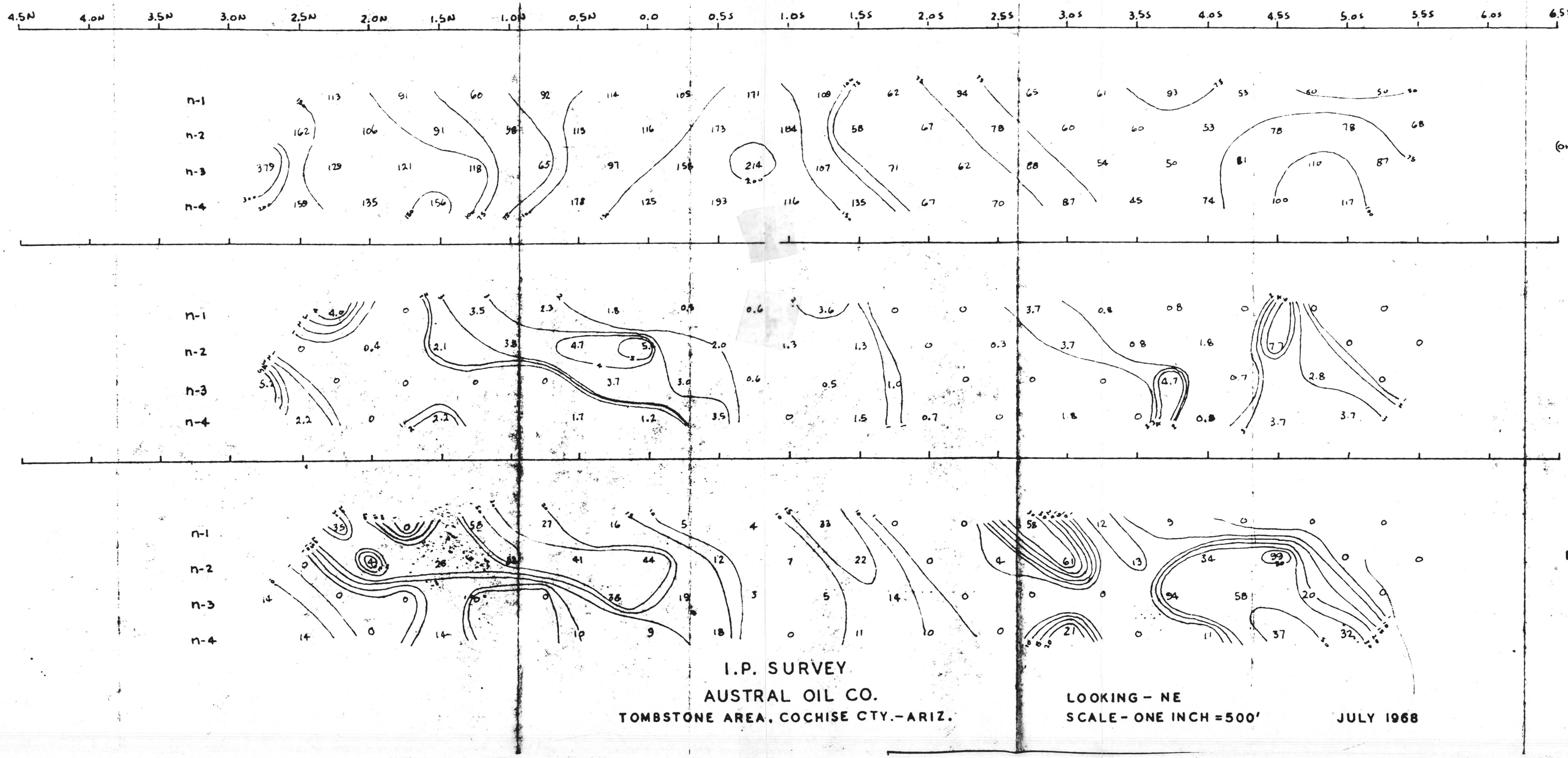
AUSTRAL OIL CO.

TOMBSTONE AREA, COCHISE CTY.- ARIZ.

LOOKING - NE

SCALE - ONE INCH = 500'

JULY 1968



I.P. SURVEY

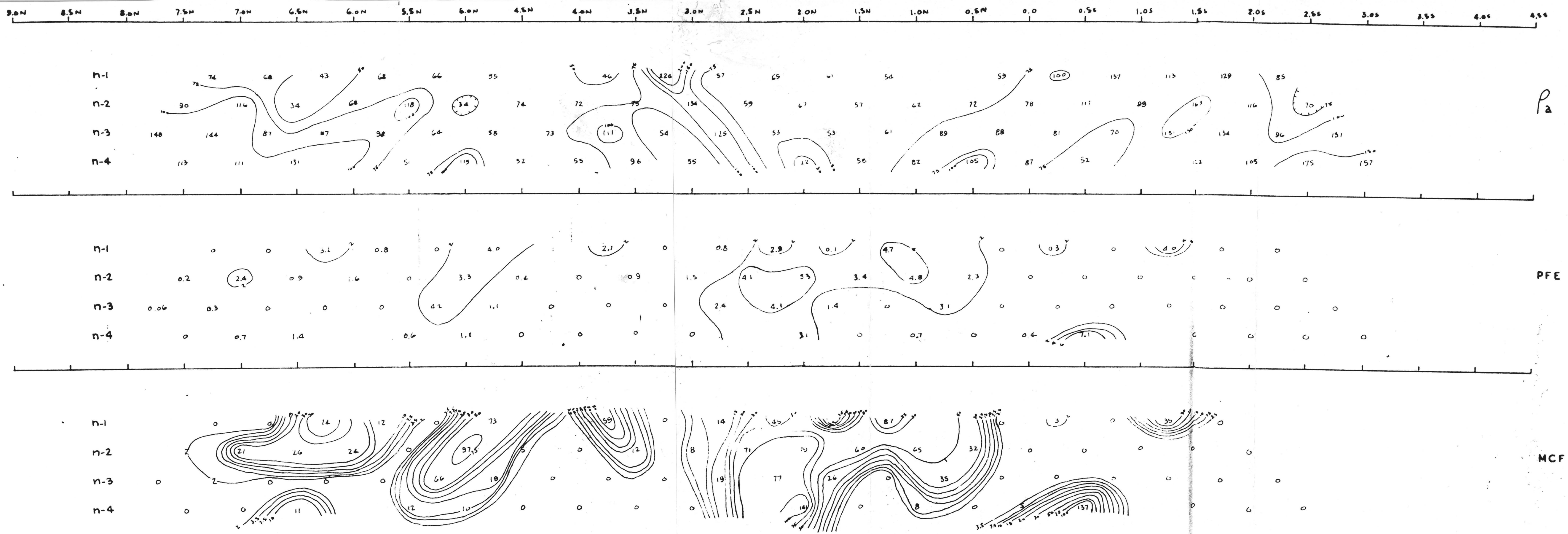
AUSTRAL OIL CO.

TOMBSTONE AREA, COCHISE CTY.-ARIZ.

LOOKING - NE

SCALE - ONE INCH = 500'

JULY 1968



I.P. SURVEY

AUSTRAL OIL CO.

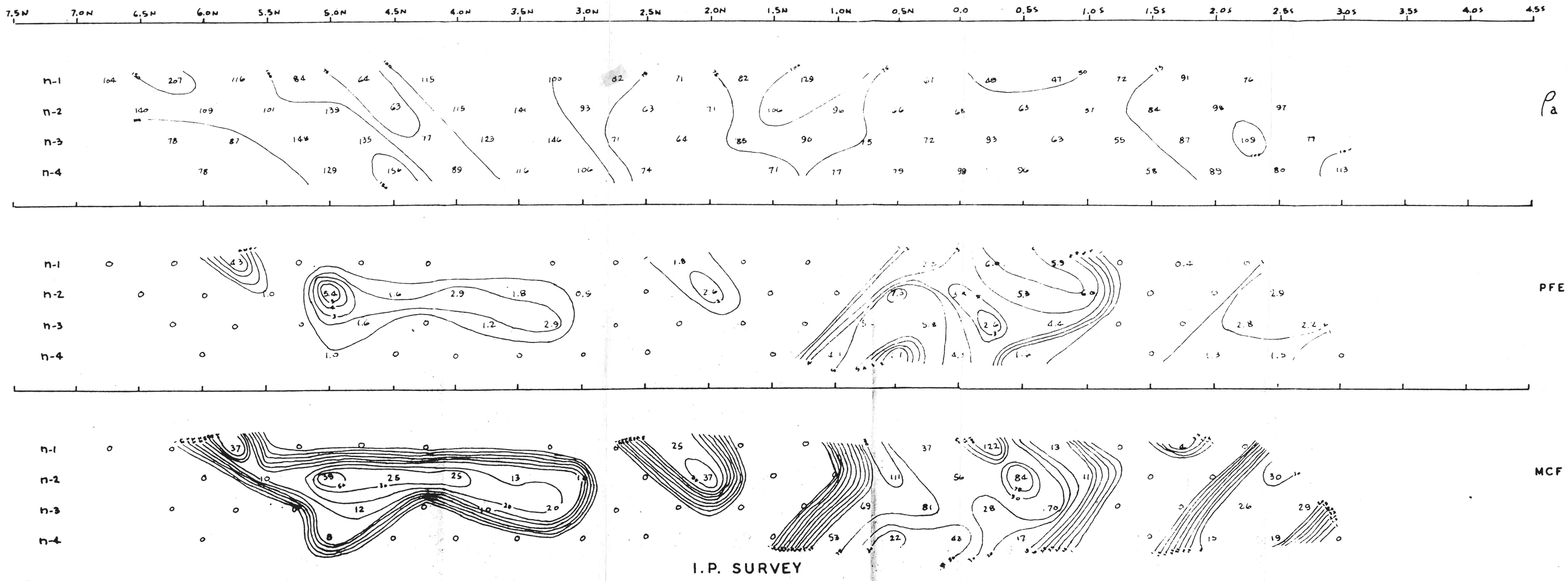
TOMBSTONE AREA, COCHISE CTY.-ARIZ.

LOOKING - NE

SCALE—ONE IN CH = 500'

JULY 1968

LINE NO. 5



LINE NO. 6

I.P. SURVEY

AUSTRAL OIL CO.

TOMBSTONE AREA, COCHISE CTY., ARIZ.

LOOKING - NE

SCALE - ONE INCH = 500'

JULY 1968

4.0N 3.5N 3.0N 2.5N 2.0N 1.5N 1.0N 0.5N 0.0 0.5E 1.0E 1.5E

n-1
n-2
n-3
n-4

119 232 172 64 70 70
179 126 182 72 80 87 106
98 187 163 39 84 87 136
95 43 86 125

PA

n-1
n-2
n-3
n-4

PFE

LINE NO. 7

n-1
n-2
n-3
n-4

30 29 16 14
17 28

CF

I.P. SURVEY
AUSTRAL OIL CO.
TOMBSTONE AREA, COCHISE CTY.- ARIZ.

LOOKING- NE
SCALE- ONE INCH=500'

JULY 1968

Lacy & Lundby (8-27-68)

8-27-68

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WILLARD C. LACY
4034 East Burns Street
Tucson, Arizona 85711

AUSTRAL OIL COMPANY

Explaration of the Escapule Claim Area

Tombstone, Cochise County, Arizona

Willard C. Lacy William Lundby

WILLARD C. LACY
4034 East Burns Street
Tucson, Arizona 85711

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TOMBSTONE, ARIZONA

EXPLORATION OF THE ESCAPULE CLAIM GROUP

LIST OF PLATES

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WILLARD C. LACY
4034 East Burns Street
Tucson, Arizona 85711

August 27, 1968.

TOMBSTONE, ARIZONA

EXPLORATION OF ESCAPULE CLAIM GROUP.

I. INTRODUCTION:

Summary Statement

A thorough exploration program, beginning in February 1968 and terminating in July 1968, under the auspices of the Austral Oil Company and directed by Richard Dobson, William Lundby and Willard Lacy, was directed toward establishing a large tonnage of low-grade silver ore amenable to bulk mining methods in the Tombstone area, Arizona. The various possibilities were tested with disappointing results, and the option was dropped.

Location, and Ownership

The Escapule claim group, totalling about three square miles, are located about two and a half miles southwest of Tombstone, Arizona in sections 9, 10, 15, 16, 17 and 21; Township 20 South; Range 22 East. The ground is held by the Escapules (Ernest B., Ernest H., Dustin, Charles, and Louis), H.E. Davis, W.W. Grace and A.J. Colvin. See Plate II.

Objectives

The Escapule claim group has had a reputation and history for the production of a considerable tonnage of high-grade silver ore from vein structures within the Uncle Sam Porphyry unit. This rock unit in the vicinity of the Escapule holdings showed widespread shattering and alteration, and there appeared to be numerous, closely spaced structures that had not been explored that had possibilities bulk mining. In addition, a breccia zone at the base of the Uncle Sam Porphyry sill was virtually un explored. It was felt that this breccia zone and the Bisbee formation below the sill offerred excellent chances for the spreading out of silver values to yield a large tonnage deposit. Also, the cpntact zone between the Schieffelin Granodiorite and the Bisbee formation was untested.

The high price of silver made the investigation of these possibilities most attractive.

Exploration Methods

Aerial photography was flown to furnish a good base map of the western Tombstone area (Plate I) and served as the base for detailed geological mapping and evaluation.

To delineate specific target areas six initial steps were employed:

1) Field reconnaissance was made and the zone of alteration, brecciation, and mineralization as reflected in previous workings and mineralized structureswas delimited.

2) A geochemical survey was made over the favorable area and anomalous concentrations of silver and copper were outlined (Plate III).

3) A limited geophysical (I.P.) survey was run over selected areas to test possibilities of subsurface sulphide concentrations.

4) A program for extensive sampling of mine dumps and underground openings to determine the minimum grade of material previously mined, and to check the possibility of extensions of known veins was carried out. This was supplemented by metallurgical testing of the dumps to test their amenability to silver extraction.

5) Photogeologic mapping, supplemented field reconnaissance mapping, was directed toward the determination of possible additional mineralized structures or zones. Plate III.

6) Detailed underground mapping of the State of Maine and Uncle Sam underground workings was done to establish those controls respnsible for the localization of the previously mine oreshoots. Plates XIII to XVII.

II. GEOLOGICAL ENVIRONMENT:

General Geology

The geology of the Tombstone area has been discussed in considerable detail and with insight by James Gilluly in the USGS Professional Paper #281 (1956). This was supplemented in the area of the Escapule claims by the work of L. Courtland Lee in an MS thesis prepared for the University of Arizona in 1967.

To obtain greater structural detail a photogeologic map was prepared by Gilbert Noice at the University of Arizona. This was field checked and modified by both Lundby and Lacy. (Plate III) Particular attention was given in this study to linear structures subtley reflected in vegetation, topography and tone that wpuld indicate possible underlying fracture zones or vein structures.

The greater portion of the Escapule claim area is underlain by a flat-lying, warped and faulted sill of Uncle Sam (quartz latite) Porphyry which was intruded along a thrust fault that cuts across the Bisbee formation of clastic sediments and thin limestone units. Where the base of the sill is exposed, at the surface and in mine workings, a complex of brecciated Bisbee sediments and Porphyry with evidence of alteration and mineralization was noted. A geochemically anomalous area follows the zone on the surface (see Plate III). Drilling and underground workings have shown the sill to be flat, about 200 to 300 feet thick but irregular and always underlain by the breccia zone.

The sill has in turn been cut by a swarm of steep andesite dikes trending N35°E. These are generally less than 10 feet wide and are most abundant in the mineralized areas.

A series of vein structures follow the dike swarm in strike, ranging from N 10°E to N60°E, butgenerally tending to a dual system with concentrations of orientations at N10°E and N60°E. The veins dip generally to the north at 80° to 25°, with the flatter dips more characteristic of the veins to the north. A close correllation was noted, both on the surface and in the underground workings, of the distribution of ore shoots with intersections of these two fracture systems.

In the northeastern portion of the claim area the Schieffelin Granodiorite with the Bisbee formation. This intrusive appears to be later than the Uncle Sam Porphyry, but earlier than at least some of the andesite dikes and is weakly cut by the vein structures. It appears that the granodiorite is pre-ore, but its massive character

made it resistant to the forces that developed or reopened fractures that were mineralized. The contact of the granodirite and the Bisbee formation was notable for its lack of contact metamorphic or alteration effects.

Vein Systems

The vein structures were mapped in some detail in the State of Maine and the Uncle Sam mine workings (Plates XIII to XVII), and were examined but not mapped in the Santa Ana-Chance-Bonanza vein system.

The veins were generally less than a foot in width except at junctions where they would widen to four to ten feet. In these junctions they generally made ore, as evidenced by the distribution and attitude of the mined stopes. These junctions are generally marked by variations of strike or dip of the major vein structure and the mine workings.

Oxidation is deep along fracture zones, extending to below 500 feet, though pyrite was noted as shallow as 200 feet where the rock was less fractured. Silver values are carried by the silver halide, Bromyrite, and is generally associated with manganese oxides, chalcedony, quartz, calcite and iron oxides. Some wire silver has been reported.

Ore shoots range from 1,000 to 5,000 tons and are about three times as long down dip as the width along the strike, and are two to three feet thick.

III. EXPLORATION PROGRAM:

Targets

Primary targets selected for drilling on the basis of the reconnaissance geological and geochemical work were:

1) Shattered and mineralized zones in the walls adjacent to the Santa Ana-Chace-Bonanza and the State of Maine-Uncle Sam vein systems. These two vein systems had attracted the greatest amount of mining, they gave excellent geochemical anomalies, and their mine dumps contained the best values.

2) Brecciated Bisbee formation at the base of the Uncle Sam Porphyry sill adjacent to the vein structures.

3) Replacement deposits in favored horizons within the Bisbee formation adjacent to the vein structures.

4) Mineralization in the contact zone between the Schieffelin Granodiorite intrusive stock and the Bisbee formation.

5) An extension of the high-grade Santa Ana vein structure to the east.

Secondary targets included:

1) Unmined ore shoots in the Mamie, Red Top and State of Maine veins.

2) Location of ore shoots alon new vein structures.

Geochemical Sampling

Soil geochemical samples were collected over most of section 16 to locate zone anomalous in silver or copper. These samples were taken on a 300-foot grid, screened to -80 mesh and tested geochemically by Rocky Mountain Geochemical Laboratories at Prescott, Arizona for silver and copper. The survey outlined the position of known vein structures, but indicated no new hidden structures with values. A broad weakly anomalous area followed the breccia zone at the base of the sill.

Mine Dump Sampling

Major mine dumps, generally in excess of 1000 tons, were sampled. A backhoe was used to trench the dumps. These large trench samples were coned and quartered at the dump, reducing the volume to about one truck load (1 ton). This selected sample was crushed to minus 3/4 inch diameter, then coned and quartered to reduce the sample to about 200 pounds. This sample was crushed to minus 1/4 inch diameter, split to 15 pounds and assayed.

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Only two areas yielded significant results:

1) The Chance-Bonanza dumps averaged about six ounces of silver per ton, and

2) The State of Maine mine dumps averaged slightly over 4.5 ounces of silver per ton.

35k Tons
Possibly more

Results from the assays of the other dumps were:

	Ounces/ton	
	Au	Ag
UnclesSam	Nil	1.60
Soltice	.004	2.80
North Bonanza	.003	1.84
Joseph	Tr	1.02
Brother Jonathan	Nil	1.94

Geophysics

An induced polarization (IP) survey was run to outlineany possible subsurface sulphide bodies. Although some slightly anomalous zones were indicated, no concentrations of importance were encountered. See Appendix A for the report.

Drilling

Diamond Drilling:

Six diamond drill holes, totalling 2,256 feet, were drilled to penetrate the Santa Ana-Chance-Bonanza vein system in depth. Diamond drilling was used to give structural information and to more accurately delineate any ore zones. The deepest hole (DD-2) was terminated at 876 feet.

The drilling established that the silver values were closely confined to the vein structures -- there are no disseminated values extending into the hanging or footwall.

Hammer Drilling:

A total of thirty hammer drill holes, totalling 8,398 feet, were drilled for claim validation and for the testing for dispersed values. The holes were concentrated in the following areas:

1) adjacent to the Chance-Bonanza veins;

2) in the hanging wall of the State of Maine vein and near the Uncle Sam shaft;

3) on the northern and southern extensions of the Santa Ana vein;

4) through the Red Top vein, an extension of the Chance-Bonanza vein in virgin ground.

In the productive veins of the area the assays were low, one to four ounces of silver per ton, except for 30 feet in H-19 which averaged 0.235 ounces gold and 5.39 ounces silver per ton. Assays ranged from a trace of silver to about 0.2 ounces of silver per ton in all other instances.

Samples were collected from the air drilling using a duclone collector.

The location of drill holes are shown on Plates VIII and IV, and cross-sections showing the attitude of the drill holes, the geology and the assay results are shown on Plates V, VI, VII, IX, X and XI.

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IV. RESULTS AND CONCLUSIONS:

Drilling of the most promising target areas in the Escapule claim area showed:

1)values in the shattered and weakly mineralized zones adjacent to the veins were extremely low;

2) brecciated Bisbee formation at the base of the Uncle Sam Porphyry sill was pyritized but contained no appreciable silver values;

3) no massive sulphide bodies were indicated by geophysics;

4) the Schieffelin Granodiorite - Bisbee formation contact was extremely "dry", with no alteration or metamorphism nor yielding any anomalous geochemical values, thereby eliminating the possibility of contact metasomatic deposits;

5 5) extension of known, previously productive veins showed little promise for other than small ore pockets.

It is very possible that small ore "shoots", ranging in size from 1,000 tons to 5,000 tons might be developed in the areas previously mined at intersections of the two principal fracture directions. However, there appears to be little possibility of developing moderate to large tonnages of ore amenable to bulk mining methods.

The mine dumps could probably be shipped at a slight profit, but the tonnage would be small (about 50,000 tons total), and the profit would be insufficient to support the option payments.

August 27, 1968.

W. L. Lacy

Willard C. Lacy

William Lundby

APPENDIX A

REPORT ON THE
INDUCED POLARIZATION SURVEY
ON THE
AUSTRAL OIL CO. HOLDINGS, TOMBSTONE AREA
COCHISE COUNTY, ARIZONA

REPORT ON THE
INDUCED POLARIZATION SURVEY
ON THE
AUSTRAL OIL CO. HOLDINGS, TOMBSTONE AREA
COCHISE COUNTY, ARIZONA

I
INTRODUCTION

At the request of Mr. Bill Lundby, representing Austral Oil Co., a reconnaissance induced polarization survey was conducted on the Austral Oil Co. holdings near Tombstone, Arizona. The property is situated several miles Southwest of Tombstone.

The induced polarization urvey was attempted to assist in locating any zones of mineralization that might be present at depth.

II
PRESENTATION OF RESULTS

The induced polarization and resistivity results are shown on the following enclosed data plots.

Seven lines with a bearing of N 45° W were run using dipole spacings of five hundred (500) feet.

LINE NO. 1	500' electrode spacing
LINE NO. 2	500' electrode spacing
LINE NO. 3	500' electrode spacing
LINE NO. 4	500' electrode spacing
LINE NO. 5	500' electrode spacing
LINE NO. 6	500' electrode spacing
LINE NO. 7	500' electrode spacing

A plan map of the surveyed area is included to exhibit the orientation and spacing of the lines run.

III

DISCUSION OF RESULTS

The apparent resistivities measured during the reconnaissance survey are in most cases moderately low. All lines run exhibit that the area surveyed is structurally quite complex.

The percent frequency effect (PFE) values range from usually excepted background to marginally anomalous. The metallic conducting factor (MCF) values exhibit a range which one would expect to find unmineralized to disseminated sulfides in the subsurface structures.

LINE NO. 1, has three possible weakly anomalous zones which are near the areas of 0.5 N to 1.5 N, 1.5 S to 2.5 S and 4.5 S to 5.0 S.

LINE NO. 2, has possible near surface and deeper marginally anomalous zones between 0.5 S and 2.5 S.

LINE NO. 3 is in a higher resistivity area, however, lower resistivity zones in the region of 2.0 N to 2.5 N and 0.5 S to 1.0 S, offer the slim possibility of bedded mineralization.

LINE NO. 4, has a weakly anomalous area between 0.5 N and 1.5 N.

LINE NO. 5, has several possible weakly anomalous zones, from 4.0 N to 5.0 N, 1.5 N to 2.5 N and 0.5 S to 1.0 S.

LINE NO. 6, has two weakly anomalous areas, 4.5 N to 5.0 N and 0.0 NS to 0.5 S.

LINE NO. 7, is not too interesting except for a possible anomalous zone from 0.5 N to 1.0 N.

Since the induced polarization measurement is essentially an averaging process, as are all potential methods, it is frequently difficult to exactly pinpoint the source of an anomaly. Certainly, no anomaly can be located with more accuracy than the spread length; i.e. when using 500' spreads, the position of a narrow sulfide body can only be determined to lie between two stations 500' apart. In order to locate sources at greater depth, larger spreads must be used, with a corresponding increase in the

uncertainties of location. Therefore, while the center of the indicated anomaly probably corresponds fairly well with the source, the length of the indicated anomaly along the line should not be taken to represent the exact edges of the anomalous material.

It should be mentioned that a mineralized body having dimensions of less than 0.1 the dipole spacing of 500 feet could go undetected.

IV

CONCLUSIONS AND RECOMMENDATIONS

The reconnaissance induced polarization survey of this area indicates that zones of weak mineralization exist. A detailing of the weakly anomalous zones, using shorter dipole spacings, might prove advantageous if future drilling is being considered.

Respectfully submitted,

Nicholas H. Carouso

Nicholas H. Carouso 7-24-68

THE INDUCED POLARIZATION METHOD

Induced Polarization as a geophysical measurement refers to the blocking action or polarization of metallic or electronic conductors in a medium of ionic solution conductors.

This electro-chemical phenomenon occurs wherever electrical current is passed through an area which contains electronic conductors such as base metal sulfides. Normally, when current is passed through the ground, as in resistivity measurements, all of the conduction takes place through ions present in the water content of the rock or soil; i. e. by ionic conduction. This is because almost all minerals have a much higher specific resistivity than ground water. The minerals commonly described as "metallic", however, have specific resistivities much lower than ground waters. The induced polarization effect takes place at those interfaces where the mode of conduction changes from ionic in the solutions filling the interstices of the rock to electronic in the metallic minerals present in the rock.

The blocking action or induced polarization described above, which depends upon the chemical energies necessary to allow the ions to give up or receive electrons from the metallic surface, increases with the time that a D. C. current is allowed to flow through the rock; i. e. as ions pile up against the metallic interface the resistance to current flow increases. Eventually, there is enough polarization in the form of excess ions at the interfaces to effectively stop all current flow through the metallic particle. This polarization takes place at each of the infinite number of solution-metal interfaces in a mineralized rock.

When the D. C. voltage used to create this D. C. current flow is cut off, the Coulomb forces between the charged ions forming the polarization cause them to return to their steady state. This movement of charge creates a small current flow which can be measured on the surface of the ground as a decaying potential difference.

Now if the direction of the current through the system is reversed repeatedly before the polarization occurs, the effective resistivity of the system as a whole will change as the frequency of the switching is changed.

In this induced polarization reconnaissance survey, five equally spaced co-linear current electrodes were placed in the ground by

burying aluminum foil in pits wetted with brine. Observations were made in accordance with a symmetrical dipole-dipole configuration where the distance between the receiver or potential electrodes was kept equal to the distance between adjacent electrode pairs. Generally the receiving dipole is separated by one to six dipole units ("n" separation) from the sending dipole. A precisely controlled square wave current was sent through a sending dipole at 0.05 and 3.0 cycles per second from which, at the receiving dipole, a D. C. and an A. C. voltage was measured, respectively. By knowing the geometry involved (the dipole length or spacing and the separation distance between the two receiving-sending dipole pairs), along with the two voltages, an apparent D. C. and an A. C. resistivity was calculated. From these apparent resistivities, their percentage difference was determined, thus giving the Percent Frequency Effect (PFE). A third quantity proportional to PFE and inversely proportional to D. C. resistivity, called Metallic Conduction Factor (MCF) was computed in order to somewhat normalize PFE for variations in ground conductivity purely as a technical interpretational aid.

The IP technique was developed primarily for porphyry type deposits and is perhaps the only reliable means of detecting hidden disseminated sulfides. However, the IP method works just as well or perhaps better on semi-massive to massive sulfides, contrary to some of the earlier thinking, for it gives increased response with increased volume percentage of sulfides.

SIERRA MINERAL MANAGEMENT

R. F. HEWLETT
President

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TOMBSTONE PROJECT

Possibilities for mine production by early 1974 are:

1. Waste dumps
2. Small high-grade underground production
3. Potential medium-sized open pit.

Cash requirements and potential cash flow are:

Project	Capital Requirement	Amount
Waste dumps	Plant (lease)	$250,000
Small underground	Mine equipment (lease)	50,000
Open pit	Exploration	50,000
		$350,000

Project	Potential Profit	Year
Waste dumps	$650,000	1974
Small underground	150,000	per year
Open pit	0-500,000	per year

Schedule of Activities follows:

1. Placer will analyze metallurgy and feasibility of moving Whitehall plant (on lease from MECL) to Tombstone.

2. Placer will review feasibility of mining "State of Maine" and we will then move down from Cordero (on lease from MECL) all required mining equipment (hoists, slushers, dozers, loaders, etc.)

3. " 71 ML" is attempting to form a corporation and merge Tombstone Mineral Reserves to obtain their plant (500 t.p.d.) and their 358 mining claims with gold-silver-and copper mineralization.

4. A lease has been proposed to Tombstone Development Corporation to explore and mine their patented claims that constitutes the largest holdings in the district.

5. A lease has been proposed to the Escapules for exploring, developing and mining the "State of Maine" and Santa Ana mines.

Activity	Amount
Move Plant	$100,000
Move Cordero Equipment	10,000
Tombstone Reserves	$ 25,000 to $100,000
Tombstone Development	$ 25,000
Escapules	$ 50,000
	$210,000 to $285,000

TECHNICAL EXPLANATION

"71 Minerals" strategy is to tie up the entire Tombstone district to allow us enough time to select claims or mines that are desireable and drop claims that don't have much potential before the assessment deadline of September 1, 1973.

The mining property in the Tombstone district is owned by (in decreasing order of importance):

1. Tombstone Development
2. Escapules
3. Tombstone Mineral Reserves
4. Grace-Bonanza
5. Wayne Winters
6. Numerous small trusts, churches, etc.

On the map (on the following page) are shown the following:

Ownership Group	Location of Claims
1. Tombstone Development	All orange dots east of "State of Maine"
2. Escapules	Around and including "State of Maine"
3. T. Mineral Reserves	Unpatented claims south and east of 41° N. (Military Hill)
4. Grace-Bonanza	Bonanza mine due east of "State of Maine"
5. Wayne Winters	North of Military Hill and South of Emerald

Tombstone Development

All orange dots south of Tombstone (excluding "State of Maine" and Bonanza) are waste dumps owned by T.D. The detailed report on waste dump and open-pit potential is in exhibit A.


TOMBSTONE
The Dome
U.S.L.M. NO. 3
San Pedro
Merrimac
State of Maine
Bonanza
Mamie
Sailor
Randolph
Uncle Sam
Toughnut
Silver Thread
West Side
Empire
Tranquility
Herschel
Ingersol
Old Guard
Pump Shaft
Grand
Lucky Cuss
U.S.L.M. NO. 1
Luck Sure
U.S.L.M. NO. 2
Oregon
Prompter
Bunker Hill
Emerald
Comet
Military Hill
Ajax Hill
Water
Pipe Line

Escapules

This property ("State of Maine") should be optioned and put into small scale underground production. This can be done for $30,000 excluding a plant. The potential for this property are:

1. Waste dumps (4.5 oz. Ag)
2. Small underground operation
3. Potential of a large underground operation
4. Potential for open pit ore.

Exhibit B shows the extent of the underground workings. I have examined these workings by ladder and rope and have taken some samples running from 147 to 225 ounces per ton. The average grade of gobb (old low-grade fill) is about 20 ounces which can be mined first.

The advantage of the old "State of Maine" workings is that we can put the mine back into production for relatively low start-up costs.

In addition to the "small" potential, there is the distinct possibility that there will be the same large high-grade bonanza one at depth as over in the Tombstone basin (due south of the town site). This is illustrated in exhibit C, where the ore is shown in cross-section as mined out stopes or levels. Notice that the ore is at and especially above the Naco limestone (8 level-bottom) up into the "Novaculite", blue limestone and Bisbee group limestones. The bottom of the "State of Maine" shaft is just going into Bisbee group limestones from a porphyry rock that is mineralized (that is where the past production came from). Therefore, there is a good chance that larger ore bodies exist at depth. (We can at least make money on the existing "lower grades".)

As I mentioned before, I have a tax lien on the San Juan mine.

Tombstone Mineral Reserves

This company is in bankruptcy and is an excellent possibility for us to control 358 unpatented mining claims with gold-silver mineralization and copper potential. Their 500 t.p.d. plant could be utilized in part by us with our White Hall plant. The T. Mineral Reserves plant is about two (2) miles from the "State of Maine" mine. Our electrolytic-oxidation process is superior to any in the district and we would have the only operating plant and could joint-venture or treat ore on a "custom basis".

Grace-Bonanza

This property is near Escapules and Mr. Grace contacted me recently and wants to make a deal with "71 ML".

Wayne Winters

"71 ML" has 15 mining claims under option in and around the Tombstone district. He has given us much free time for $100 per month. He is very helpful to us in consolidating property and arranging meetings for "71 ML". The value of his claims are discussed in Exhibit D.

EXHIBIT A

Tombstone Development

I

INTRODUCTION

TOMBSTONE DISTRICT

The Tombstone mining district is in the Tombstone Hills, about 21 miles northwest of Bisbee, and about 24 miles southeast of Benson, Arizona. The maximum elevation for this area is about 5300 feet above sea level.

PROPERTIES EXAMINED

Twenty-three (23) patented mining claims were selected, mainly those with mine dumps sufficiently large in tonnage to warrant re-handling and milling them or those in an area of geological interest.

The patented mining claims evaluated are tabulated in TABLE I.

II

SAMPLING PROCEDURE

Bulk samples were taken from each of the mine dumps and reduced in size for assay. Weight of bulk samples ranged from fifty (50) to one hundred (100) tons each. The size and location of the bulk samples was dependent on the size of the mine dumps and the area of expected influence. Bulk samples were coned and quartered using the backhoe-loader equipment until they were reduced in size to about two (2) tons, then they were trucked to a crusher-conveyor site, crushed, coned and quartered and finally split with a Jones splitter to a final weight of about ten (10) pounds. It is believed that the final samples represent very closely the content of the dumps sampled, at least to within the area of influence. The tonnage calculated for the dumps take this into consideration.

The method used to obtain and prepare samples for assay was decided upon in collaboration with Dr. Willard C. Lacy, Professor and Head of

the Mining and Geological Engineering Department, College of Mines, University of Arizona, Tucson, Arizona.

III

ASSAY RESULTS

Samples for assay were sent to Hawley and Hawley, Assayers and Chemists, Tucson, Arizona, to be assayed for gold, silver, lead, copper and in many cases for zinc, molybdenum and a few for manganese. The assay values are tabulated in TABLE II.

Copies of the original assay results from Hawley are included in APPENDIX I. of this report.

Arithmetical averages for grades of all the mine dumps sampled are as follows: gold, 0.018 oz./ton; silver, 1.86 oz./ton; lead, 0.55%; copper, 0.07%, for 28 samples; zinc, 0.76% for 11 samples; molybdenum, 0.004%, for 20 samples; and manganese, 4.56%, for 5 samples.

These averages are interesting as they somewhat indicate the grade of the mineralized material considered waste during certain active periods of mining in this district. However, it should be mentioned that many of the mine dumps have been selectively reworked and the concentrate shipped to smelters. Actually, these averages should be considered as minimums.

In contrast to these minimum values, perusal of the "Ore Shipping Records, from April 3, 1920 to February 28, 1923", gratefully furnished by Mr. Pete Giacomi of Tombstone, a copy of which is included in APPENDIX II of this report, indicate what was considered ore grade during this period and the arithmetical averages of grade and tonnage for selected mines are tabulated in TABLE III.

IV

TONNAGE AND METAL CONTENT OF MINE DUMPS

The selected mine dumps were surveyed and their respective tonnages calculated. The total tonnage calculated for the twenty-three mine dumps sampled was 524,900 tons, and are considered accurate to ±10%. This tonnage excludes dump material which was considered waste and dump material outside of the area of sampling influence. Access to certain areas of larger dumps, that were not sampled, and to isolated smaller mine dumps would considerably increase the total tonnage, however, for this feasibility study, the additional expense did not seem justified. A value of 17.5 cubic feet per ton was used in calculating the tonnages of the mine dumps. This value was determined after weighing known volumes of average size distribution dump material.

The tonnages calculated and the metal content of the mine dumps sampled are tabulated in TABLE IV.

V

ECONOMIC CONSIDERATIONS

An attempt to place dollar value to the mine dump material generated the following data:

1. Weighted averages for grade of all the mine dumps sampled were: gold, 0.021 oz./ton; silver, 1.36 oz./ton; and lead, 10.9 lb./ton. Weighted averages for grade of copper, zinc, molybdenum and manganese, based on available assays were: copper, 1.19 lb./ton, for 338,300 tons; zinc, 2.41 lb./ton, for 108,600 tons; molybdenum, 0.099 lb./ton, for 326,700 tons; and manganese, 48.9 lb./ton, for 14,500 tons.
2. Metal content of mine dumps sampled: gold, 10,975 oz.; silver, 715,500 oz.; lead, 5,707,320 lb.; copper 461,780 lb., based

on 388,300 tons; zinc, 261,134 lb., based on 108,600 tons; molybdenum, 31,346 lb., based on 326,700 tons; and manganese, 708,340 lb., based on 14,500 tons. Metal content of copper, zinc, molybdenum and manganese was based on tonnages covered by available assays. Because gold and silver were the metals of prime importance in the feasibility study, the other metals were assayed to assist in determining their distribution and their importance for inclusion in metallurgical testing to develop an economically feasible flowsheet for their extraction.

3. Assuming 90% extraction for the gold and 85% extraction for the silver content of the dumps, at the following market price of $90.00/oz. for gold and $2.41/oz. for silver, gives the recoverable dollar value of $888,975 for gold, and $1,464,678 for silver, or a gross of $2,354,677; this gross excludes lead, zinc, copper, molybdenum and manganese. The exclusion of these elements in this economic evaluation is justified until laboratory testing indicates the feasibility of extracting them. However, their presence is certainly significant in the overall evaluation as they have potential dollar value.
4. An estimate for handling and treatment costs would be about $2.75 per ton, in a 200 TPD pilot production type plant or approximately $1,444,000, leaving a net gross of $910,677.
5. Assuming the pilot production plant would cost approximately $250,000 for a 200 TPD operation, one would realize a nice profit from an operation of this type, and the advantages derived would be meaningful. Advantages would be the familiarity with ore treatment characteristics, resulting in refinement of the flowsheet, which of course would have to be developed by

laboratory testing, which would include all the recoverable values in the mine dump material. The recoverable dollar value of lead could be approximately $720,000, based on a lead price of $0.14/lb., and the copper, zinc, molybdenum and manganese would also enhance the recoverable dollar value that could be expected from treating the mine dump material.

The decision to consider construction of a pilot production plant should be based on the following criteria:

1. An active exploration program, to determine if potential open pit type mining sites exist in this area, and the ore reserves that could be expected.
2. The development of an effective flowsheet, by laboratory testing, to economically extract all or most of the valuable metals in the mine dumps and/or developed ore.

VI

OPEN PIT MINING POTENTIAL

During the field work of this feasibility study, potential open pit type mining sites were under consideration. One of the areas which appeared to warrant further consideration is that area of Tombstone Basin which contains the Silver Thread, Tranquility, Head Center, Contention, Empire, Toughnut, and West Side mines, and another area would be the Lucky Cuss-Herschel Zone.

In the first area, it is reported by B.S. Butler, E.D. Wilson, and C.A. Rasor, in the "Geology and Ore Deposits of the Tombstone District, Arizona," that the ore occurs (1) in the faulted segments of the dike, (2) in brecciated footwall zones of these segments, and (3) in limestone beds of the shale sequence.

From the same reference, the second area of interest, the Lucky Cuss-Herschel Zone has the following statement: that the ore deposits

in and associated with the Lucky Cuss fault zone are of three types -- veins in the Lucky Cuss fault, veins in the northeast fissures, and limestone replacement deposits associated with the northeast fissures. Mining in both areas of interest was developed to the surface.

These areas should offer excellent targets, for a detailed evaluation by geological, geophysical, drilling and computer techniques.

VII

METALLURGICAL CONSIDERATIONS

The prime metals considered in this report are gold and silver which could be beneficiated by using the cyanidation method. Concern is expressed by some as to the expected recovery of silver from manganiferous ores. This could present a problem in dump material of high manganese content. However, most of the dumps sampled appear to be not too high in manganese content.

Two processes which have been developed to treat silver ores high in manganese are the Caron Process and the McClusky Process. The Caron Process utilizes a roast in a reducing atmosphere, the higher manganese oxides are reduced to manganous oxides which render them amenable to cyanidation. Laboratory tests followed by plant-scale testing gave the following results: Direct cyanidation of ore containing 2-10% MnO_2 gave 50% extraction of the silver, the Caron Process extracted 92% of the gold and 90% of the silver. The McClusky Process utilizes a sulphur dioxide treatment which dissolves the manganese minerals which are then precipitated by a lime emulsion and oxidized to the manganic state by aeration. In this state the manganese no longer affects the extraction of silver by cyanidation.

To fully exploit the potential dollar value of the Tombstone ores, a comprehensive laboratory testing program is recommended. The testing

program should include flotation tests, pressure leaching tests, to solubilize the base metals present and possibly effect their extraction, and liquid ion exchange for upgrading and separation. New chemical extraction techniques should definitely be explored.

TABLE I. PATENTED MINING CLAIMS EXAMINED

NAME OF MINE	LOCATION
Bob Ingersoll	Sec 11, T 20 S, R 22 E
Boss	Sec 11, T 20 S, R 22 E
Bunker Hill	Sec 14, T 20 S, R 22 E
Comet	Sec 23, T 20 S, R 22 E
Contention Little Joe Shaft Pump Shaft Main Workings Shaft	Sec 11, 12 & 14, T 20 S, R 22 E
Defence	Sec 11, T 20 S, R 22 E
Emerald	Sec 14 & 23, T 20 S, R 22 E
Empire	Sec 11 & 12, T 20 S, R 22 E
Free Coinage	Sec 9, T 20 S, R 22 E
Grand Central	Sec 14, T 20 S, R 22 E
Herschel	Sec 11, T 20 S, R 22 E
Lucky Cuss	Sec 11 & 14, T 20 S, R 22 E
Old Guard	Sec 11, T 20 S, R 22 E
Oregon	Sec 14, T 20 S, R 22 E
Prompter	Sec 14, T 20 S, R 22 E
Rattlesnake	Sec 14, T 20 S, R 22 E
San Pedro	Sec 8, T 20 S, R 22 E
Silver Plume	Sec 14 & 23, T 20 S, R 22 E
Silver Thread	Sec 11 & 12, T 20 S, R 22 E
Toughnut	Sec 11, T 20 S, R 22 E
Tranquility	Sec 11 & 12, T 20 S, R 22 E
West Side	Sec 11, T 20 S, R 22 E

TABLE II. MINE DUMP ASSAY RESULTS

SAMPLE NO. AND NAME OF MINE	Gold oz./T	Silver oz./T	Lead lb./T	Copper lb./T	Zinc lb./T	Moly lb./T	Manganese lb./T
B.I. #1 (Bob Ingersoll)	0.005	1.08	6.4	0.8	28.8	0.02	---
BS #1 (Boss)	0.037	2.39	9.2	1.8	9.0	---	---
B.H. #1 (Bunker Hill)	0.030	3.59	26.4	3.8	48.0	0.10	---
B.H. #2 (Bunker Hill)	0.007	3.10	24.0	---	36.6	---	---
CMT #1 (Comet)	0.015	0.91	3.8	0.6	---	0.02	---
L.J. #1 (Contention)	0.017	1.07	10.0	0.2	8.0	0.02	---
CONT #1 (Contention)	0.022	1.06	6.0	0.6	---	0.02	---
CONT #2 (Contention)	0.010	0.77	4.2	---	---	---	---
CONT #3 (Contention)	0.027	1.33	6.4	---	---	---	---
DF #1 (Defence)	0.010	1.25	7.8	0.6	24.2	---	---
EMER #1 (Emerald)	0.020	1.59	21.8	3.0	---	0.02	---
EMER #2 (Emerald)	0.020	2.10	22.4	5.6	---	0.02	---
EMER #3 (Emerald)	0.010	0.90	7.6	1.2	---	0.02	---
EMP #1 (Empire)	0.080	1.90	15.6	1.4	---	0.30	---
F.C. #1 (Free Coinage)	0.005	0.95	0.5	0.2	0.2	0.02	8.6
G.C. #1W (Grand Central)	0.010	0.22	2.6	---	---	---	---
G.C. #2 (Grand Central)	0.010	0.97	23.8	0.2	3.2	0.02	---
HER #1 (Herschel)	0.015	3.47	6.0	1.4	---	---	---
L.C. #1 (Lucky Cuss)	0.040	2.98	20.8	1.4	15.2	0.02	---
O.G. #1 (Old Guard)	0.015	1.34	6.0	0.8	10.8	---	11.6
ORE #1 (Oregon)	0.005	5.52	14.2	2.8	---	---	159.0
ORE #2 (Oregon)	0.002	3.27	12.8	2.8	---	---	139.0
PRMT #1 (Prompter)	0.005	3.63	16.0	---	---	---	138.0
RTLS #1 (Rattlesnake)	0.005	2.33	11.6	1.4	---	---	---
S.P. #1 (San Pedro)	0.005	4.48	5.4	2.2	---	0.06	---
SLP #1 (Silver Plume)	0.002	0.45	4.2	0.6	---	---	---
S.T. #1 (Silver Thread)	0.025	1.33	13.0	0.6	---	0.12	---
SET #1 (Sulphuret)	0.022	0.66	6.2	0.6	3.6	0.10	---
TN #1 (Toughnut)	0.015	0.87	10.0	1.0	---	0.18	---
TN #2 (Toughnut)	0.005	0.36	3.8	0.2	---	0.04	---
TR #1 (Tranquility)	0.060	3.22	19.8	1.8	---	0.16	---
TR #2 (Tranquility)	0.022	0.85	4.8	0.4	---	0.04	---
W.S. #1 (West Side)	0.012	1.36	11.8	1.0	---	0.12	---
ARITHMETICAL AVERAGE	0.018	1.86	11.1	1.4	17.1	0.07	91.2

TABLE III. ARITHMETICAL AVERAGES OF ORE SHIPMENTS

APRIL 1920 THROUGH MARCH 1921

NAME OF MINE	TONNAGE	Gold, oz./T	Silver, oz./T
Bunker Hill	99.5	0.035	15.45
Emerald	118.5	0.010	8.00
Grand Central	1,437.5	0.140	13.75
Lucky Cuss	5,559.5	0.056	16.92
Oregon	3,865.5	0.013	23.00
Prompter	9,688.0	0.017	16.50
San Pedro	431.5	0.170	27.15

APRIL 1920 THROUGH FEBRUARY 1923

Contention	3,639.0	0.198	13.57
Empire	158.5	0.240	13.48
Head Center (Yellow Jacket)	1,738.0	0.200	14.50
Silver Thread	4,738.0	0.270	25.47
Toughnut	5,203.0	0.170	27.45
Tranquility	1,977.5	0.320	22.46
West Side	1,237.5	0.560	38.58

TABLE IV. MINE D[illegible]S METAL CONTENT

SAMPLE NO.	TONNAGE ± 10%	Gold Total oz.	Silver Total oz.	Lead Total lb.	Copper Total lb.	Zinc Total lb.	Moly Total lb.	Manganese Total lb.
B.I. #1	10,500	52.5	11,340	67,200	8,400	426,800	210	
BS #1	3,400	125.8	4,624	31,280	6,120	30,600		
B.H. #1	15,300	459.0	54,927	403,920	58,140	734,400	1,530	
B.H. #2	10,500	73.5	32,550	252,000		384,300		
CMT #1	13,000	195.0	11,830	49,400	780		260	
L.J. #1	2,000	34.0	2,140	20,000	400	16,000	40	
CONT #1	11,800	259.6	12,508	70,800	7,080		236	
CONT #2	97,700	977.0	75,229	410,340				
CONT #3	16,300	440.1	21,679	94,320				
DF #1	24,200	242.0	30,250	188,760	14,520	585,640		
EMER #1	40,000	800.0	63,600	872,000	120,000		800	
EMER #2	1,600	32.0	3,360	35,840	8,960		32	
EMER #3	7,000	70.0	6,300	53,200	8,400		140	
EMP #1	41,100	3,288.0	78,090	641,160	57,540		12,330	
F.C. #1	200	1.0	190	100	40	40	4	1,720
G.C. #1W	10,000	100.0	2,200	26,000				
G.C. #2	10,000	100.0	9,700	238,000	2,000	32,000	200	
HER #1	6,800	102.0	23,596	40,800	9,520			
L.C. #1	18,200	728.0	54,236	378,560	25,480	276,640	364	
O.G. #1	10,200	153.0	13,668	61,200	8,160	110,160		118,320
ORE #1	1,000	5.0	5,520	14,200	2,800			159,000
ORE #2	1,500	3.0	4,905	19,200	4,200			208,500
PRMT #1	1,600	8.0	5,808	27,200				220,800
RTLS #1	3,000	15.0	6,990	252,000	4,200			
S.P. #1	1.500	7.5	6,720	8,100	3,300		90	
SLP #1	12,000	24.0	5,400	50,400	7,200			
S.T. #1	17,000	425.0	22,610	221,000	10,200		2,040	
SET #1	4,100	90.2	2,706	25,420	2,460	14,760	410	
TN #1	18,000	270.0	15,660	180,000	18,000		3,240	
TN #2	32,000	160.0	11,520	121,600	640		1,280	
TR #1	9,200	552.0	29,624	182,160	16,560		1,472	
TR #2	29,200	642.4	24,820	140,160	11,680		1,168	
W.S. #1	45,000	540.0	61,200	531,100	45,000		5,500	
	524,900	10,974.6	715,500	5,707,320	461,780 (388,300T)	261,134 (108,600T)	31,346 (326,700T)	708,340 (14,500T)

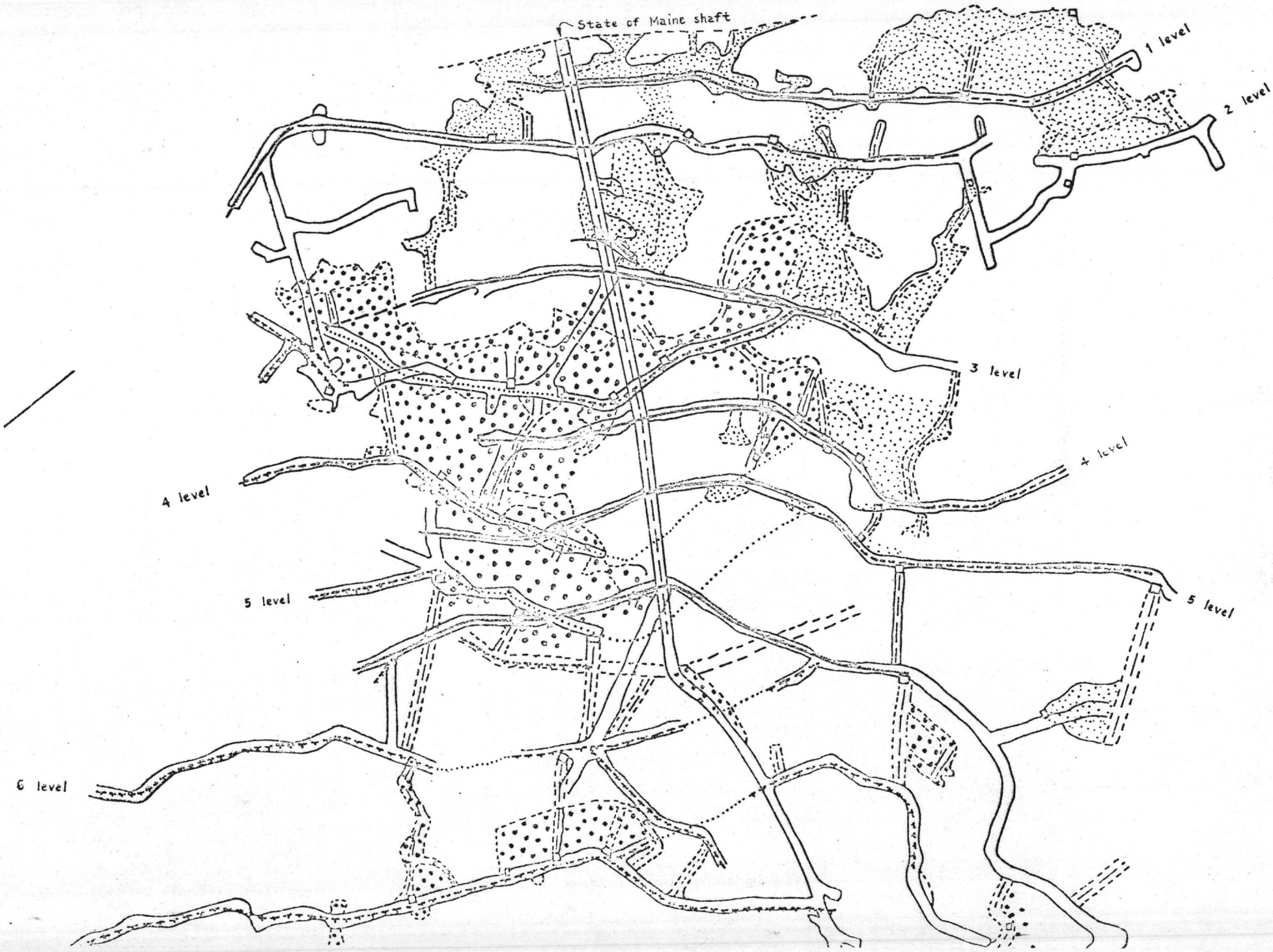
TOTALS BASED ON ABOVE TONNAGES

EXHIBIT B

"State of Maine"

underground workings

and other data


State of Maine shaft
1 level
2 level
3 level
4 level
4 level
5 level
5 level
6 level

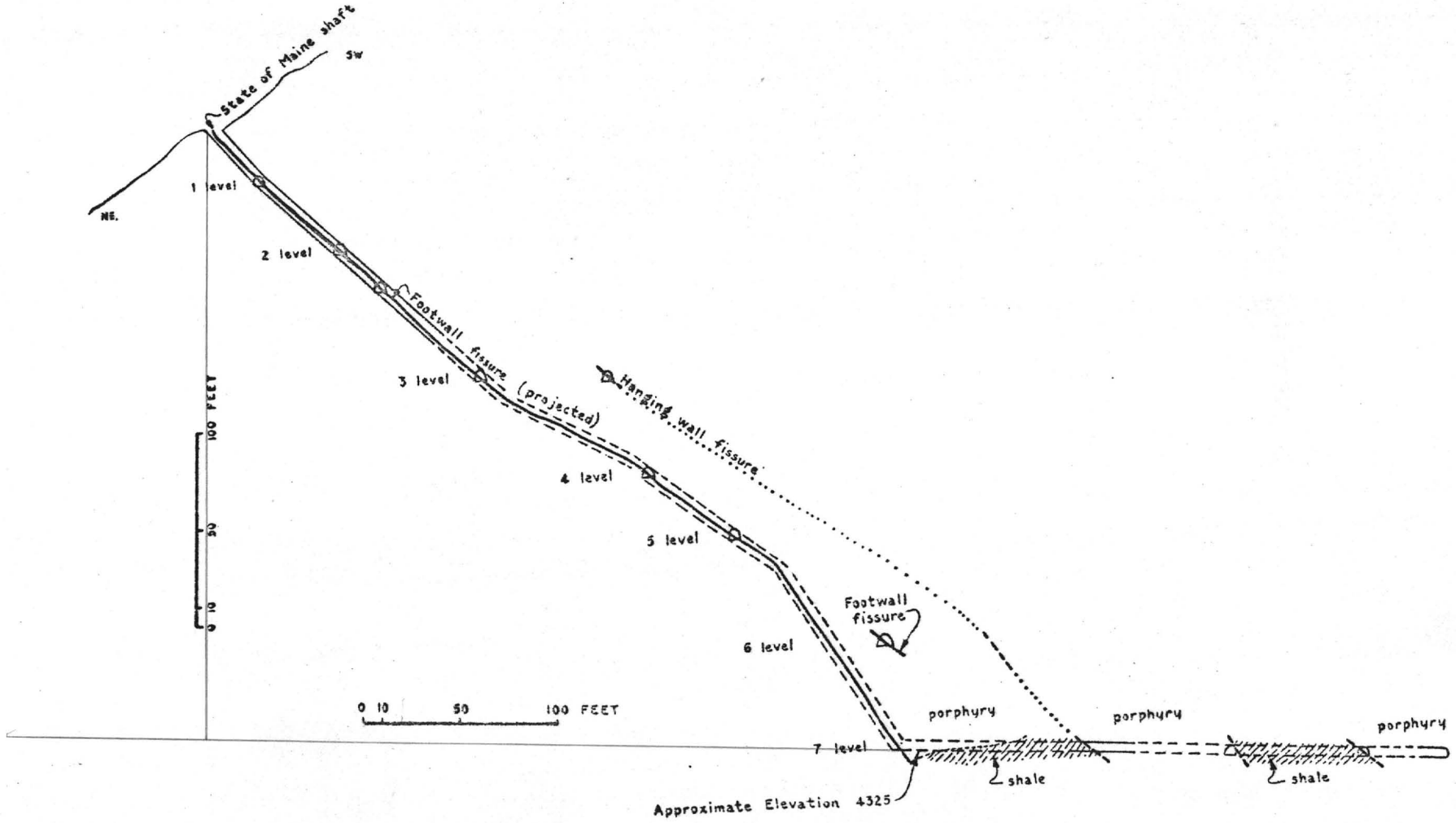
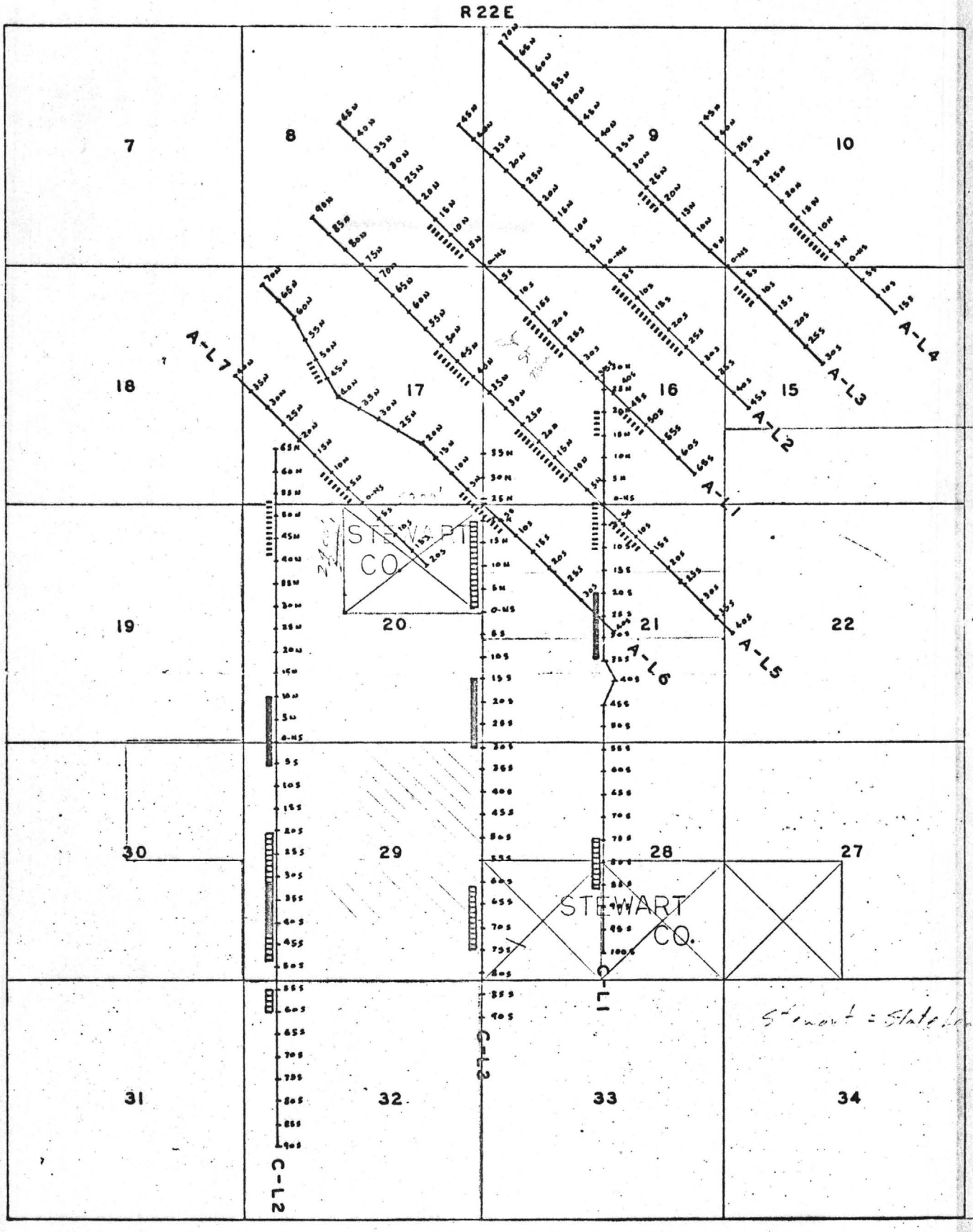


Plate XXVI.—Cross section through State of Maine Mine, looking southwest.


2 level
3 level
4 level
4 level
5 level
5 level
6 level
6 level
7 level
North
N
0 10 50 100 FEET
Footwall fissure



INDUCED POLARIZATION AND RESISTIVITY SURVEY
COMPOSITE OF CAB AND AUSTRAL SURVEYS
TOMBSTONE AREA, COCHISE COUNTY, ARIZONA
SCALE 1:24000

STATE LEASE

SUFACE PROJECTION OF ANOMALOUS ZONES
DEFINITE
PROBABLE
POSSIBLE

I.P. LINES
A = AUSTRAL
C = CAB

NOV 19

SOUTHWESTERN ASSAYERS & CHEMISTS, Inc.

REGISTERED ASSAYERS

FELIX K. DURAZO
WIL WRIGHT
ARIZONA REG. NO. 5875

P. O. BOX 7517
TUCSON, ARIZONA 85713

710 E. EVANS BLVD.
PHONE 602-294-5811

Austral Oil Company
2700 Humble Building
Houston, Texas

JOB # 002703
RECEIVED 6-27-68
REPORTED 6-27-68

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD %	COPPER %	ZINC %		MOLYBDENUM %
# 7 f.s.E Stateofmaine	Nil	4.54					
# 8 Stateofmaine (course:	Nil	4.94					

REGISTERED ASSAYER CERTIFICATE NO. 5875 WIL D. WRIGHT Signed Arizona U. S. A.

CHARGE $ 8.00

	6	.52	.30	2.79	.34	72.5	2.8	4.5
Sid. c. & of m.	(7)	.56	.27	3.06	.22	75.0	11.1	3.9
Sulf(c) S. of m	(8)	.65	.22	2.30	.16	73.5	12.7	3.5
	9	.93	.23	3.50	.14	76.5	.80	3.4
	10	3.95	.39	3.45	.07	70.0	11.7	3.0
	11	16.6	.98	3.40	.05	47.50	7.7	4.1
B.J.	(12)	1.99	.65	2.97	.04	67.7	13.1	3.9
	13	2.07	.44	3.01	.09	70.7	8.8	5.1
		CaO % calcium	MgO % mag.	Fe % iron	S % sulphur	SiO_2 % silica	INSol %	Al_2O_3 % aluminum

$ 431.00 less 10% quantity discount of 48.10

dumps

CHARGE $ 432.90

* Gold and Silver reported in troy oz. per 2,000 lb. ton.

INVOICE

& Scapa

SOUTHWESTERN ASSAYERS & CHEMISTS, Inc.

REGISTERED ASSAYERS

FELIX K. DURAZO
WIL WRIGHT
ARIZONA REG. NO. 5875

P. O. BOX 7517
TUCSON, ARIZONA 85713

710 E. EVANS BLVD.
PHONE 602-294-5811

Austral Oil Company
2700 Humble Building
Houston, Texas

JOB # 002740
RECEIVED 7-2-68
REPORTED 7-7-68

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD %	COPPER %	ZINC %		MOLYBDENUM %
95L:							
190 ND.		.06					
30 S.	Nil	3.00					
50 W.		.34					
433 L:							
105 NW	Nil	2.34					
60 S	Nil	5.24					
175N50W	Nil	.62					
195L:							
76 S	Nil	7.26					
105 ND.	Nil	8.66					
356L 136ND.	Nil	9.28					
356L100 ND.	Nil	1.52					
300L							
77ND. 41W	Nil	8.12					
141L-30S	.003	21.06					
161L 35 ND.	Nil	6.32					
480L							
164S 117W	Nil	Trace					
dump #12 Brother Donation	Nil	1.94					

REGISTERED ASSAYER
CERTIFICATE NO.
5875
WIL WRIGHT
Arizona U. S. A.

Gold

St. of Maine

$ 50.00

Level 1 Stopeing

7/22/69

Dore' beads.

#96 = 17.8 mg WINZE S of M

#97 = 52.3 " RAISE B.J.

#98 = 16.6 " 20' N of S. end Int level

#99 = 14.3 " Pilot #2 Heads

#100 = 16.3 " Pilot #1 Heads

#101 = 8.4 " 10' N of S. end

#102 = 7.0 " S. side of winze

#104 = 13.0 " 50' N of winze

#108 = 4.0 " 10' N of S. end

#109 = 6.5 " B.J. S. end.

#110 = 3.3 " Pilot #1 TAILS

#111 = 13.0 " Point of High Dump B.J.

#118 = 4.0 " Pilot #2 TAILS

SKYLINE LABS, INC.
Hawley & Hawley, Assayers and Chemists Division
P.O. Box 50106, 1700 W. Grant Rd., Tucson, Arizona 85703

CERTIFICATE OF ANALYSIS

SAMPLE IDENTIFICATION	GOLD oz/ton	SILVER oz/ton	LEAD	ZINC	COPPER	MO	Mn %		
# 1	< 0.005	224.95					0.011		
# 2	< 0.005	146.80					0.009		

TO: Sierra Minerals
4741 East Sunrise Drive
Tucson, Arizona 85718

REMARKS:
Single determination

CERTIFIED BY:

REGISTERED ASSAYER
CERTIFICATE NO.
6734
U. S.
Arizona

CHARGES:
PREPARATION $ 1.80
ANALYSIS $ 14.00

ACCT.:	DATE REC'D:	DATE COMPL.:		
SIERRA MINERALS	2/28/73	3/5/73	tuc 346954	$ 15.80

APPENDIX B

METCON LABORATORY

PROJECT CT-15

FOR

AUSTRAL OIL COMPANY

TOMBSTONE, ARIZONA

July 22, 1968

SUMMARY

Preliminary work only has been done, Due to misunderstanding no further work was carried on until Mr. Carouso came in during the first week in July and indicated the urgency. Since then additional work has been done, the results of which are not all available. Cyanide assays of pregnant liquor, obtained at a custom assay office failed to check expected results within credibility figures.

PROCEDURE

A large sample of ore (over a thousand pounds) from the Tombstone, Arizona area was delivered to METCON LABORATORY by the Austral Oil Company. This was thoroughly mixed by coning several times after which coning and quartering continued until a small enough sample was achieved for screen analysis and an aliquot portion for head assay.

SCREEN ANALYSIS AND ASSAY OF SCREEN FRACTIONS

No.	SCREEN	WGT. %	ASSAY OZ/TON		UNITS		% DISTRIBUTION	
			Au	Ag	Au	Ag	Au	Ag
525	1.050	29.73	0.008	3.18	0.0024	0.945	35	29.8
526	0.742	10.10	0.010	3.21	0.0010	0.324	15	10.3
527	0.525	9.52	0.006	2.31	0.0006	0.220	9	6.9
528	0.371	8.08	0.008	2.35	0.0006	0.190	8	6.0
529	3 MESH	6.20	0.005	1.94	0.0003	0.120	4	3.8
530	4 "	5.11	0.004	2.18	0.0002	0.111	3	3.5
531	6 "	4.30	0.004	3.62	0.0002	0.156	3	4.9
532	10 "	4.87	0.004	3.84	0.0002	0.187	3	5.9
533	20 "	5.26	0.003	2.18	0.0002	0.115	3	3.6
534	35 "	4.35	0.008	4.53	0.0003	0.197	4	6.2
535.	48 "	1.71	0.005	6.28	0.0001	0.107	1	3.4
536	65 "	2.49	0.005	6.02	0.0001	0.150	1	4.7
537	100 "	1.36	0.004	6.27	0.0001	0.085	1	2.7
538	200 "	3.69	0.010	4.83	0.0004	0.178	6	5.6
539	-200 "	3.23	0.010	2.59	0.0003	0.084	4	2.7
	Calculated Screen Head				0.007	3.169		
	Actual Assay of Screen Feed				0.010	2.82		

Looking at the silver distribution in the screen analysis, it appears there is little to be gained by screening or classifying since the silver distribution follows the fraction weights very closely.

Three alkalinity checks were made to determine if acid generating minerals were in evidence.

TEST No. 1

200 grams of ore - minus 9 mesh

200 ml of water

Rolled for 1 hour Final pH 6.0

TEST No. 2

Same as above but with the addition of

2 grams CaO. Final pH 11.2

TEST No. 3

Same as above but with the addition

of 1 gram of CaO and rolled for

20 hours. Final pH 11.0

It appears that once sufficient lime has been added to raise the pH substantially on the alkaline side there is little degradation. Apparently there are not many sulfides available for creating acid.

Additional tests, Nos. 4 through 9 were completed to determine the protective alkalinity as follows:

400 grams of ore - each charge

0.645 grams of 77.5% available CaO (equal to 0.5 grams on a 100% basis)

1000 ml of water

	TIME ON ROLLS (HRS.)	MESH OF ORE	LIME TITRATION OF FINAL LIQUOR
4	1	-10	0.0050% CaO
5	2	-10	0.0060% "
6	3	-10	0.0055% "
7	4	-10	0.0050% "
8	1	-100	0.0030% "
9	4	-100	0.0030% "

The final liquor was titrated with 0.1 N HNO_3.

Four preliminary tests were run to compare mesh size with leach capabilities.

Make-up of each charge as follows (differing only in screen size):

500 grams of ore assaying Au 0.010 Ag 2.82

500 ml of water

5 grams CaO

1.885 grams NaCN (KCN equivalent to 0.5%)

All were rolled for 20 hours and tailing assayed.

SAMPLE No.	100 % MINUS SCREEN MESH	Au	Ag	% RECOVERY
603	9	Nil	0.73	74.12
604	20	"	0.64	77.31
605	35	"	0.60	78.73
606	48	"	0.52	81.57

No further gold assays will be obtained since obviously 100 % recovery of the gold is evidenced.

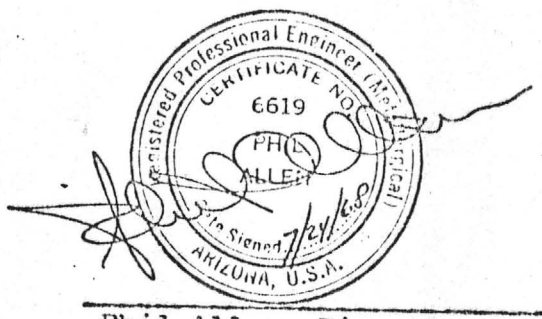
It could well be that finer grinds might be even more easily leached however in reducing to all minus 48 mesh in a mill a lot of very fine material would be created. In this test the samples were screened before each additional pass through the pulverizer (loose plates) so not too much in fines above the next smaller mesh screen could be created.

Cyanide consumption is not known at this point since the assay results were not credible. These will be rerun.

We will fabricate some laboratory size tanks for counter-current

leaching (probably of the pachuca type) and proceed with tank type leaching as soon as possible.

We are nearly set up to do our own assaying of Cyanide and available lime. Since this appears to be something the assay offices are not readily able to slot into their line-up, quite probably we can do a better job.



Phil Allen, Director
METCON Laboratory

PA/vi

EXHIBIT C

"State of Maine"

deep potential

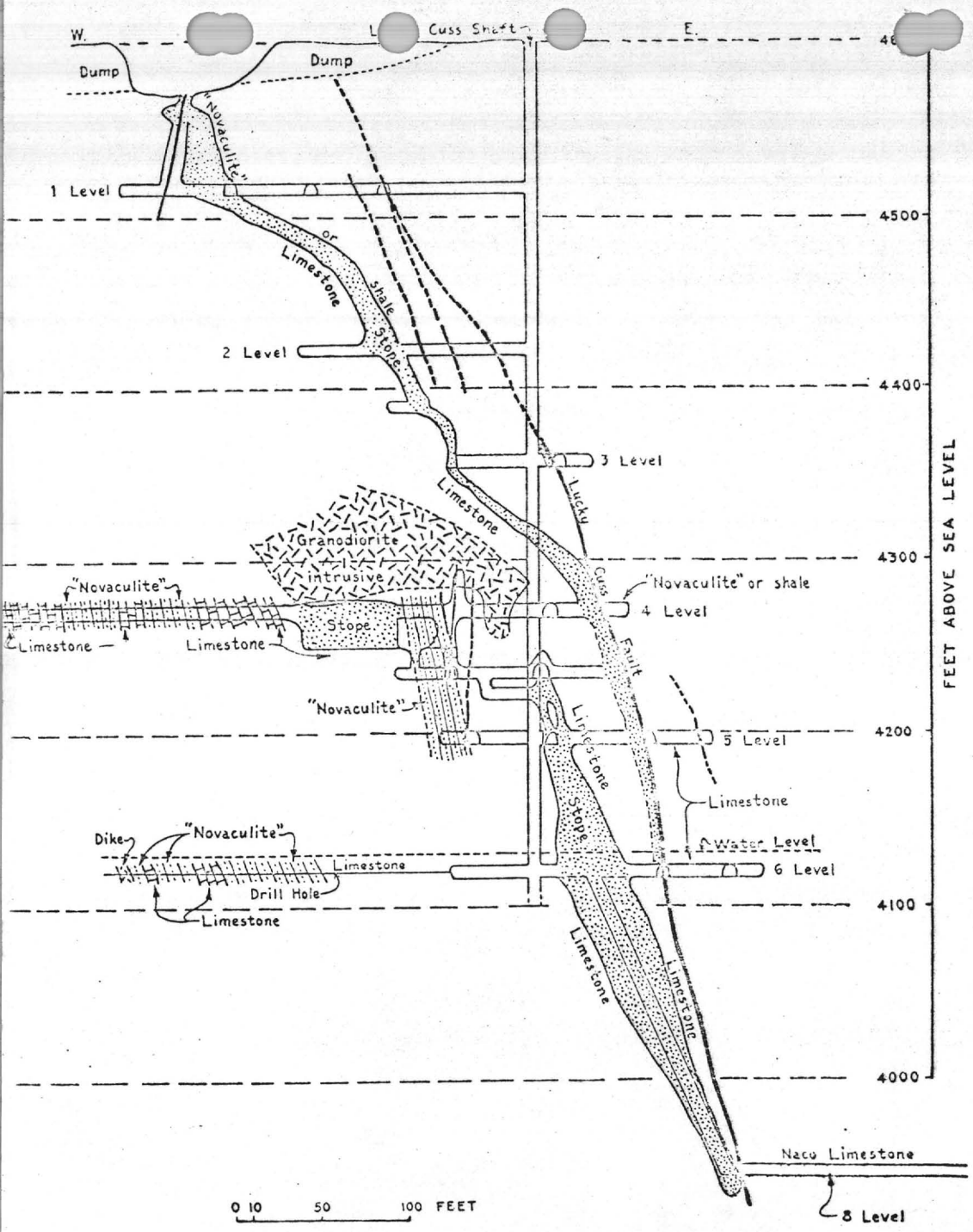
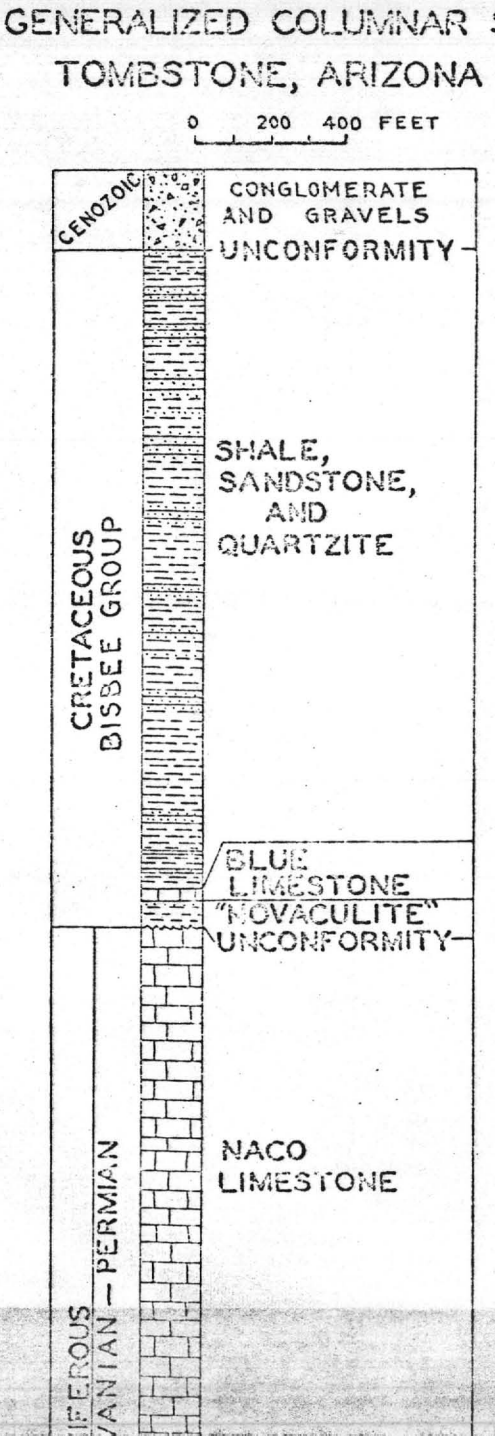


Plate XIII.—Cross section through Lucky Cuss workings at main shaft, looking north. (After F. L. Ransome and C. L. Poindexter.)



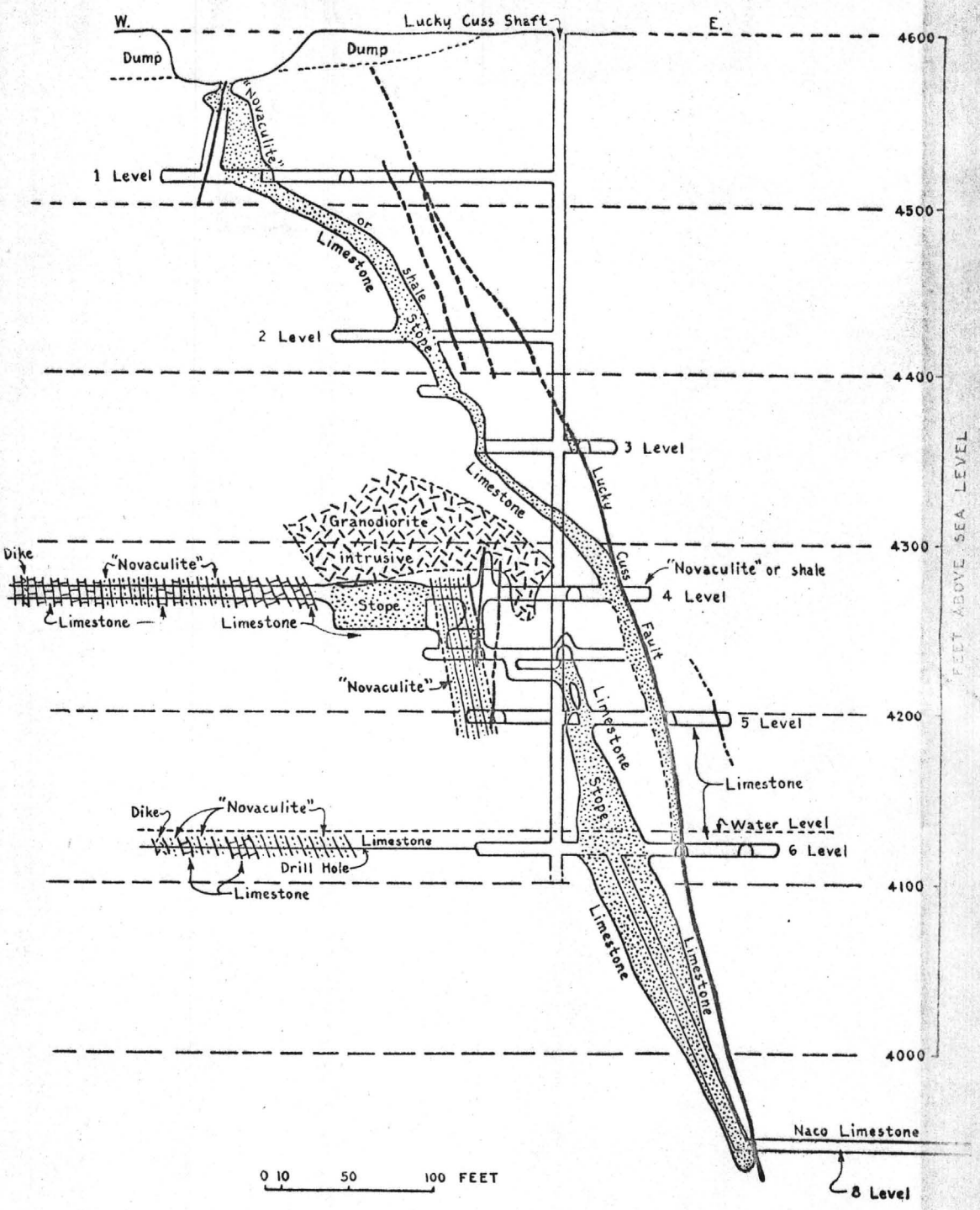


Plate XIII.—Cross section through Lucky Cuss workings at main shaft, looking north. (After F. L. Ransome and C. L. Poindexter.)

GENERALIZED COLUMNAR SECTION
TOMBSTONE, ARIZONA

0 200 400 FEET

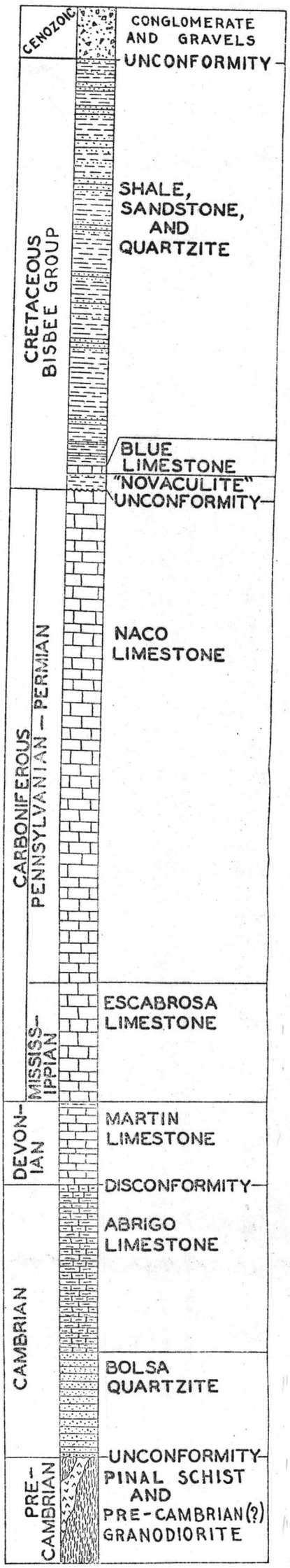


Plate II

Figur

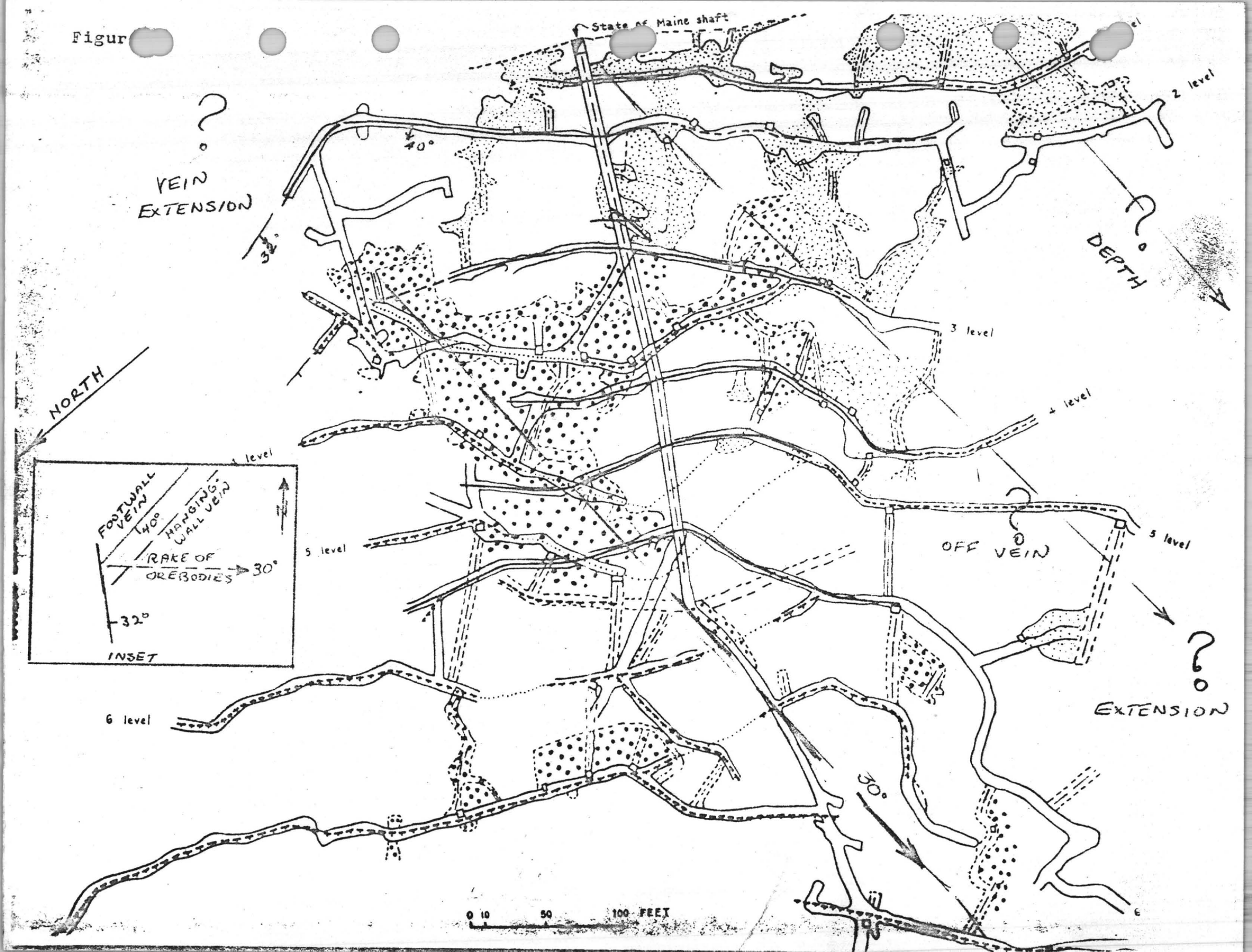

State of Maine shaft
2 level
3 level
4 level
5 level
6 level
40°
32°
VEIN
EXTENSION
DEPTH
NORTH
OFF VEIN
EXTENSION
30°
INSET
FOOTWALL VEIN
140°
HANGING-WALL VEIN
RAKE OF OREBODIES
30°
32°
0 10 50 100 FEET

EXHIBIT D

Wayne Winters Properties

MINING PROPERTIES IN WHICH WAYNE WINTERS IS INTERESTED:

TOMBSTONE DISTRICT--Solely owned by Winters.

Patented:

Side Wheel--Developed to the point where production could be started from underground on a small scale within five shifts.

Rattling Boy--Ore developed for surface mining where production could begin on the first shift.

Wauban--Minerals only. Can be reached eventually by drifting underground from Side Wheel shaft. Some anomolies (IP) on ridge.

Hugenot--Unprospected in recent years.

Honeycomb--An old working. Some ore showing in 250-foot inclined shaft. Needs thorough prospecting.

Nicholas--An old operation currently undergoing additional exploration. Appears to be an excellent prospect.

TOMBSTONE DISTRICT--Properties in which Winters has an interest.

Sultana patented claim--Owns 10 persent of the mineral rights. A possible prospect. Did produce a little lead carbonates in the early days.

Blue Top Group--Five unpatented claims in Section 15. Associates on these.

Black Beauty Claim--Small fraction that adjoins the Wauban on the east. Associates on this.

HARTFORD DISTRICT--Solely owned by Winters.

Pinetree, New Strike, #2, White Fawn, Mountain Lion, Mammoth, Lost Chance. (Mineral survey #1811). 101.895 acres in Secs. 34 & 35--23 20. Forest Service owns surface. Winters owns patented minerals. (Lutz tunnel, etc.)

ORO BLANCO DISTRICT--Solely owned by Winters.

LAURA Patented lode claim (gold). 20 acres.

Doran's Folly--Unpatented gold placer, 20 acres. Currently contested in United States District Court by the Forest Service.

Phil Allen (METCON)
9-26-68

649

Metallurgical Consulting to the Chemical Industry

METCON LABORATORY

Box 5912
Tucson, Ariz.
85703
Phone 623-5045
Area code 602

September 26, 1968

Mr. William Lundby
8840 Wrightstown Road
Tucson, Arizona 85715

Dear Mr. Lundby,

Here is the final report on the Tombstone test work.

We are also enclosing a final billing. Inasmuch as we have delayed this final dispatch unreasonably long we are canceling our laboratory charge but would appreciate receiving the small amount we are out of pocket for assays.

Thank you very much for having this opportunity to work with you and we would certainly appreciate any consideration you might be able to give us in the future.

Very cordially,

Phil Allen, Director
METCON Laboratory

PA/vi

METCON LABORATORY

PROJECT CT-15

FOR

AUSTRAL OIL COMPANY

TOMBSTONE, ARIZONA

July 22, 1968

SUMMARY

Preliminary work only has been done. Due to misunderstanding no further work was carried on until Mr. Carouso came in during the first week in July and indicated the urgency. Since then additional work has been done, the results of which are not all available. Cyanide assays of pregnant liquor, obtained at a custom assay office failed to check expected results within credibility figures.

PROCEDURE

A large sample of ore (over a thousand pounds) from the Tombstone, Arizona area was delivered to METCON LABORATORY by the Austral Oil Company. This was thoroughly mixed by coning several times after which coning and quartering continued until a small enough sample was achieved for screen analysis and an aliquot portion for head assay.

SCREEN ANALYSIS AND ASSAY OF SCREEN FRACTIONS

No.	SCREEN	WGT. %	ASSAY OZ/TON Au	ASSAY OZ/TON Ag	UNITS Au	UNITS Ag	% DISTRIBUTION Au	% DISTRIBUTION Ag
525	1.050	29.73	0.008	3.18	0.0024	0.945	35	29.8
526	0.742	10.10	0.010	3.21	0.0010	0.324	15	10.3
527	0.525	9.52	0.006	2.31	0.0006	0.220	9	6.9
528	0.371	8.08	0.008	2.35	0.0006	0.190	8	6.0
529	3 MESH	6.20	0.005	1.94	0.0003	0.120	4	3.8
530	4 "	5.11	0.004	2.18	0.0002	0.111	3	3.5
531	6 "	4.30	0.004	3.62	0.0002	0.156	3	4.9
532	10 "	4.87	0.004	3.84	0.0002	0.187	3	5.9
533	20 "	5.26	0.003	2.18	0.0002	0.115	3	3.6
534	35 "	4.35	0.008	4.53	0.0003	0.197	4	6.2
535.	48 "	1.71	0.005	6.28	0.0001	0.107	1	3.4
536	65 "	2.49	0.005	6.02	0.0001	0.150	1	4.7
537	100 "	1.36	0.004	6.27	0.0001	0.085	1	2.7
538	200 "	3.69	0.010	4.83	0.0004	0.178	6	5.6
539	-200 "	3.23	0.010	2.59	0.0003	0.084	4	2.7
	Calculated Screen Head				0.007	3.169		
	Actual Assay of Screen Feed				0.010	2.82		

Looking at the silver distribution in the screen analysis, it appears there is little to be gained by screening or classifying since the silver distribution follows the fraction weights very closely.

Three alkalinity checks were made to determine if acid generating minerals were in evidence.

TEST No. 1

200 grams of ore - minus 9 mesh

200 ml of water

Rolled for 1 hour Final pH 6.0

TEST No. 2

Same as above but with the addition of

2 grams CaO. Final pH 11.2

TEST No. 3

Same as above but with the addition

of 1 gram of CaO and rolled for

20 hours. Final pH 11.0

It appears that once sufficient lime has been added to raise the pH substantially on the alkaline side there is little degradation. Apparently there are not many sulfides available for creating acid.

653

Additional tests, Nos. 4 through 9 were completed to determine the protective alkalinity as follows:

400 grams of ore - each charge

0.645 grams of 77.5% available CaO (equal to 0.5 grams on a 100% basis)

1000 ml of water

	TIME ON ROLLS (HRS.)	MESH OF ORE	LIME TITRATION OF FINAL LIQUOR
4	1	-10	0.0050% CaO
5	2	-10	0.0060% "
6	3	-10	0.0055% "
7	4	-10	0.0050% "
8	1	-100	0.0030% "
9	4	-100	0.0030% "

The final liquor was titrated with 0.1 N HNO_3.

Four preliminary tests were run to compare mesh size with leach capabilities.

Make-up of each charge as follows (differing only in screen size):

500 grams of ore assaying Au 0.010 Ag 2.82

500 ml of water

654

5 grams CaO

1.885 grams NaCN (KCN equivalent to 0.5%)

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It could well be that finer grinds might be even more easily leached however in reducing to all minus 48 mesh in a mill a lot of very fine material would be created. In this test the samples were screened before each additional pass through the pulverizer (loose plates) so not too much in fines above the next smaller mesh screen could be created.

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leaching (probably of the pachuca type) and proceed with tank type leaching as soon as possible.

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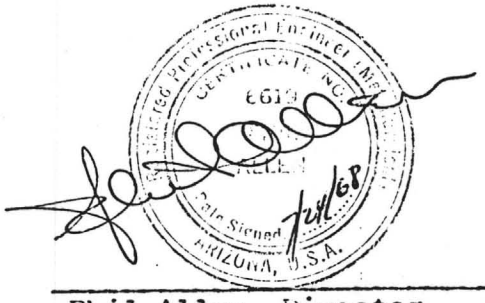


Phil Allen, Director
METCON Laboratory

PA/vi

656

SOUTHWESTERN ASSAYERS & CHEMISTS, Inc.

REGISTERED ASSAYERS

FELIX K. DURAZO
WIL WRIGHT
ARIZONA REG. NO. 5875

P. O. BOX 7517
TUCSON, ARIZONA 85713

710 E. EVANS BLVD.
PHONE 602-294-5811

Metcon Laboratory
P. O. Box 5912
Tucson, Arizona

JOB # 002883
RECEIVED 7-30-68
REPORTED 7-31-68

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD %	COPPER %	ZINC %		MOLYBDENUM %
15-622		1.14					
623		.82					
624		.76					
625		.74					
626		.40					

REGISTERED ASSAYER
CERTIFICATE NO.
5875
WILBUR D.
WRIGHT
Date Signed
Arizona U. S. A.

CHARGE $ 10.00

* Gold and Silver reported in troy oz. per 2,000 lb. ton.

INVOICE

SOUTHWESTERN ASSAYERS & CHEMISTS, Inc.

657

REGISTERED ASSAYERS

FELIX K. DURAZO
WIL WRIGHT
ARIZONA REG. NO. 5875

P. O. BOX 7517
TUCSON, ARIZONA 85713

710 E. EVANS BLVD.
PHONE 602-294-5811

Austral Oil Company
2700 Humble Building
Houston, Texas

JOB # 002740
RECEIVED 7-2-68
REPORTED 7-7-68

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD %	COPPER %	ZINC %		MOLYBDENUM %
95L:							
190 NO.		.06					
30 S.	Nil	3.00					
50 W.		.34					
433 L:							
105 NW	Nil	2.34					
60 S	Nil	5.24					
175N50W	Nil	.62					
195L:							
76 S.	Nil	7.26					
105 NO.	Nil	8.66					
356L 136NO.	Nil	9.28					
356L100 NO.	Nil	1.52					
300L							
77NO. 41W	Nil	8.12					
141L-30S	.003	21.06					
161L 35 NO.	Nil	6.32					
480L							
164S 117W	Nil	Trace					

REGISTERED ASSAYER
CERTIFICATE NO.
5875
WILLIAM WRIGHT
Duly Signed
Arizona U. S. A.

CHARGE $ 52.00

* Gold and Silver reported in troy oz. per 2,000 lb. ton.

INVOICE

658

SOUTHWESTERN ASSAYERS & CHEMISTS, Inc.

REGISTERED ASSAYERS

FELIX K. DURAZO
WIL WRIGHT
ARIZONA REG. NO. 5875

P. O. BOX 7517
TUCSON, ARIZONA 85713

710 E. EVANS BLVD.
PHONE 602-294-5811

Austral Oil Company Inc.
2700 Humble Building
Houston, Texas 77002

cc: W. Lumdby

JOB # 002423
RECEIVED 4-22-63
REPORTED 4-24-63

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD %	COPPER %	ZINC %		MOLYBDENUM %
SA-1	Nil	3.04					
SA-2	.016	1.63					
SA-3	Nil	2.40					
SA-4	.010	20.39					
SA-5	Trace	.64					
SA-6	Trace	.54					

CHARGE $ 22.50

(please hold payment until statement is received)

* Gold and Silver reported in troy oz. per 2,000 lb. ton.

INVOICE

SOUTHWESTERN ASSAYERS & CHEMISTS, Inc.

659

REGISTERED ASSAYERS

FELIX K. DURAZO
WIL WRIGHT
ARIZONA REG. NO. 5875

P. O. BOX 7517
TUCSON, ARIZONA 85713

710 E. EVANS BLVD.
PHONE 602-294-5811

Austral Oil Inc.
2700 Humble Building
Houston, Texas 77002

CC; Lundby

JOB # 002574
RECEIVED 5-29-68
REPORTED 6-4-68

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD %	COPPER %	ZINC %		MOLYBDENUM %
Dump: 3	Nil	2.46					
4	Nil	2.60					
5	.003	1.24					

Chance - So. Bonanza

REGISTERED ASSAYER CERTIFICATE NO. 5809 WILBURN D. WRIGHT Date Signed 6-4 Arizona U. S. A.

CHARGE $ 11.25

* Gold and Silver reported in troy oz. per 2,000 lb. ton.

INVOICE

640

SOUTHWESTERN ASSAYERS & CHEMISTS, Inc.

REGISTERED ASSAYERS

FELIX K. DURAZO
WIL WRIGHT
ARIZONA REG. NO. 5875

P. O. BOX 7517
TUCSON, ARIZONA 85713

710 E. EVANS BLVD.
PHONE 602-294-5811

Austral Oil Company Inc.
2700 Humble Building
Houston, Texas 77002

JOB # 002618
RECEIVED 6-11-68
REPORTED 6-13-68

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD %	COPPER %	ZINC %		MOLYBDENUM %
Dump #6	Nil	1.60					

Uncle Sam

REGISTERED ASSAYER CERTIFICATE NO. 5875 WILBUR D. WRIGHT Date Signed Arizona U. S. A.

CHARGE 3.75

* Gold and Silver reported in troy oz. per 2,000 lb. ton.

INVOICE

SOUTHWESTERN ASSAYERS & CHEMISTS, Inc.

661

REGISTERED ASSAYERS

FELIX K. DURAZO
WIL WRIGHT
ARIZONA REG. NO. 5875

P. O. BOX 7517
TUCSON, ARIZONA 85713

710 E. EVANS BLVD.
PHONE 602-294-5811

Austral Oil Company
2700 Humble Building
Houston, Texas

JOB # 002739
RECEIVED 7-2-68
REPORTED 7-8-68

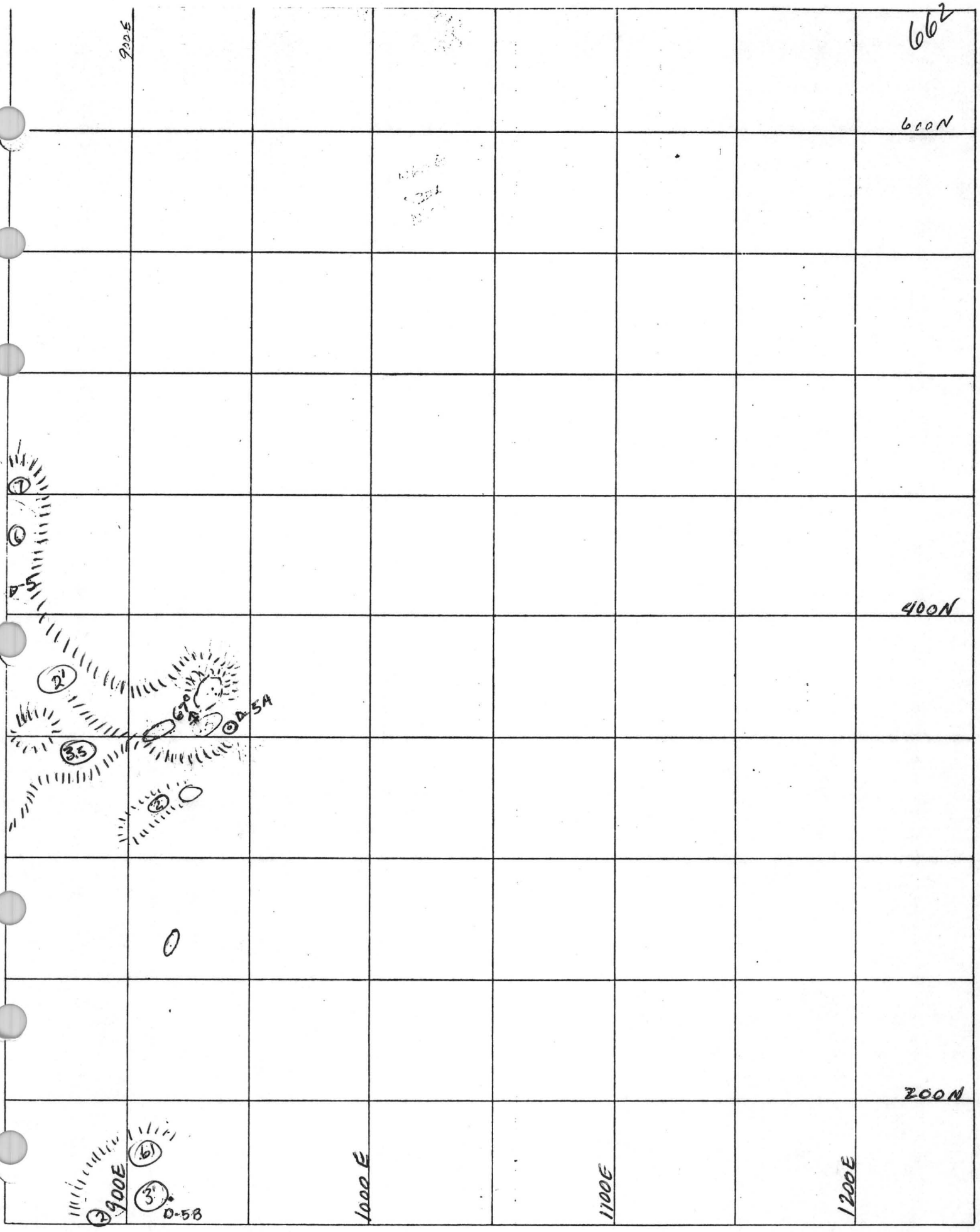
SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD %	COPPER %	ZINC %		MOLYBDENUM %
Dump Samples:							
# 9	.003	1.84	North Bonanza				
10	.004	2.80	Solstice				
11	Trace	1.02	Joseph				
12	Nil	1.94	Brother Jonathan				

REGISTERED ASSAYER
CERTIFICATE
5875
WILBUR D.
WRIGHT
Tucson
Arizona U. S. A.

CHARGE 16.00

* Gold and Silver reported in troy oz. per 2,000 lb. ton.

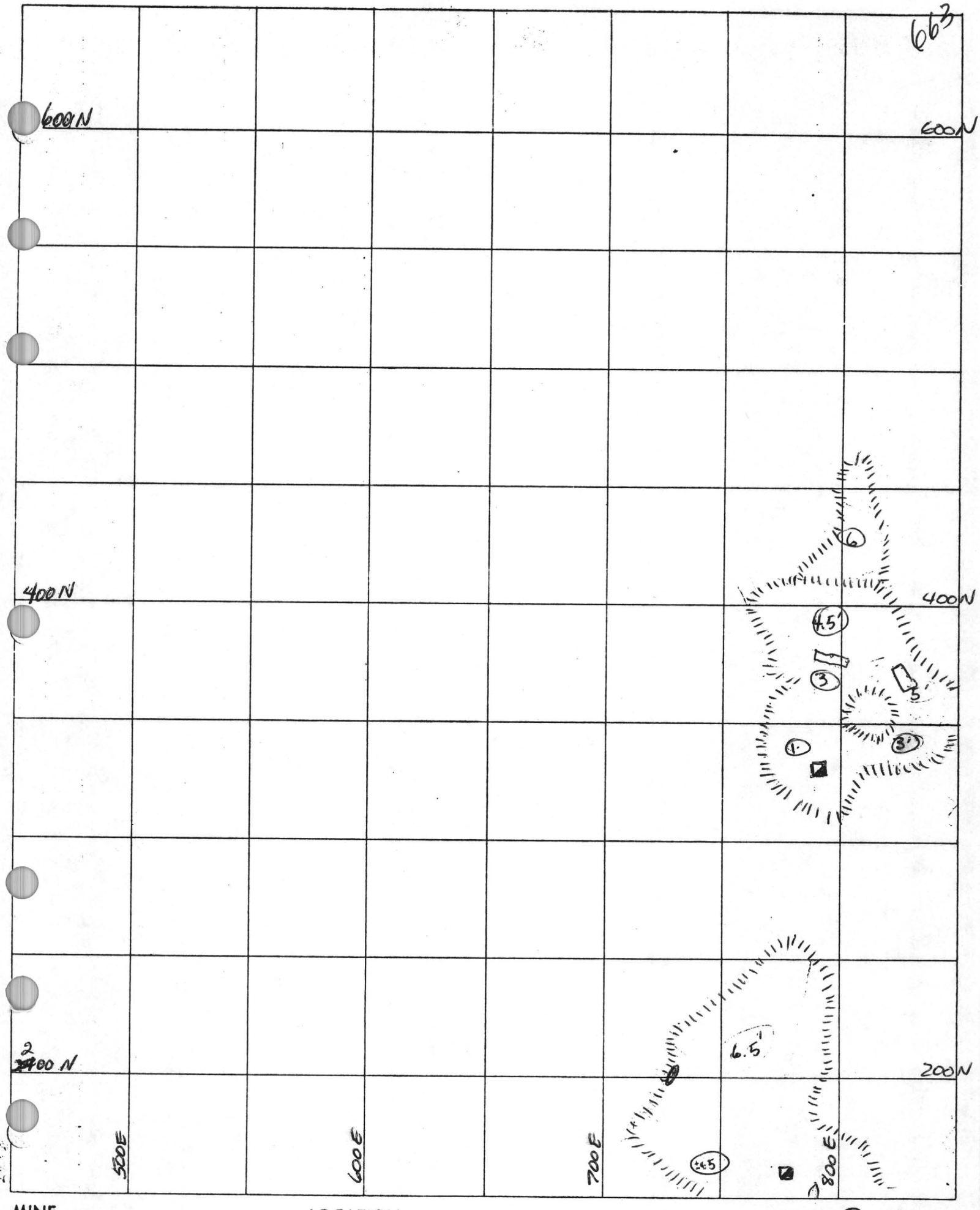
INVOICE



MINE _____ LOCATION _____ LEVEL _____

GEOLOGY BY _____ SURVEY _____ DATE _____ SCALE _____

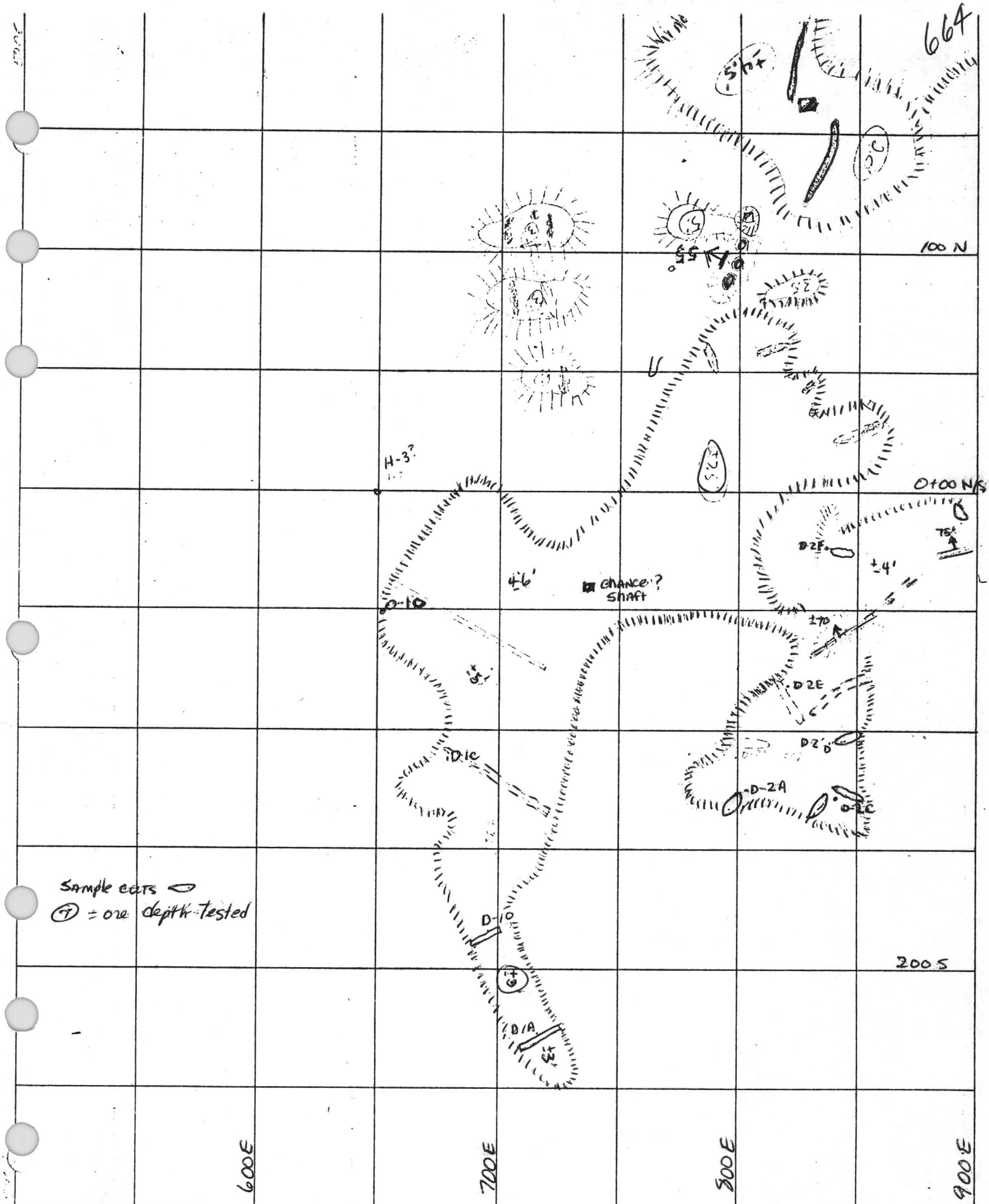
N _____ E _____ EL. _____



MINE _____ LOCATION _____ LEVEL Pumps

GEOLOGY BY _____ SURVEY _____ DATE _____ SCALE 1" = 50'

N _____ E _____ EL. _____



MINE *Chance - Bonanza* LOCATION *Tombstone, ARIZONA.* LEVEL

GEOLOGY BY *W.L.* SURVEY DATE SCALE *1" = 50'*

N E EL.

0-00 E/W | 100 E | 200 E | 300 E

+400 N

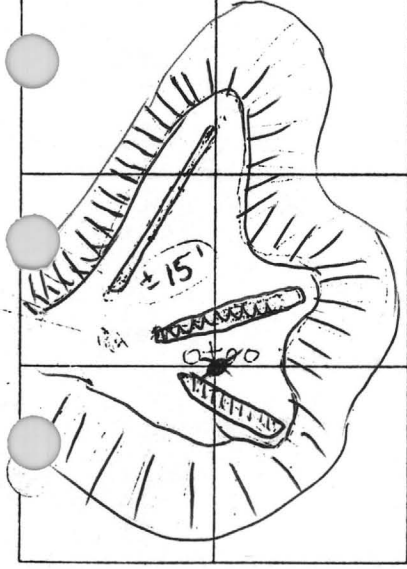
400 N

300 N

0+200 N

200 N

100 N



100 E

0+00 E

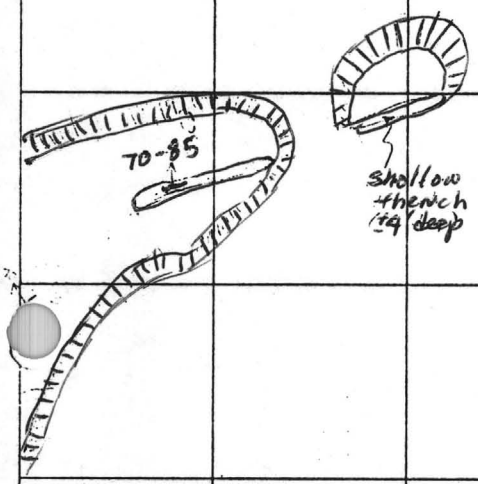
0+00 N/S

MINE _____ LOCATION _____ LEVEL _____

GEOLOGY BY _____ SURVEY _____ DATE _____ SCALE _____

N _____ E _____ EL. _____

666



0-00 N/S

200 S

MINE Chance - Bonanza LOCATION [illegible] LEVEL

GEOLOGY BY W.L. SURVEY DATE SCALE 1" = 50'

N E EL.

667

SOUTHWESTERN ASSAYERS & CHEMISTS, Inc.

REGISTERED ASSAYERS

FELIX K. DURAZO
WIL WRIGHT
ARIZONA REG. NO. 5875

P. O. BOX 7517
TUCSON, ARIZONA 85713

710 E. EVANS BLVD.
PHONE 602-294-5811

Austral Oil Company
2700 Humble Building
Houston, Texas

JOB # 002703
RECEIVED 6-27-68
REPORTED 6-27-68

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD %	COPPER %	ZINC %		MOLYBDENUM %
# 7 State of Maine	Nil	4.54					
# 8 State of Maine (course:	Nil	4.94					

REGISTERED ASSAYER CERTIFICATE 5575 WRIGHT Tucson Arizona U. S. A.

CHARGE 8.00

* Gold and Silver reported in troy oz. per 2,000 lb. ton.

INVOICE

668

SOUTHWESTERN ASSAYERS & CHEMISTS, Inc.

REGISTERED ASSAYERS

FELIX K. DURAZO
WIL WRIGHT
ARIZONA REG. NO. 5675

P. O. BOX 7517
TUCSON, ARIZONA 85713

710 E. EVANS BLVD.
PHONE 602-294-5811

Austral Oil Company
2700 Humble Building
H ouston, Texas

JOB # 002751
RECEIVED 7-5-68
REPORTED 7-9-68

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD %	COPPER %	ZINC %		MOLYBDENUM %
Dump # 13	Nil	2.34	— Mamie				

$ 4.00

* Gold and Silver reported in troy oz. per 2,000 lb. ton.

INVOICE

March 11, 1968

Austral Oil Company, Inc.
Houston, Texas

Tombstone Area, Cochise County, Arizona, Mining Dump surveyed for cubic yardage from February 22 to March 3, 1968 for Austral Oil Company, Inc., of Houston, Texas, with the following results:

1	North Bananza		2,546.3 cu. yds.
2	Southern		2,493.5 " "
3	Santa Ana		
	A.	42.5	
	B.	10.3	
	C.	70.2	
	D.	157.7	
			280.7 " "
4	Red Top		
	A	70.7	
		34.5	
			105.2 " "
5	South Bonanza		
	A.		
	B.	36.8	
	C.	35.4	
	D.	80.2	
	E.	61.4	
	F.	40.2	
	G.	190.1	
	H.	195.6	
	I.	204.0	
	J.	182.4	
	K.	192.9	
	L.	336.2	
	M.	230.0	
	N.	276.7	
	O	435.5	
			2,497.4 " "
6	Chance		
	A.	306.0	
	B.	15.0	
	C.	20.0	
	D.	33.0	
	E.	4.0	
	F.	18.0	

6	Chance (Continued)		
	G.	28.0	
	H.	12.0	
	I.	24.00	
	J.	6.0	
	K.	266.0	
	L.	110.0	
	M.	125.0	
	N.	138.2	
	O.	49.0	
	P.	92.0	
	Q.	93.0	
			1,229.2 cu. yds.
6	Chance (Cyanide Tailings)		
	A.	178.0	178. " "
7	Brother John		
	A.	2,466.0	
	B.	11.0	
	C.	4.0	
	D.	30.0	
	E.	5.9	
	F.	3.1	
	G.	4.2	
	H.	5.5	
	I.	466.0	
	J.	5.7	
	K.	4.4	
	L.	4.2	
	M.	20.0	
	N.	20.0	
		6.0	
		5.8	
		3.0	
		4.8	
		6.0	
		6.3	
			3,081.9 " "
8	Triple X		392.3 " "
9	Earnist		254.5 " "
10	May		85.3 " "

11	Maine		
	A.	1,238.2	
	B.	13,703.0	
	C.	7,100.4	
			22,091.6 cu. yds.
12	Uncle Sam		
	A.	102.0	
	B.	232.0	
	C.	7.6	
			341.6 " "
13	South Fox		
	A.	104.0	
	B.	56.0	
	C.	72.0	
	D.	84.0	
			316.0 " "
14	North Fox		
	A.	52.0	
	B.	107.0	
	C.	526.0	
			685.0 " "

672

March 7, 1968

Austral Oil Company, Inc.
Houston, Texas

Tombstone Area, Cochise County, Arizona, Mining Dump surveyed for cubic yardage from February 22 to March 3, 1968 for Austral Oil Company, Inc., of Houston, Texas, with the following results:

1	North Bananza 1 dump	2,547.3 cu. yds
2	Southern 1 dump	2,493.5 " "
3	Santa Ana Numerous combined small dumps	280.7 " "
4	Red Top 2 dumps	105.2 " "
5	South Bananza Numerous combined dumps	2,497.4 " "
6	Chance Numerous combined dumps	1,329.2 " "
6a	Chance (Cyanide Talings)	178 " "
7	Brother John Numerous combined dumps	3,081.9 " "
8	Triple X 1 dump	392.3 " "
9	Earnest ? 1 dump	254.5 " "
10	May 1 dump	85.3 " "
11	Maine 3 dumps (large)	22,091.6 " "
12	Uncle Sam 3 dumps (small)	341.6 " "
13	South Fox Group 4 dumps (small)	316 " "
14	North Fox Group 3 dumps (small)	685 " "

Dump # 2	Nil	5.78							

"Chance" area

CHARGE $ 7.50

* Gold and Silver reported in troy oz. per 2,000 lb. ton.

INVOICE

674

SOUTHWESTERN ASSAYERS & CHEMISTS, Inc.

REGISTERED ASSAYERS

FELIX K. DURAZO
WIL WRIGHT
ARIZONA REG. NO. 5675

P. O. BOX 7517
TUCSON, ARIZONA 85713

710 E. EVANS BLVD.
PHONE 602-294-5811

Austral Oil
2700 Humble Building
Houston, Texas 77002

cc: Lundby

JOB # 002489
RECEIVED 5-9-68
REPORTED 5-9-68

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD %	COPPER %	ZINC %	Manganese %	MOLYBDENUM %
D-1	.020	6.10				.20	

"Chance area"

CHARGE $ 6.75

* Gold and Silver reported in troy oz. per 2,000 lb. ton.

INVOICE

676

SOUTHWESTERN ASSAYERS & CHEMISTS, Inc.

REGISTERED ASSAYERS

FELIX K. DURAZO
WIL WRIGHT
ARIZONA REG. NO. 5875

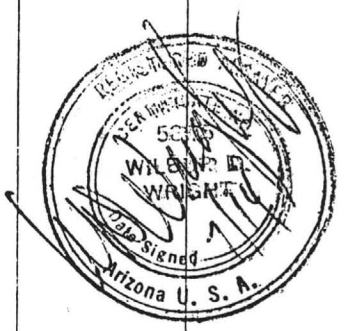
P. O. BOX 7517
TUCSON, ARIZONA 85713

710 E. EVANS BLVD.
PHONE 602-294-5811

Austral Oil Company
2700 Humble Building
Houston, Texas

JOB # 002771
RECEIVED 7-10-68
REPORTED 7-13-68

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD %	COPPER %	ZINC %		MOLYBDENUM %
	CaO %	MgO %	Fe %	S %	SiO_2 %	Insol %	Al_2O_3 %
Dump #: 1	.56	.22	3.95	.49	73.3	9.9	3.9
2	1.25	.30	4.37	.10	70.3	8.3	4.1
3	.91	.29	3.25	.33	71.9	8.1	4.7
4	.70	.27	4.85	.41	66.6	13.3	4.5
5	.56	.23	4.25	.38	79.8	1.8	3.7
6	.52	.30	2.79	.34	72.5	2.8	4.5
7	.56	.27	3.06	.22	75.0	11.1	3.9
8	.65	.22	2.30	.16	73.5	12.7	3.5
9	.93	.23	3.50	.14	76.5	.80	3.4
10	3.95	.39	3.45	.07	70.0	11.7	3.0
11	16.6	.98	3.40	.05	47.50	7.7	4.1
12	1.99	.65	2.97	.04	67.7	13.1	3.9
13	2.07	.44	3.01	.09	70.7	8.8	5.1



$ 481.00 less 10% quantity discount of 48.10

CHARGE $ 432.90

* Gold and Silver reported in troy oz. per 2,000 lb. ton.

INVOICE

676

SOUTHWESTERN ASSAYERS & CHEMISTS, Inc.

REGISTERED ASSAYERS

FELIX K. DURAZO
WIL WRIGHT
ARIZONA REG. NO. 5875

P. O. BOX 7517
TUCSON, ARIZONA 85713

710 E. EVANS BLVD.
PHONE 602-294-5811

Austral Oil Company
2700 Humble Building
Houston, Texas 77002

JOB # 002542
RECEIVED 5-21-68
REPORTED 5-24-68

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD %	COPPER %	ZINC %		MOLYBDENUM %
SA# 7	.200	838.80					
8	.080	210.92					
9	.040	32.96					

REGISTERED ASSAYER
CERTIFICATE NO. 5875
WILBUR D. WRIGHT
No Signed 5/24
Arizona U. S. A.

CHARGE $ 11.25

* Gold and Silver reported in troy oz. per 2,000 lb. ton.

INVOICE

Briscoe Smith (5-16-73)

5-16-73

635

PRELIMINARY CYANIDATION TEST ON DUMP MATERIAL FROM THE "STATE OF MAINE AND BROTHER JONATHAN MINE, TOMBSTONE, ARIZONA

Lot I

submitted

by

Mr. James A. Briscoe
Sierra Mineral Management
4741 E. Sunrise Dr.
602-299-9736
Tucson, Arizona 85718

by

Sigmund L. Smith
Registered Metallurgical Engineer
P.O. Box 4063, University Station
Tucson, Arizona, 85717
602-884-1578 or 1361

May 16, 1973

RESULTS:

Lot I; about 500 pounds

Calculated head assay = 3.06 oz/T silver and a trace of gold

PERCOLATION TEST

The plus 20 mesh (0.03") minus 6 mesh (0.13") material assaying 3.40 oz/T silver (40% of the total silver) and 37.3% of the total weight percolated in a 5 foot column for 3 days will extract about 70% of the silver and have a tail assaying about 1.06 oz/T silver.

Using the first order reaction equation, the percent extract vs. time at the end of a 4 day leach will be about 80% recovery of the silver.

Cyanidation and lime consumption tests shows a normal consumption of about 1.5 pounds soldium cyanide (NaCN) and about 5 pounds of lime (CaO) per ton of ore leached.

SCREEN ANALYSIS AND ASSAYS

No.	Size	Ind. % Wt.	Accum. % Wt.	ASSAYS oz/T Silver	ASSAYS oz/T Gold	SILVER DIST. Ind. % Total	SILVER DIST. Accum. %
1	+1.05"	18.9	18.9	0.36	Tr(A)	2.2	2.2
2	-1.05 +0.74	5.9	24.8	0.56	Tr	1.1	3.3
3	-0.74 +0.63	5.7	30.5	0.72	Tr	1.3	4.6
4	-0.63 +0.38	5.9	36.4	1.14	Tr	2.2	6.8
5	-0.38 +0.26	5.9	42.3	1.60	Tr	3.1	9.9
6	-0.26 +0.13	12.4	54.7	2.40	Tr	9.7	19.6
7	-0.13 + .065	13.5	68.2	3.60	Tr	15.8	35.4
8	-0.065+0.031	11.4	79.6	4.02	Tr	14.9	50.3
9	-0.33(20M)	20.4	100.0	7.52	Tr	49.6	99.9

(A) Trace less than 0.02 oz/T gold.

Calculated head assay = 3.06 oz/T silver and a trace of gold.

CYANIDATION AND LIME CONSUMPTION: TEST I

Forty grams of pulverized head sample was agitation leached with 120 cc tap water plus 120 mg lime (2#/T solution or 6#/T ore) and 300 mg solium cyanide (5#/T solution or 15#/T ore) for 4 hours.

After leaching the free sodium cyanide was 4.5 # NaCN/ton solution or consumed 0.5 # cyanide/T solution or 1.5 #/T ore.

The free lime was 0.35 # CaO/T solution or consumed 1.65 # CaO/T solution or 4.95 #/T ore.

SOAK AND DISPLACEMENT LEACH OF VARIOUS SIZE: TEST 2

Five hundred cc of ore was placed in a 600 cc beaker and tap water was added to make a volume of 500 cc. Three hundred and fifty grams of lime and 350 mg sodium cyanide were added to each size fraction. Every 24 hours the contents were changed to a new beaker.

Test 2	Size	Gms Ore	CC Soln.	Reagents Added		Pulp Ratio	After 96 Hours Leaching #/T Soln				
				NaCN #/T Soln.	CaC #/T Soln.		Free CN	Free CaO	Heads oz/T mg	Tails oz/T mg	% Rec Trend
A	-1.05 +0.742	514	270	2.6	2.6	1 to 1.90	1.04	Trace	0.56	0.48	14.0
B	-0.74 +0.63	543	270	2.6	2.6	1 to 1.97	0.96	Trace	0.72	0.60	17.0
C	-0.63 +0.38	560	270	2.6	2.6	1 to 2.08	0.76	Trace	1.14	0.56	51.0
D	-0.38 +0.26	590	270	2.6	2.6	1 to 2.19	0.68	Trace	1.60	Lost	--
E	-0.26 +0.13	621	270	2.6	2.6	1 to 2.30	0.60	Trace	2.40	1.20	50.0
F	-0.13 +0.065	623	270	2.6	2.6	1 to 2.32	0.54	Trace	3.60	0.98	73.0
G	-0.065+0.031	611	270	2.6	2.6	1 to 2.26	0.98	Trace	4.02	2.42	(B) 40.0
H	-0.033(20M)	669	270	2.6	2.6	1 to 2.48	NO RESULT		7.52	2.68	(B) 65.0

(B) Poor results caused by insufficient washing.

PERCOLATION TEST: TEST 3

A 4" diameter 5.5 feet high plastic tube was used as a downward type of percolator.

Feed: Mixed (41 pounds)

6,410 grams #6 -0.26 +0.13" (33% by wt.)

6,960 grams #7 -0.13 +0.065 (36% by wt.)

5,940 grams #8 -.065 +0.03 (31% by wt.)

19,310 grams

Having an assay of 3.4 oz/T silver.

Solution: 8.5 liters (pulp ratio 1 to 0.44) contained 10.69 NaCN (1.25 #/T soln) and 11.39 CaO (1.33 #/T soln).

Leaching cycle was 72 hours and the percolation rate was about 6 inches per hour, a satisfactory rate.

At the end of 24 hours the free cyanide was 1.50 #/T solution and a trace of lime. End 48 hours the free cyanide was 1.30 #/T solution and a trace of lime and at the end of 72 hours of leaching the free cyanide was 1.16 #/T solution.

The tails assayed 1.06 oz/T silver giving a recovery of about 70% for 3 days of leaching or a calculated 80% for 4 days of leaching.

After leaching the system was allowed to drain over night and 2 separate washings were applied.

First wash of 1,250 cc contained 165 mg silver.

Second wash of 1,000 cc contained 64.0 mg silver.

Total silver IN = $\frac{19,300}{30}$ x 3.4 = 2180 mg Ag.

% Recovery total silver first wash = $\frac{165}{2180}$ x 100 = 7.6

% Recovery total silver second wash = $\frac{64}{2180}$ x 100 = 3.0

Wash recovery = 10.6%

Which can be considered satisfactory.

642

CONCLUSION:

It appears the dump material is amenable for cyanidation leaching and the cyanide and lime consumption is satisfactory.

More work should be done with various fractions between -20 mesh and perhaps 65 mesh to increase the assay of silver and at the same time increase the percent of the total weight going to percolation. The -0.375 + 0.265 material assaying 1.60 oz/T silver might be included as percolation material.

The -20 mesh material had a poor filtering rate and further testing should be required on agitation before any conclusion can be reached as to its amenability to agitation leaching.

Sigmund L. Smith

Sigmund L. Smith
Registered Metallurgical
Engineer

Geo. Roseveare (5-30-17)

632

UNIVERSITY OF ARIZONA
ARIZONA BUREAU OF MINES
ORE TESTING SERVICE

May 30, 1973

Mr. J. A. Briscoe
1971 Minerals Ltd.
Sierra Mineral Management
4741 E. Sunrise Dr.
Tucson, Arizona 85716

Dear Mr. Briscoe:

Ore Test No. 2182

A sample of minus 20-mesh product which Mr. Smith had screened from the State of Maine dump was separated into minus 20 plus 100-mesh, which assayed 8.3 ounces silver per ton, and minus 100-mesh products.

The minus 100-mesh product was cyanided in a rotating bottle at 40 percent solids for 72 hours and after settling the solution was syphoned off. There is clay present in the material and a flocculent was needed to make the solids settle. More water was added and the pulp agitated for a few minutes and again allowed to settle and the clear solution syphoned off. This procedure was repeated.

The results are given in the following table:

Product	Percent weight based on -100-mesh product	Ounces silver per ton	Distribution percent silver
Head	100.0	6.05*	100.0
Solution #1	85.0	2.55	40.7
" #2	68.0	2.08	23.3
" #3	92.0	0.87	13.3
Tailing	98.0	1.40	22.7

*Calculated

The cyanide consumption was 3.0 pounds per ton and lime, 2.5 pounds. The silver recovered amounted to 77.3 percent of the silver in the minus 100-mesh.

Another test was made on the minus 20-mesh desliming the material at about 200-mesh and cyaniding the plus 200-mesh sands. There was too much fine material left in the sands for the solution to percolate down through the sand in a 20-inch column. I would not recommend leaving any material less than 20-mesh in the sands to be leached.

Jarosite in fines ?

KEEP Slimes out of dump

NO Pan

assayed finest slimes, hi-SO_4

633

UNIVERSITY OF ARIZONA
ARIZONA BUREAU OF MINES
ORE TESTING SERVICE

#2, 5/30/73

Mr. J. A. Briscoe

State of Maine

Ore Test No. 2183

The sample you delivered to the Arizona Bureau of Mines, May 25, was screened and the products assayed. The results are given in the following table:

Screen size	Weight Percent	Assay ounces silver	Distribution percent silver
Head	100.0	4.25*	100.0
on 1"	31.8	2.00	15.0
Minus 1 on 3/4"	9.1	2.75	6.0
3/4 on 1/2"	6.9	2.30	3.7
1/2 on 1/4"	16.2	3.85	14.8
1/4 on 10-mesh	17.6	6.90	28.6
10 on 20-mesh	6.9	6.40	10.4
20-mesh	11.3	8.10	21.5

*Calculated from products

The silver values in the minus 1/2 plus 20-mesh amounted to 40.7 percent of the weight and contained 53.8 percent of the silver in the mine run sample. It assayed 5.8 ounces silver.

We are holding the samples in reserve in case you may wish to have cyanide test made on any of those products.

634

UNIVERSITY OF ARIZONA
ARIZONA BUREAU OF MINES
ORE TESTING SERVICE

#3, 5/30/73

Mr. J. A. Briscoe

Bisbee Group
(Solstice Mine)

Ore Test No. 2184

The sample you delivered from the Bisbee group, May 25, was screened and each size assayed. The results are given in the following table:

Product	Weight percent	Assay Ounces Silver
Head	100.0	2.00*
plus 1"	32.5	1.30
Minus 1 plus 3/4"	12.4	4.20*
3/4 " 1/2"	10.4	2.20
1/2 " 1/4"	21.4	1.80
1/4 " 10-mesh	11.4	2.20
10 on 20-mesh	3.5	1.85
20-mesh	8.4	3.80

*Calculated

This sample is too low to be considered ore.

Yours very truly,

Geo. Roseveare,
Metallurgist

GR:B

* a little out of norm.: Why?

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.

Larry K. Davidson (6-14-73)

ANCHORAGE LOS ANGELES
ATLANTA NEW YORK
CHICAGO PORTLAND
CINCINNATI SALT LAKE CITY
DENVER SAN FRANCISCO
HONOLULU SEATTLE
HOUSTON WASHINGTON, D.C.

CONSULTING ENGINEERS IN THE APPLIED EARTH SCIENCES

CALGARY SEOUL
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MADRID TEHRAN
PERTH TORONTO
VANCOUVER, B.C.

SUITE 100, 10597 WEST 6TH AVENUE · DENVER, COLORADO 80215 · (303) 232-6262
TWX: 910-931-2600

June 14, 1973

Sierra Mineral Management
4741 East Sunrise Street
Tucson Arizona 85700

Attention: Mr. Richard Hewlett

Gentlemen:

Proposal
Feasibility Study of Containment System
Proposed Heap Leaching Operation
Near Tombstone, Arizona
For Sierra Mineral Management

INTRODUCTION

In response to a request from Mr. Richard Hewlett of Sierra Mineral Management, we are pleased to submit this proposal for performing a feasibility study of alternative containment systems for a heap leaching operation near the abandoned Maine Mine to the south and east of Tombstone, Arizona. Mr. Larry K. Davidson of Dames & Moore was escorted on a tour of the site area by Mr. James A. Briscoe, exploration geologist for the project, on Friday, June 8, 1973. A topographic map of the site area was provided by Mr. Briscoe for use in preparing this proposal.

PROJECT DESCRIPTION

Sierra Mineral Management plans to extract silver from mine waste dump material near the abandoned Maine Mine by using a combination of heap leaching with a cyanide solution and cyanide milling. The pH of the leaching solution will be controlled at an alkaline level to prevent the formation of cyanide gas. Waste dump materials passing a No. 20 mesh screen will be milled, and the large sized material will be leached. Materials contained in the dumps are estimated to be approximately 20 to 30 percent finer than the No. 20 mesh. The same facilities will be used to precipitate silver from pregnant cyanide solution obtained from the leaching and milling operations.

Estimates of the volume of mine waste material available on the surface of the site range from 30 to 40-thousand tons. Work is currently underway on a head-frame for re-entry into the Maine Mine, and additional silver is expected to be contained within the "gob" located in many of the mine stopes. With additional prospecting, total reserves of leachable ore are expected to reach 100 to 130-thousand tons.

Present plans are to construct a leach pad of sufficient size to stack all of the leachable ore in the dumps over the surface of the site. Areal extent of this pad is expected to be on the order of 150 feet by 250 feet in plan dimensions. Ore will be stacked on the leach pads with scrapers, rather than by stackers and conveyor belts. Depending upon the economics of leach pad construction and transport costs, additional pads or pad area may be constructed as additional ore becomes available or the initial pad may be cleared of leached ore and restacked with the new ore.

The heap leach pad or pads will consist of graded areas of reasonably uniform slope, with a relatively impervious blanket or membrane at the ground surface to permit collection of pregnant leach solution percolating down through the overlying ore pile, without significant seepage loss into underlying soil or rock. Leach solution is normally collected in one or more sumps at the downslope edge of the pad. Dikes of a sprinkler system are commonly used on top of the leach piles to control the distribution of leaching solution.

PROPOSED STUDY

PURPOSE

The purpose of our study would be to evaluate the near-surface materials and topograph at two prospective leach pad locations on the site, one near the Maine Mine shaft and the other near the Fox Ranch; and to provide recommendations for leach pad construction procedures and materials at each site. Suitable lining materials would be of critical importance at both sites.

Primary consideration would be given to the use of compacted native materials for construction of the pads. The fine-grained soils in the low ground to the northeast of the Maine Mine are potential lining materials, possibly in combination with the soils at the pad site near the Fox Ranch. Various commercially-available additives which can be used in combination with natural soils would also be considered. Artificial linings or membranes

will be considered, if necessary, for a workable solution; although these materials are normally more expensive than alternatives using native materials, and performance of these materials on a slope and under a stack of solid materials is sometimes unsatisfactory.

SCOPE

In order to accomplish the purpose of our study, we propose to perform the following scope of work:

1) Representative bulk sampling of native soil at the Fox Ranch pad site and any fine-grained soils in the area which may be available in sufficient quantities for use in lining construction (we understand that Mr. Briscoe may be able to perform this task);

2) Laboratory testing of the sampled materials to determine the compaction and permeability characteristics of these soils alone and possibly in combination with other soils or additives;

3) An office engineering program which will include,

   a) An evaluation of the engineering properties of alternative lining materials,

   b) An evaluation of required site preparation and grading and construction method for the lining material,

   c) Estimating seepage loss of leach solution for the lining alternatives;

4) A brief site visit to inspect test pits used for sampling and to verify available material quantity estimates;

5) Preparation of a final report which will summarize our findings and recommendations.

SCHEDULE

We are prepared to begin our work on the project within 2 to 3 days following your notification to proceed and receipt of the necessary soil samples from the site. We estimate that 3 to 4 weeks would be required to complete our work and submit a final report.

FEE

We propose to perform our study on a time-and-expense basis, in accordance with the attached schedule of charges. We estimate that our fee, including expenses, will be on the order of $2500 to $3000. For this estimate, we have assumed that field sampling could be performed by Mr. Briscoe, and that no equipment charges would be included. We would not exceed our estimated maximum fee without your prior authorization.

In the case of all new clients, it is the policy of Dames & Moore to request that an amount of money equal to our fee estimate be placed in an escrow account for payment of our billings upon receipt. Verification of this account is required before the work can be started. We hope that you will understand the firm's position on this matter.

INSURANCE

During the course of our work, we will provide workmens' compensation insurance as required by law, and public liability and property damage insurance in an amount in excess of $1,000,000.

* * *

It has been our pleasure to prepare this proposal for your consideration. We look forward to assisting you on this project. If you are in agreement with the contents of this proposal, please sign one copy in the space provided below and return it for our files. Receipt of a signed copy will be considered as your notification to proceed.

Very truly yours,

DAMES & MOORE

Larry K. Davidson
Associate

LKD/dls

Attachment

SIERRA MINERAL MANAGEMENT

_____

Richard Hewlett

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SCHEDULE OF CHARGES AND GENERAL CONDITIONS

DAMES & MOORE

UNITED STATES & CANADA

The compensation to Dames & Moore for our professional services is based upon and measured by the following elements, which are computed as set forth below.

PERSONNEL CHARGES

Charges for employees are computed by multiplying the total direct salary cost of our personnel by two and one-half. The total direct salary cost shall be a sum equal to the direct payroll cost (computed on a typical annual basis and expressed as an average hourly rate) plus 25 percent of same to cover payroll taxes, insurance incident to employment, holidays, sick leave vacations, etc. The time of a partner or retained consultant devoted to the project is charged at an assigned billing rate.

The 25 percent employee benefit factor is used for work performed by personnel assigned to offices in the United States and Canada. For work performed by personnel in our offices in other countries, it will vary depending on the employee benefits paid in the particular location.

When outside the United States, employees' and partners' total direct salary cost will be increased by the premium customarily paid by other organizations for work at that location.

Time spent in either local or inter-city travel, when travel is in the interest of the work, will be charged for in accordance with the foregoing schedule; when traveling by public carrier, a maximum charge of eight hours per day will be made.

EQUIPMENT CHARGES

Computer control of project costs will be billed at a rate of $1.25 per each $50 of job charges. Other Dames & Moore equipment, if used, will be billed at the rates noted in the Appendix.

OTHER SERVICES AND SUPPLIES

Charges for services, equipment and facilities not furnished directly by Dames & Moore, and any unusual items of expense not customarily incurred in our normal operations, are computed on the basis of cost plus ten percent. Such items include:

Rental and operation of drilling equipment
Erecting facilities for the performance of field tests
Surveying services
Shipping charges for equipment or samples
Subsistence
Fares of public carriers
Rental vehicles
Printing and photographic reproductions
Long distance communications
Special fees, insurance, permits and licenses
Services of testing laboratories
Services of explosives technicians

BILLING

Statements will be issued every four weeks, payable upon receipt, unless otherwise agreed.

Interest of 1½% per month (but not exceeding the maximum rate allowable by law) will be payable on any amounts not paid within 30 days, payment thereafter to be applied first to accrued interest and then to the principal unpaid amount. Any attorney's fees or other costs incurred in collecting any delinquent amount shall be paid by the Client.

In the event that the Client requests termination of the work prior to completion of a report, we reserve the right to complete such analyses and records as are necessary to place our files in order and, where considered by us necessary to protect our professional reputation, to complete a report on the work performed to date. A termination charge to cover the cost thereof in an amount not to exceed 30 percent of all charges incurred up to the date of the stoppage of the work may, at the discretion of Dames & Moore, be made.

Rates are subject to change upon notification.

WARRANTY AND LIABILITY

Dames & Moore warrants that our services are performed, within the limits prescribed by our Clients, with the usual thoroughness and competence of the engineering profession. No other warranty or representation, either expressed or implied, is included or intended in our proposals, contracts or reports.

Our liability to the Client for injury or damage to persons or property arising out of work performed for the Client and for which legal liability may be found to rest upon us, other than for professional errors and omissions, will be limited to our general liability insurance coverage, which we maintain in limits in excess of $3,000,000. For any damage on account of any error, omission or other professional negligence, our liability will be limited to a sum not to exceed $50,000 or our fee, whichever is greater. In the event that the Client does not wish to limit our professional liability to this sum, we will waive this limitation upon the Client's written request provided that the Client agrees to pay for this waiver an additional consideration of 4% of our total fee or $200, whichever is greater.

In the event the Client makes a claim against Dames & Moore, at law or otherwise, for any alleged error, omission or other act arising out of the performance of our professional services, and the Client fails to prove such claim, then the Client shall pay all costs incurred by Dames & Moore in defending itself against the claim.

N. H. Carouso (8-22-73)

8-22-73

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PROGRESS REPORT

To: R. F. Hewlett, President

From: N. H. Carouso, Consultant

Subject: Progress Report

71 Minerals Project:

The 71 Minerals project area, southwest of Tombstone, Arizona, was visited with Mr. R. F. Hewlett, President, Sierra Mineral Management, on June 28, 1973, to inspect the project site, and discuss project goals. It was decided to resample the State of Maine Mine area dumps at a deeper level in the dumps to determine if the grade of silver changes with depth and also to collect representative samples for cyanidation tests to be run by the Reno Metallurgy Research Center, U.S.B.M., Reno, Nevada. A forty to fifty pound sample from each dump was collected and sent to the Reno Metallurgy Research Center. Mine dumps sampled were as follows:

	Ag. oz./ton	Au. oz./ton
State of Maine dump #2	3.8	trace
" #3	2.0	trace
" #4	2.8	trace
" #5	2.6	trace
" #6	1.4	trace
" #7	4.8	trace
" #8	3.2	trace
Triple X dump	3.7	trace
Triple X extension dump	4.5	trace
Bonanza dump	4.4	trace
North Bonanza dump	2.0	trace
Uncle Sam dump	1.1	trace
Brother Jonathan	3.0	trace
Solstice	3.4	trace
Merrimac	2.4	trace

The above assays were run by the Reno Metallurgy Research Center, and the results received by the writer while visiting the Center on August 17, 1973. Discussion of the visit will be reported in a subsequent part of the progress report.

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On July 9, 1973, at a meeting at Miami, Arizona, Messrs. R.F. Hewlett, E. Escapule, John White and the writer discussed the Golden Sunlight Mill at Whitehall, Montana, which was to be dismantled and reconstructed at the 71 Minerals project area near Tombstone, Arizona. Immediately after the meeting, Mr. E. Escapule and his crew departed for Whitehall, Montana. Early the next morning the writer and his son, Mark, also departed for Whitehall, Montana, to inspect the equipment, take measurements of equipment and building, and assist Mr. E. Escapule in scheduling the priority of equipment to be dismantled and shipped to Tombstone, Arizona.

Upon inspection of the thickners at the Whitehall Mill, it was found that pulp had been left in the steel tanks when the mill was shut down about 1956, and along the air/solids line the walls of the tanks were pitted and in places rusted through. Two possible coatings to restore the tanks will be discussed later in this report. The agitator tanks are sound and will only require minor modification to conform to our flowsheet design. The balance of the major equipment all appears usable. The building will be erected at the Tombstone site and will be expanded using material from the Whitehall site and other sources.

It was decided to return via Denver, Colorado, and to contact MSI Industries, Inc., makers of the Marcy ball mill acquired from the Whitehall Mill, and order Instruction and Operations Manuals, to include Parts Lists and Foundation Drawings. This was done, however, as of August 22, 1973. The Manuals have not arrived. The ball mill foundation drawings are needed to complete our building foundation plans. While in Denver, Colorado, Mr. Charles Cito of Machinery Reserve of Denver, and Mr. Harold Grimes of Morse Bros. Machinery Co., were visited and I inspected some equipment which we may need for the Tombstone Mill. Mr. Charles Cito has followed up with additional quotations.

Before the return trip via Denver, Colorado, a gold property evaluation trip was made to the Ruby and Joe placer claims, situated on the St. Joe River, of eastern Idaho. The evaluation of this property will be covered by a separate report. Also a trip was made to Salt Lake City, Utah, for a meeting with Messrs. R.F. Hewlett and J. Bruce Stevenson pertaining to the Gibson Mine copper leaching operation and on the following day a meeting with Messrs. R. F. Hewlett, J.B. Stevenson, and Seth Horne, et al., regarding the acquisition of mining claims to

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expand the 71 Minerals project area.

Upon returning to Arizona during the week of July 24th, effort was directed toward calling and visiting local suppliers of used milling equipment, corrosion resistant coatings, gasket material for the thickner and agitator tanks, prefabricated forms for construction of tanks and sumps from concrete, Gunite contractors, electric motor rebuilders and suppliers. During this time much consideration was given to Tombstone plant site location for the cyanide counter current decantations plant and also the tailings disposal area. A site was selected near the State of Maine main shaft and the site was stripped to bedrock and then drilled by pneumatic drill to obtain samples for assay. Assay results and geological examination will determine if the site selected can be used. We will then set forms for the mill building foundation. However, we are waiting for the ball mill foundations drawings from USI Industries, Inc. Called Mr. Al Evans, Applications Engineer, for MSI Industries, Inc., Denver, Colorado, on August 22, 1973, and he assured me he will expedite our getting the foundation drawings. It is expected that we will set forms for the mill foundations next week.

Two types of tank coatings are being considered and will be evaluated by coating test material. One coating is called Elastron butyl base coating by United Paint Mfg., and the other is a catalytic 2-part nylon epoxy primer and a catalytic nylon modified epoxy enamel manufactured by Garlock Products. The test results should determine the product to be used; however, at this time I am partial to the nylon epoxy coating because, firstly, the cost is approximately one fourth the cost of the butyl base, evaluating from their respective specifications sheets, and secondly, I believe the Garlock product has been more widely tested by industry, expecially the mining industry.

Quotations on gasket material required for tanks, approximately 4600 feet, vary widely. Of the two quotations we have, one is for $114.00/100 feet and the other is for $24.80/100 feet. The $24.80/100 feet quote is my preference, both from cost and quality, as this gasket will be fabricated from Garlock neoprene by Helm Industrial Supply, Inc., Phoenix, Arizona, with one week delivery.

A meeting with Mr. Henry H. Rubin, Trelleborg, pertaining to rubber linings and wear point products was very informative and could lead to some applications at the Tombstone Mill.

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A meeting with Mr. Thomas L. Muir, President, Phoenix Gunite, Inc. Costs and application of Gunite for our needs was discussed and Mr. Muir will send us drawings per my specifications and price quotations for construction of 500 TPD leaching vat and a leach dump pad. The vat could be considered for both Tombstone and the Gibson Mine expansion.

Through Mr. C. Richardson, Denver Equipment Co., Tucson Office, I learned about a CCD cyanide plant that could possibly be acquired, at Atlanta, Nevada. We were unable to locate the last owner of the mill, so I decided that I would inspect the mill at the Atlanta Mine, Nevada, and at the same time attempt to determine the ownership. The trip to Nevada would also include visiting the Carlin Gold Mine and Cortez Gold Mine along with visiting and discussing test work results with Bureau of Mine personnel at the Reno Metallurgy Center, Reno, Nevada.

The Atlanta CCD cyanide plant is about a 500 TPD plant less the crushing plant and conveyors. The equipment is in good condition. The present owner is Mr. Rutherford Day, 1118 S.W. 8th Terrace, Ft. Lauderdale, Fla. 33345, phone (305) 527-0368, who purchased the equipment and buildings at a sheriff's sale on May 25, 1973 for $17,325. The appraised valuation is approximately $98,000 and assessed value at $32,500. I attempted to contact Mr. Day and was informed that he would be back in Florida on August 24, 1973, at which time I will ask him if he wishes to sell the mill and for how much.

The Carlin Gold Mine, Carlin, Nevada, was interesting. I visited with Mr. Jim McFarlane, Chief Engineer, and discussed the mill design and performance and also their dump leaching design and techniques. They plan to use stripped lake bed pads for dump leaching of their satellite deposits. Asphalt pads, 4 inches thick, sheared, at their millsite test area. This is similar to some of my experiences with asphalt pads. I found at the Gibson Mine that compacted local clay worked far superior to asphalt. The Carlin Mill was designed for 2000 TPD capacity and cost about $6,000,000 and about a year to build. They are now milling about 2400 TPD gold ore.

Heap leaching at Carlin Gold Mine is presently conducted on the abovementioned asphalt pads. They are 100 feet wide and 90 feet long, with four such pads in line with approximately a 2.5% pad slope grade. They load to about a 10 foot lift and irrigate with rubber tubing outlets at 120 gpm per 90 X 100 feet pad. Leaching time is about 5½ days for a 60%

recovery. Carbon precipitation is used with a caustic strip.

The Cortez Gold Mine, Cortez, Nevada, was next visited and a detailed inspection of the mill was arranged by Mr. Don Duncan, Mine Manager. Messrs. Jim Smolik, Mill Superintendent; Reeve Fagg, Mill Foreman; Ed Walker, Refinery Operator; and Bob Baker, Metallurgist, all were very informative. The Cortez Mill was patterned after the Carlin Mill and it has a design capacity of 1600 TPD and cost about $7,000,000. They are milling about 2400 TPD, due to their efficient grinding section. Metallurgy is about the same as Carlin.

Mr. Don Duncan refused to discuss their heap leaching operation with the statement that it was company policy; however, I was able to piece together enough information to at least satisfy some of my curiosity. They are building heaps on stripped lake beds and then compacting mill tailings in the pad area. They eventually plan to build a 50 foot lift. The slope grade of their pads is about 5%. It appears that the gold content of the heap dumps was underestimated, because from a reliable source I learned that as of a week or so ago, they have already extracted 150% of the gold they estimated to be in the dumps. It looks like they may have used mill grade ore for their dump heaps.

The visit with U.S. Bureau of Mines personnel at the Reno Metallurgy Center, Reno, Nevada, was loke old home week. Most of the fellows that I worked with at the Center during the middle 1950's are still there. We discussed Bureau projects, past, present and potential future. Mr. R. Lindstrom, Supervisor Chemical Engineer, assured me that our State of Maine mine area dump samples will be processed in the near future. We need this data for our mill design at Tombstone; therefore, I am initiating test work to be conducted at the Arizona Bureau of Mines laboratory at the University of Arizona, Tucson, Arizona. Mr. Dave Rabb, of the Arizona Bureau of Mines, will expedite grinding and settling rate tests on our ore next week.

I believe that Mr. E. Morrice, Research Metallurgist, Reno Metallurgy Center, Reno, Nevada, is conducting a research project to study methods to benificiate argentiferous manganese ore that is common in certain areas of the Tombstone district and other localities of Arizona. I plan to send Ed Morrice samples of this type ore and information I have and also possibly assist funding of the research project by talking to Dr. T. Henrie, Assistant Director, U.S. Bureau of Mines, Washington, D.C.

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I strongly urge that we implement the laboratory at Tombstone to enable us to do most or all of our test work. This is necessary for mill control and to test characteristics of custom ores or for whatever property is being evaluated by the company. If this suggestion meets with management approval, I will prepare a proposal of what equipment will be required and supervise the implementation of equipment and train the laboratory technicians

August 22 1973

John B. White (9-11-73)

File. Tombstone

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September 11, 1973

Mr. R. F. Hewlett, President
Sierra Mineral Management
4741 East Sunrise Drive
Skyline Bell Aire Plaza
Tucson, Arizona 85718

Dear Dick:

On Saturday, September 8, an examination was made of the Tombstone area operations. Messrs. Charles and Ernest Escapule were guides for this tour. Of course, a one day inspection visit cannot fully acquaint anyone with all the facets of the proposed operations. The tour, however, did alert me to your general proposed plan. I see nothing wrong with the overall picture, but would like to offer the following suggestions which are based on examination of present test work and field inspection.

1. Dump Sampling:

   Attached to this letter is a sampling procedure which will allow for a quick analysis for the silver contained in a dump. The system allows for a dump to be segregated into areas which can then be sampled and tonnages calculated.

   Dumps already known to carry some values should be the first tested. This would allow for a known ore feed to the plant prior to the start of milling operations.

   It is suggested that at least 100,000 tons should be proven prior to the start of milling. The program should not take over three months to accomplish.

2. Screening Plant:

   An adequate screening plant should be immediately constructed and operated. At least 10,000 tons of mill feed should be stockpiled for subsequent treatment.

   The operation of this plant, prior to actual milling, would work out the most adequate production methods.

   All screened materials should be stockpiled either at dump or mill site. This would allow for subsequent weighing and blending (if necessary) prior to milling.

3. Assaying of Products:

The assay office should immediately be completed. Analysis of ores at the job site would save considerable dollars plus giving more adequate control of sampling operations.

4. Milling Plant:

The cyanide plant with added ore feed bins should be installed as it was at Whitehall, Montana. Space should be left for added wet screening, cyclone CCD circuit and an additional grinding mill. The flowsheet with minor changes and location of equipment is correct for testing the Tombstone area silver ores.

5. Open Pit Prospecting:

Areas around old stopes might contain sufficient values to allow for treatment. As old prospectors say, "Look for elephants where elephants have been before." It is suggested that prospecting around the old stopes of the main mines could be quite productive.

With the Tombstone Exploration holdings tied up, your company can develop long-range plans.

The main thing right now is to do the work for getting the dumps properly sampled and prepare the mill for operation. Once money is being generated, everyone feels better.

I strongly recommend that other mine work or geologic exploration be held to a minimum until the work outlined in the preceding paragraph is done.

Sincerely yours,

John B. White
Post Office Box 8
Inspiration, Arizona 85537

JBW:ma

N. H. Carouso (9-18-73)

9-18-73

Tim Briscoe 608

Counter Current Decantation Cyanide Process for Tombstone, Arizona, Silver Ores

Introduction

The cyanide process was a very important metallurgical process, developed for the extraction of gold and silver from their ores.

The early development of the cyanide process is mainly attributed to John Stewart MacArthur and the Forrest brothers. It was first introduced into South Africa in 1890, and then it was widely used in Australia, Mexico and the United States.

From a historical standpoint, it is interesting to note that the first patent registered by MacArthur and the Forrests was on October 19, 1887. It covered the effectiveness of a weak solution of potassium cyanide as a solvent for gold and silver. The following year they patented the use of alkalies and zinc for precipitation of the precious metals from solution. The fact is that this old process revolutionized the gold and silver processing industry and is still basically the same process used today.

The flowsheet of a typical cyanide circuit will be discussed to familiarize the reader with the process. The crushed ore is ground in a ball mill in closed circuit with a classifier to a preselected fine size in the presence of an alkaline cyanide solution. The classifier overflow is thickened to remove the pregnant solution and produce an underflow which is subjected to agitation for final dissolution of gold and silver values. The agitator discharge is washed in a countercurrent decantation system consisting of several washing thickeners. Pulp is fed into one end and water into the other end, thus the flow of pulp and water is in opposite directions. The pulp becomes progressively

lower in soluble content as it passes to the discharge end and the water at the discharge end increases in lime, cyanide, gold and silver strength to constitute the mill solution. The mill solution is then used in the grinding circuit and is further enriched in gold and silver content to form the pregnant solution from the primary thickener. The pregnant solution is precipitated using zinc dust and the barren solution after precipitation is recycled to the washing thickeners. The precipitate is refined to bullion by adding fluxes and smelting.

Flowsheet for Tombstone Mill

Cyanidation flowsheets consist mainly of two types, all-slime and sand leaching. The all-slime cyanidation flowsheet includes fine grinding and agitation in alkaline cyanide solution for dissolution of gold and silver values, whereas, sand leaching is usually a batch process treated in vats by percolation. Another type could be called sand-slime leaching and a modified version of this type will be discussed in another report and will cover my concepts of an agitated vat leaching process for crushed ore.

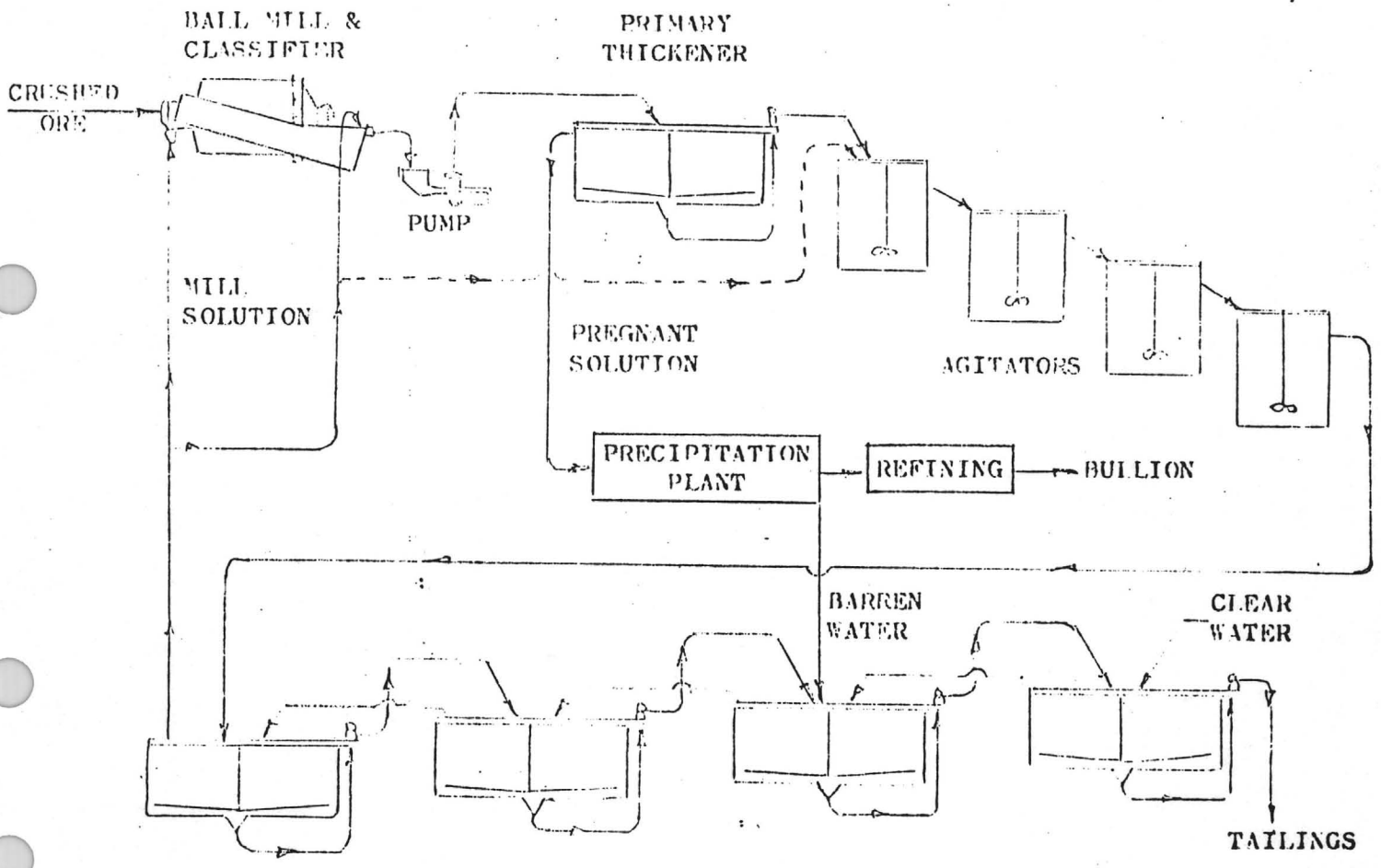
A typical flowsheet is included in this report. This type of flowsheet is industry approved and tested. Although this flowsheet appears similar to an all-slime type process, it will differ because a relatively coarse grind will be sought. Preliminary laboratory testing indicates that a coarse grind should give satisfactory recoveries of gold and silver values.

Settling rates favor a coarser grind and recoveries are not adversely influenced. Laboratory testing currently being conducted at the Arizona Bureau of Mines Laboratory in Tucson, will furnish the necessary data to finalize the mill design and plant operating

BY NHC DATE 9-18-73 SUBJECT SHEET NO. OF

CHKD. BY DATE TOMBSTONE, ARIZONA JOB NO. 71 MINERALS LTD.

CCD CYANIDE PLANT FLOWSHEET



COUNTER CURRENT DECANTATION THICKENERS

conditions.

A discussion of the various steps in the flowsheet will be presented and related to the equipment available from the Whitehall, Montana, mill.

Grinding

Single stage grinding utilizing the No. 66 Marcy Ball Mill in close circuit with the No. 1658-D Dorr Rake Classifier, should give the tentative optimum mesh size of grind at a thru-put of about 150 tons per day of ore, assuming that ball mill feed will be -½" screen fraction from the crushing plant.

To slightly increase the thru-put of the grinding circuit, one can consider several options; one, feed the mill with a smaller size screen fraction, two, increase the coarseness of grind, three, optimize by mill testing, the size and number of ball charge and type of liners, however, to substantially increase the daily tonnage, a second ball mill and classifier circuit should be installed.

Agitation

The propeller type agitators available from the Whitehall Mill are ideal for agitating a coarse grind product. Installation of an air agitation system to the agitators should be considered, especially to the rake Dorr type agitator.

Aeration is essential for successful cyanidation, to supply free oxygen. For efficient dissolving, it is necessary that oxygen come in physical contact with the gold and silver particles. Therefore, air bubbles should be well dispersed in the pulp. The agitators can be modified to accomplish this.

As in the grinding circuit, the calculated tonnage that can

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be treated by the available agitators is about 150 tons per day. This is assuming that 24 hour retention time in the agitators will be sufficient, however, 48 hours or a longer retention time may be required. Current laboratory tests, when completed, should give us this information.

To increase the retention time and also the tonnage, additional agitators will be required.

The agitator tanks and drive mechanism are in fairly good condition, however, the impellers must be reworked and possibly rubber covered.

Thickening

Thickening is an important part of a cyanide plant and is essentially a continuous mechanical process involving settling where excess solution is removed from the pulp.

The primary thickener removes pregnant solution which is sent to the precipitation plant for removal of gold and silver values from the solution. The counter current decantation thickeners wash the cyanide pulp to recover the solution and reject the solids to waste.

Free settling rate studies conducted at the Arizona Bureau of Mines Laboratory, Tucson, Arizona, indicate that the State of Maine dump ore tested had acceptable settling characteristics at a pH of 11.0, adjusted with lime at 2#/ton ore. The settling rate determined was 0.5 feet per hour and was dependent on a high pH. Lower pH degraded the settling rate. Based on this free settling rate, the available thickeners are capable of handling at least 70 tons per day of ore per thickener.

The thickeners can be installed in parallel. I recommend that

the thickeners be installed in pairs, each higher in elevation than the preceeding thickener pair to allow the solution to flow by gravity, thus eliminating at least four pumps, if standby pumps are included.

The pulp will have to be pumped from the underflow of each thickener to the next thickener. This can be accomplished by either an adjustable stroke diaphragm pump or a slurry pump with pinch valve flow control. Either pumping systems are effective, however, the slurry pump-pinch valve system will lend itself favorably to future automatic control systems.

The five 30 foot diameter thickeners at the Whitehall Mill were all set at the same elevation. This arrangement requires many pumps, and in my opinion and experience as Chief Metallurgical Engineer for a 30,000 ton per day concentrator, will result in high maintenance costs and poor running time availability. Industry practice, and the two recently constructed cyanide plants in Nevada, use gravity flow for thickener solution.

The available thickeners are in need of repair. Pulp was left in the thickener tanks when the Whitehall Mill was shut down in the middle 1950's, and along the air-pulp interface, the tank walls are badly rusted. Badly rusted sections should be replaced or portions cut out and new plates welded in place. All tank sections should be sand blasted and when the tanks are assembled, they should be treated inside with a corrosion resistant coating. A 2-part catalytic nylon base epoxy primer and enamel will be tested as soon as received from the supplier. A butyl rubber coating, "Elastron", has been received and will be tested immediately.

The thickener drive mechanisms are in only fair mechanical condition and will have to be reworked.

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Clarification and Precipitation

The equipment, although antiquated, appears to be useable. The leaf type clarifier filter and the sock type precipitation tank, typical of small cyanide plants in the past, can be reworked and used for initial production.

At a later date, pressure type clarifier filters and precipitate presses can be installed to update the precipitation plant.

Refinery

At present, refinery equipment is not available. It is believed that the Amex-Placer people plan to keep this equipment with their laboratory facilities at Whitehall, Montana; however, it would seem prudent for management to investigate.

Summary and Conclusions

It appears that about 150 tons of ore per day is the maximum tonnage that can be processed, utilizing the equipment acquired from the Whitehall mill. Upon completion of laboratory test work, plant design and operating conditions can be finalized.

Thickeners should be installed to benefit from gravity flow of solutions. Agitators should also be installed to benefit from gravity.

The thickener tanks must be repaired as well as the drive mechanisms. Agitator impellers should be rebuilt and possibly rubber covered.

The Oliver Vacuum Drum Filter, acquired from the Whitehall mill, should be reworked and available for use in the counter current decantation washing circuit as well as the two 22 foot diameter thickeners. It is quite evident that we will be crowded for pulp

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washing capacity.

Additional equipment will have to be acquired to expand the mill capacity. The writer has been active in investigating sources for equipment procurement.

This cyanide plant, with realistic engineering and careful construction practices, should be successful.

Nicholas H. Carouso

Nicholas H. Carouso
Consultant

September 18, 1973

September 24, 1973

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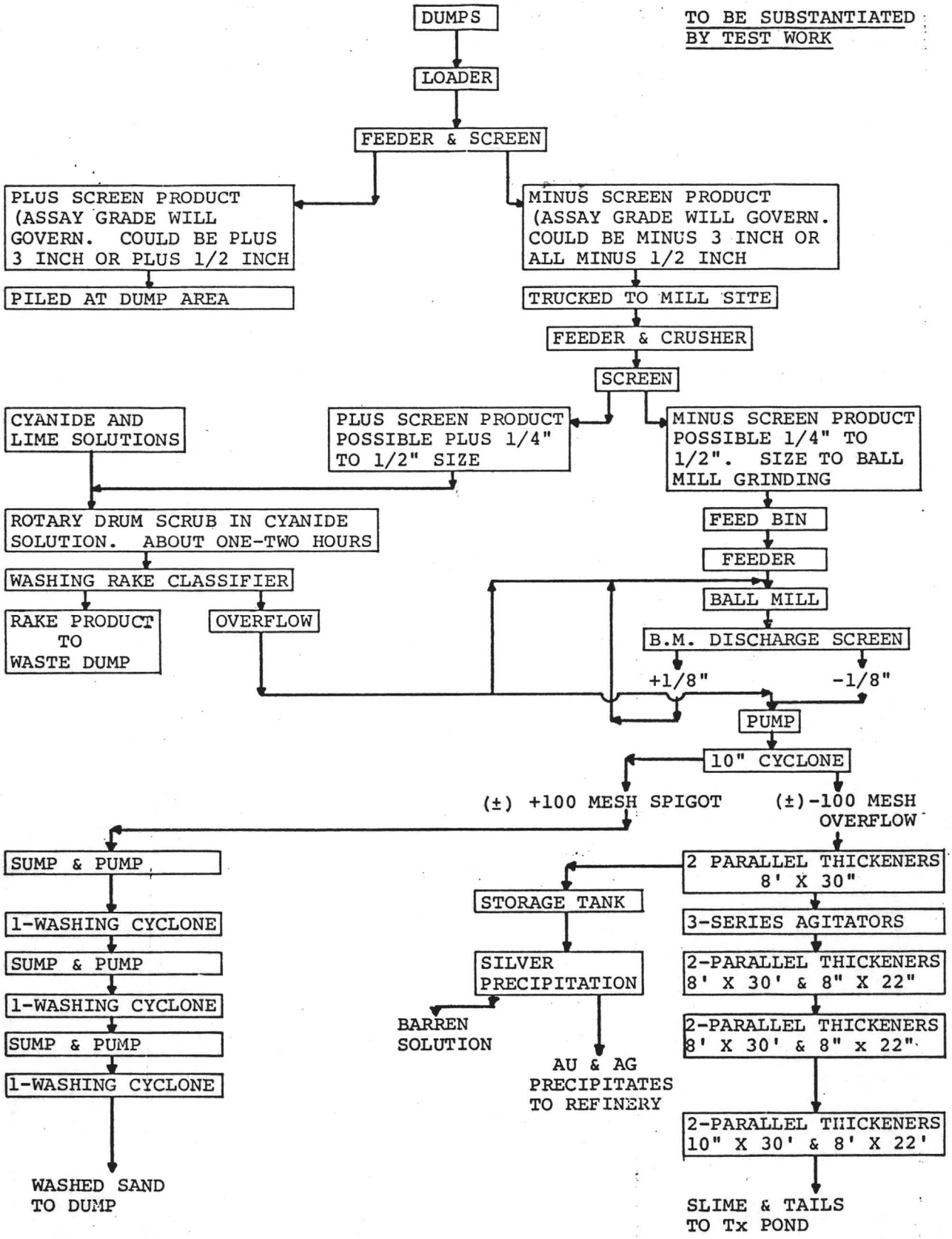
POSSIBLE
ORE OPERATIONS FLOWSHEET - TOMBSTONE



CYCLONE CCD CIRCUIT

THICKENER CCD CIRCUIT

Daily Mine Tonnages (1975)

Mine Daily Temperatures - Boyle Brezy - Rec. Tapes 69

3-63 Revised Sept. 10 1939

JHB

Mead

the Spiral

notebook

11 In. x 8½ In.
40 Sheets
Wide Marginal Ruled
06-3520
A Mead Product
Hulman Bldg., Dayton, Ohio 45402

May

Daily Mine, Pulp Assay

Date	Tons	Au Pulp	Ag Pulp	Au sol.	Ag sol	Dump	Pad	Area
May 19/75	1280			.014	.429	Cont. #1	1	1
" 20	540			.007	.336	" "	1	1
23	1060			.008	.325	" "	1	1
	2880							

Cont#1 Note: April, 1975 - 18960 Tons Hauled To Pad #1 Area #1
Cont#2 May, 1975 - 31240 " " " " " " " "
Total 50,200

Cont. #2 Note: 5-180 Tons Hauled Hauled to Pad #2 Area #2

Cont. #1 9740 " " "June" " " " " " "
14920

Date	Tons	Au Pulp	Ag Pulp	Au Sol.	Ag. Sol	Dump	Pad	Area
June 20	1340			.049	1.66	Cont. #2	2	2
23	1180			.035	1.02	" "		
24	2560			.048	.896	" "		
25	560			.020	.355	" 1		
25	1440			.036	1.12	" 2		
26	1240			.043	.550	" 1		
27	1580			.032	.783	" "		
28	1440			.014	.271	" "		
30	2200			.005	.194	" "		
				.277	6.749			

Cont #1
Cont #3
Trans.

Note: 16820 Tons Hauled To Pad #1 - #2
1890 " " " " " " "
20940 " " " " " " "
54,510 Mine Tonnage - Pulp Assay - Recoverable Values

Date	Tons	Au III Pulp	Ag HH Pulp	Au II Sol.	Au AA Sol.	Dump	Pad	Area
July 1, 75	3020	.026	.528	.021	.318	Cont. #1	1	1
2	1820	.015~	.333	.007	.244	" "		
3	2200			.016	.339	" "	"	"
3	-34			.018	.369	" "	"	"
5	2500	.036	.590	.016	.258	" "	"	"
7	1260	.020	.281	.015	.277	" "	"	"
8	2000	.024	.636	.026	.331	" "	"	"
9	760	.012	.324	.020	.290	" "	"	"
10	2980	.012	.204	.005	.082	" "	"	"
11	780	.012	.204	.018	.508	Tranquility	"	"
12	1840	.086	1.16	.032	.771	"	"	"
14	2140	.120	1.81	.025~	.625	"	"	"
15	1800	.170	3.22	.022	.330	"	"	"
16	700	.031	.795	.613	.166	"	"	"
17	840	.032	.829	.028	.563	"	"	"
18	1520	.		.017	.605~	"	"	"
19	1420	.021	.498	.015~	.246	"	2	2
21	1080	.036	.829	.026	.580	"	"	"
22	1080	.079	.777	.023	.449	"	"	"
23	980	.056	.740	.027	.424	"	"	"
23		.025~	1.23	.013	.732	Cont #3	"	"
23		.050	1.85~	.021	.775~	" " #2	"	"
23		.020	.778	.008	.814	" " #1	"	"
24	1520	.052	.761	.023	.466	Trans.	"	"
25	1420	.058	.586	.038	.467	"	"	"
26	1100	.052	.606	.025~	.494	"	"	"
28	1240	.035~	.638	.020	.492	"	"	"
28	260	.020	.641	.020	.641	Cont. #3	"	"

July

D	Tons	Au Pulp	Ag Pulp	Au Sol	Ag Sol	Dump	Prod	Amt
July 29	240			.019	.553	Cont. 3rd	2	2
29	1100	.065	1.54	.021	.550	Trang.	2	2
30	700	.128	2.42	.017	.595	Cont 3	2	2
31	700	.054	2.18	.628	3.40	Trang.	2	2

Aug.

Date	Tons	Au Pulp	Ag Pulp	Au Sol	Ag Sol	Dump	Pad	Area
Aug. 1 1925	900	.054	1.13	.030	.783	Trang.	2	2
2	1300	.040	.95	.016	.638	"	"	"
4	2040	.062	1.03	.022	.554	"		
5	1320			.019	.438	"		
6	500	-	-	-	-	"		
7	1420	.150	2.54	.019	.394	"		
8	1460			.023	.258	"		
9	1800	.020	.75	.007	.08	Cont. #1		
11	480	.018	.56	.010	.24	"		
22	440 ✓	-	-	-	-	"		
27	924	-	-	.112	2.67	" #3		
28	924	-	-	.014	.414	Trang.		
29	784	-	-	.013	.421	"		
30	2876	-	-	.011	.205	Cont #1		
	39140							

Date	Tons	Au Pulp	Ag Pulp	Ausol	Agsol	Dump	Pad	Area
Sept. 2, 1988	2310	-	-	.013	.319	Cont #1	2	2
" 2	948	-	-	.024	.369	Trang.	"	"
3	2772	-	-	.008	.211	Cont #1	"	4
3	720	-	-	.009	.193	Trang.	"	"
4	2616	-	-	.016	.206	"	"	"
5	1768	.014	.335	.012	.315	"	"	"
8	3976	.031	.694	.014	.254	Cont #1	"	"
9	2710	-	-	.007	.196	"	"	"
10	828	-	-	.012	.246	Trang.	1	3
11	3330	-	-	.011	.436	"	"	"
12	3454	.038	2.29	.013	.250	Cont #1	"	"
13	3938	.076	.901	.018	.343	Trang.	"	"
15	4100	.048	1.19	.015	.281	Cont #1	"	"
16	492	.050	2.25	.024	.408	Boss	"	"
16	3743	.038	.766	.017	.264	Cont #1	"	"
17	1780	.019	.530	.017	.293	" "	"	"
18	948	.041	1.04	.018	.336	" "	"	"
19	1584	.025	.50	.017	.302	Trang.	"	"
20	2476	.035	1.52	.014	.190	Cont #1	"	"
54 22	2336			.019	.327	" "	"	"
23	2176			.013	.211	" "	"	"
24	2510			.009	.234	" "	"	"
25	408			.015	.405	" "	1	5
29	2028					Trang	"	"
30	2944					" "	"	"

MINE RECORD, START OCT. 1, 1975

Date	PAD	AREA	TONS	DUMP	AU PULP	AG PULP	AU SOL.	AG SOL.
Oct. 1	#1	#5	1186	Boss	.05	.579	.235	6.71
oct. 2	#1	#5	1150	Boss	.0325	.695	.118	1.15
oct. 3	#1	#5	700	Boss	.0395	.3875	.092	.68
oct. 4	#1	#5	2600	Boss	.0325	.40	.078	1.07
oct. 5	SUNDAY							
oct. 6	1#	#5	1430 1490 2920	Boss TRANS.	.039 .030	.530 .687	.136 .097	1.60 1.80
oct. 7	1#	#5	2590 1630 CONT 1	BOSS CONT. 1	.036 .022	.920 .229	.135 .052	1.85 1.20
oct 8	1#	#5	1592 TRANS 3260 1000	TRANS. CONT. 1	.014	.449	.050 .046	.88 1.23
oct. 9	1#	#5	1040 2040 1780 2850	G. TAILINGS CONT. 1			.045	1.18
oct. 10	1#	#5	1070	Boss			.109	2.18
oct. 11	1#	#5	2180 2700 520	CONT. 1 G. TAILINGS			.046	1.20
Oct. 12	SUNDAY							
oct. 13	1#	#5	320 = 2100 1780	G. TAILINGS Boss			.102	2.10
oct. 14	"	"	1280 = 2130 850	Boss cont. 1	.020	.800	.055	1.45
oct. 15	"	"	770 = 2590 1820	TRANS. CONT. 2			.066	1.56
oct 16			3010	CONT. 1	.030	.460		
oct. 17	"	"	2790	CONT. 1	.011	.510		
oct. 18	No haul							
oct. 19	No haul							
oct 20	#1	#5	3340	cont 1				
oct 21	Switched to 1-5		41456 TONS	TOTAL ON PAD				
oct. 22	#1	#6	2080 850 2320	CONT. 1 G. TAILINGS CONT. 1				
	#1	#6	710 2100	G. TAILINGS CONT #1				
oct. 23	#1	#6	702 1580	G. TAILINGS TRANS.				
oct. 24	#1	#6	2800 1320	CONT. 1 TRANS.				
oct. 25	#1	#6	3220	CONT. #1				
Oct. 26	SUNDAY							

DATE	PAD	ROCK	DUMP	TONS	AU PULP	AG PULP	AU SOL	AG SOL
			TRANS					
oct 27	#1	#6	CONT 1	3520				
			CONT. 1	2440				
oct. 28	#1	#6	TRANS.	1500				
			CONT. 1	2880				
ct. 29	"	"	TRANS	1900				
			CONT. 1	3340				
Oct. 30	"	"	TRANS	1140				
			CONT. 1	2440				
oct. 31	"	"	TRANS	1430				

MINE RECORD TONS HAULED NOVEMBER 1985

NOV 1	SATURDAY SHUT							
NOV. 2	SUNDAY SHUT							
			TRANS	1480				
NOV. 3	#1	6#	CONT. #1	3180				
			WEST SIDE	2520				
NOV. 4	"	"	CONT. #1	1640				
			CONT. #1	1150				
NOV 5	"	"	TRANS	520				
			LEST SIDE	2380				
			WEST SIDE	2580				
	"	"	CONT #1	320				
NOV. 6			WEST SIDE	1680				
NOV. 7	"	"	CONT 1	3350				

Daily Plant Production 3-62 SEA copy
Rev. Sept 10, 1962
HR

Mead

the Spiral

notebook

11 In. x 8½ In.
40 Sheets
Wide Marginal Ruled
06-3520

A Mead Product
Hulman Bldg., Dayton, Ohio 45402

Lot 101-102 Pad #1 Area #1

Daily Plant Production

Date	Ton [illegible]	[illegible] Au	[illegible]	[illegible] Au	[illegible] Ag	Au Precip	Ag Precip	
June 2, 19[illegible]	948.1	.048	1.376	0	.004	45.91	1273.36	
3	812.5	.045	1.376	.01	.045	27.62	951.07	Total Tons
4	684.7	.045	1.30	.001	0	30.72	893.66	Lot 101-102
5	616.8	.042	1.126	.0005	0	25.93	694.76	4986.9 Au 202.54
6	555.4	.039	1.02	.005	.039	19.98	540.96	Ag 5051.75
7	534.0	.040	.987	0	0	21.72	527.30	
8	584.7	.037	.951	0	0	21.82	560.80	
9	635.7	.036	.873	0	.010	23.11	548.45	
Total Lots 101-102	5376.9					216.81	5990.30	
Lot 103 10	656.7	.030	.825	0	.030	19.03	524.74	Total Tons
11	1001.8	.033	1.00	0	0	32.34	312.13	Lot 103
12	1190.3	.027	.679	0	0	31.75	755.6	5540.5 Au 151.41
13	922.8	.025	.714	0	.017	22.83	648.6	Ag 4129
14	776.6	.024	.669	0	.007	18.16	508.6	
15	663.7	.022	.642	0	.003	14.31	419.4	
	5217.9					138.40	3168.4	
Lot 104 16	790.9	.022	.581	.002	.005	16.06	420.9	
17	606.9	.021	.519	0	.006	12.46	308.2	
18	651.3	.020	.493	0	.003	12.56	317.6	Total Tons
19	635.9	.019	.487	0	0	11.61	303.37	Lot 104
20	641.1	.017	.467	0	0	10.65	295.8	5721.0 Au 125.65
21	552.1	.017	.423	0	0	8.85	230.7	Ag 2680.8
22	640.7	.016	.421	0	0	9.54	262.8	
23	750.5	.016	.381	0	0	11.24	279.1	
24	542.2	.016	.290	0	.005	8.11	204.9	

Date	Ton Precip	Au Reg	Ag Reg.	Au Barren	Ag Barren	Au precip.	Au precip.	
Lot 105 June 24	682.4	.013	.378	.001	.036	8.23	252.9	Total Tons
27	971.1	.01	.310	0	0	8.77	294.6	3842
28	747.0	.01	.266	0	0	6.73	192.5	Au 35.8
29	777.6	.007	.274	0	0	4.89	205.1	Ag 1158.16
30	812.5	.009	.224	0	.01	6.86	174.3	Lot 105
	3990.5					35.48	1294.0	
Lot 106 July 1	689.0	.007	.245	0	.01	4.78	159.5	Total Tons
2	814.0	.008	.193	0	0	5.91	148.6	6794.5
3	843.0	.007	.212	0	0	5.06	170.0	Au 47.7
4	832.0	.007	.229	0	0	5.56	182.8	Ag 1401.2
5	746.0	.008	.231	0	0	5.74	165.9	Lot #106
6	816.0	.008	.226	0	0	6.27	177.0	
7	628.0	.007	.182	0	0	3.81	108.3	
8	587.0	.007	.202	0	.007	3.56	113.0	
9	530.0	.008	.217	0	0	3.71	111.4	
	6485.0					44.40	1336.5	
Lot 107-108 10	825	.007	.206	0	0	4.23	162.2	2 Lots 107-108
11	601	.008	.208	0	0	4.54	118.5	Au 187.4
12	120	.007	.185	0	.003	.63	21.0	Ag 4692
13	371	.008	.195	.002	0	2.43	68.6	Total Tons
14	500	.007	.200	0	.003	3.40	92.7	?
15	835	.006	.168	0	0	4.47	133.0	
16	560	.004 1 shift	.104 1 shift	0	.008 1 shift	3.05	81.2	
17	217	.009 2 shifts	.100 2 shifts	0. 2 shifts	.013	1.74	19.5	
18	477	.029	.922	.001	0	13.38	436.6	
19	1068	.036	.899	0	.003	37.4	947.0	
20	1290	.037	.857	.002	.050	44.5	1632	

Date	Ton Recip	Au Prod	Ag Prod	Au Barren	Ag Barren	Au Recip	Ag Recip	
July 21	1233	.032	.907	0	.012	37.0	818.0	
22	1032	.027	.617	.001	.018	25.4	606.0	
23	919	.025	.598	.001	.016	21.9	525.6	
	9129					203.27	5061.3	
Lot 109 July 24, 25	1077	.026	.544	0	0	27.3	588.0	
25	1093	.027	.643	0	0	29.7	689.0	
26	994	.024	.585	0	0	22.4	562.0	Lot 109 Au 440. Ag 10,134.
27	895	.020	.480	0	0	16.9	415.0	
28	1154	.021	.450	0	0	23.0	508.0	
29	790	.018	.405	0	0	13.9	312.0	
30	979	.015	.337	0	0	14.2	314.0	
31	1108	.015	.348	0	0	15.9	374.0	
Aug. 1	1045	.017	.318	0	0	16.3	321.0	
2	1093	.014	.339	0	0	14.8	305.0	
3	1146	.022	.691	0	0	24.8	778.0	
4	1240	.026	.628	0	0	29.6	758.0	
5	1135	.022	.519	0	0	23.7	574.0	
6	1199	.020	.412	0	0	23.5	483.0	
7	1223	.020	.438	0	0	23.6	525.0	
8	1101	.022	.527	0	0	23.6	571.0	
9	1220	.025	.518	0	0	29.6	613.0	
10	1048	.023	.478	0	0	23.5	491.0	
11	1259	.018	.343	0	0	22.4	413.0	
12	262	.012 1 shift	.277 1 shift	0	0	2.9	70.0	
	21061					420.7	4664.0	
Lot 110 13	1120	.013	.291	0	.008	13.9	293.0	
14	1113	.012	.244	0	0	13.0	262.0	
15	1133	.011	.207	0	0	11.3	223.0	

Date	Ton Precip	Av Preg	Ag Preg	Av Barren	Ag Barren	Av Precip	Ag Precip.	
Lot 110								
Aug 16	1167	.008	.216	0	0	8.5	246	
17	1236	.008	.166	0	0	8.5	193	Lot 110
18	1127	.007	.155	0	0	6.7	162	Av 89.1
19	1057	.006	.149	0	0	5.3	148	Ag 2020
20	1228	.004	.115	0	0	4.1	130	
21	1117	.006	.109	0	0	5.4	110	
22	949	.005	.093	0	0	3.9	79	
23	746	.007	.100	0	0	4.6	66	
24	630	.004	.104	0	0	2.3	60	
25	494	.004	.101	0	0	1.6	57	
	13117					89.1	2020	
26-28	Shut Down							
Lot 111								
29	1222	.003 1 shift	.142	0	0	3.6	162	
30	482	.009	.120	0	0	2.9	53	
Sept. 1-13	Shut Down							
14	1017	.02	.464	0	.006	19.1	455	2865 2047 4912
15	1183	.016	.515	0	0	18.2	597	2730 2686 5416
16	1112	.023	.485	0	0	24.6	533	3690 2390 6080
17	1303	.019	.395	0	.004	23.3	499	3495 2245 5740
18	1251	.018	.368	0	0	22.2	449	3330 2020 5350
19	1190	.016	.291	0	.003	13.4	335	
20	1188	.013	.262	0	0	15.0	300	
21	1207	.014	.251	0	0	16.1	291	
22	1099	.012	.275	0	0	12.5	294	
23	70	.012	.263	0	0	.77	18	
	12324					171.67	3486.0	
24	Shut Down							
Lot 112								START LOT 112
25	817	.013	.292	.001	.018	9.4	223	
26	1289	.010	.242	0	0	12.0	290	

19,000.00 OCT

25,000# per Month Cyanide

Date	Ton Precip	Au Prec	Ag Prec	Au Barren	Ag Barren	Au Precip	Ag Precip	LOT 112
Sept. 27	1368	.007	.136	0	0	8.6	170	
28	566	.005	.084	0	0	2.3	43	
29	658	.006	.134	0	0	3.8	83	
30	765	.012	.210	0	.010	6.9	150	
	5463							
Oct. 1	570	.011	.206	0	.013	5.6	118.4	
Started Lot 113 on 1-Ton Test								
2	149	.011	.205	0	0	1.5	29.0	LOT 113 START ZN 75#
3	341	.010	.190	0	0	3.0	63.0	
4	0	0	0	0	0	0	0	
5	0	0	0	0	0	0	0	
6	0	0	0	0	0	0	0	
7	0	0	0	0	0	0	0	
8	1097	.016	.273	0	0	16.25	294.64	10-5- ZN 100#
9	1308	.023	.323	0	0	28.5	410	Au- 49.25 Ag- 796.64
10	1365	.022	.342	0	0	28.73	453.5	10-10- ZN 100#
11	1276	.021	.335	0	0	25.96	411.8	
12	1225	.020	.346	0	0	22.62	411.5	Au-126.36 Ag-2073.44 10-12- ZN 100#
13	1317	.017	.325	0	0	21.54	414.86	10-13 ZN 100#
14	1302	.015	.304	0	0	18.25	386	10-14 ZN 100#
15	1281	.012	.272	0	0	14.1	336.18	Au 180.45 Ag 3210.48
16	1319	.011	.239	0	0	13.6	320.86	10-16 ZN 100#
17	1306	.009	.214	0	0	10.89	267.42	10-17 ZN 100#
18	1293	.009	.192	0	0	10.9	236.45	10-18 ZN 100#
19	1126	.006	.142	0	0	5.62	170.32	221.36 Au
	221.36	oz Au	4205.59	oz Ag	775#	Zinc	Lot 113	START LOT 114 with 100# Zinc
20	918	.007	.163	0	0	5.447	141.277	
21	349	NO Sample		—	—	—	—	100# ZN

Ash 113-B 88.5 – 21.5 BBL
Bullion – Lot 111 Wt 48.32 Lot 112 Wt 10.7
Lot 110 Wt. 30.16

Date	Tons Precip.	Au Preg.	Ag Preg.	Au Bar.	Ag Bar.	Au Precip	Ag Precip.	Lot 114
22	1055	.004	.123	0	0	4.848	118.89	
23	120	.012	.279	0	0	1.4	34.3	
24	0	0	0	0	0	0	0	10-25-95 100# ZN 10-26-95 100# ZN
25	846	.019	.523	0	0	15.4	435	
26	1277	.017	.545	0	0	20.7	680.8	
27	1327	.021	.593	0	0	26.9	773	
28	1352	.023	.608	0	0	104.885 30.19	2992.287 809.07	10-28-95 100# ZN 10-29-95
29	1343	.022	.523	0	0	28.06	689.2	100# ZN 10-30-95
30	1310	.021	.473	0	0	25.775	606.98	100# ZN
31	1241	.020	.455	0	0	23.41	551.52	
Nov. 1	1260	.021	.420	0	0	75.6	516.87	11-1-95 100# ZN
					Totals Lot 114	222.03	6444.93	770# ZN Lot 114
2	713	.021	.400	0	0	14.3	279.06	
START LOT 115								START LOT 115
3	1436	.016	.338	0	0	22.23	474.8	30# Zinc 100# ZN
4	1319	.012	.250	0	0	13.95	316.56	
5	921	.013	.297	0	0	10.9	265.7	100# ZN
6	890	.019	.375	0	0	16.0	324.7	
7	781	.016	.375	0	0	11.33	283.82	
8	678	.016	.360	0	0	10.39	238.45	100# ZN 100# ZN
9	681	.016	.338	0	0	10.19	221.9	
10	803	.012	.275	0	0	8.93	209.94	
11	1078	.011	.271	0	0	114.809 10.889	2565.36 229.49	100# ZN 100# ZN
12	1052	.015	.288	0	0	15.48 142.219	292.48 3111.76	
13	899	.014	.293	0	0	11.99	253.12	100# ZN
14	828	.015	.303	0	0	11.9	241.56	
15	1145	.014	.274	0	0	14.29	305.36	
16	899	.012	.227	0	0	10.8	209.55	
START LOT 116 17								START LOT 116 100# ZN

Trench Samples (7/79)

FIRST TRENCH (MEASURED FROM SOUTH TO NORTH)

.51 TA-1 0'-2.5' PORPHYRY NEAR RHY. DIKE (SAMPLE CONTAMINATED)?

.25 TA-2 2.5'-7.0' RHY DIKE (SAMPLE CONTAMINATED)?

.39 TA-20 49.8'-50.5' SILICIOUS MN O_2 VEIN

TRENCH FROM WATER LINE SOUTH IN LINE WITH FIRST TRENCH

.26 TA-89 AT 29 FT QUARTZ VEIN

.52 TA-92 AT 32 FT QUARTZ VEIN

.52 TA-94 QUARTZ VEIN IN DRIFT OF TRIPLE X

.45 TA-95 ROCK BETWEEN QUARTZ VEINS

.42 TA-97 AT 40 FT QUARTZ VEIN

1.22 TA-99 AT 41½ FT RED (FeO) ALTERED PORPHYRY

THIRD TRENCH (MEASURED FROM SOUTH TO NORTH)

.39 TC-23 117-119 SOUTH FOOTWALL OF STOPE

.64 TC-24 2½'-3' WIDE VEIN

14.1 TC-25 6 FEET WIDE GOB.

FIFTY FOOT BARREL TESTS

.32 TAB-14
.90 TAB-15
1.34 TAB-MUCK
} SOUTH OF P.A.S. LINE

.40 TAC-1
.60 TAC-2
.90 TAC-3
} FIRST 150 FT TRENCH ~~FIVE~~ THREE

TRENCH D 8-31-79

.02 TD-1 0-17 1/2

WHITE, MED. GRAINED, HARD, ALT. TUF.
L.A.P.

JOINTS N AAW VERT
N22E 69SE

N.L TD-2 17 1/2 - 20

WHITE, MED. GRAINED FAIRLY HARD, ALT. TUF.
L.A.P. MnO FILLING FRACTURES. (JOINTS)

JOINTING: N49E 72NW
N69W 43SW

NIL TD-3 1/4"

MnO. FROM FRACTURE FILLING.

NIL TD-4 20-50

GREEN, MED. GRAINED, HARD, UNALT. TUF. BLOCKY

JOINTING: N9E 61SE
N60E 71NW
N45W 69SW

TR. TD-5 50-59

WHITE, MED GRAINED, FAIRLY SOFT, ALT. TUF.
L.A.P GIVES SPOTTED APPEARANCE. CHLORITE IS BROWN.
FAIRLY FRACTURED

JOINTING: N10E 48NW
N56W 66SW CONT.

TR. TD-6 59-80

WHITE, MED GRAINED, FAIRLY HARD. ALT. TUF. L.A.P.
HEMATITE VEINLETS. FAIRLY FRACTURED
N5AE 29NW CONT.

NIL TD-7 IN TD-6 ~150 FT AT SURFACE
WHITE, FINE GRAINED, FAIRLY SOFT. L.A.P.

NIL TD-8 80 - 111
WHITE, MED. GRAINED, FAIRLY HARD, ALT TUF.
FeO STRINGERS, WITH MINOR MnO. QUARTZ
COATING ON FeO IN STRINGERS. (BOTROIDAL).

.06 TD-9 WEATHERED SURFACE /
WHITE, MED. GRAINED, SOFT, ALT TUF.
COULD BE A PRODUCT OF FAULTING.

NIL TD-10 AT 100
WHITE, MED GRAINED, HARD, ALT. TUF.
FeO STRINGERS COATED, WHITE BOTROIDAL
QUARTZ. SILICIFICATION AFTER SERITIZATION?

NIL TD-11 108-109
WHITE, MED, GRAINED, HARD, ALT. TUF.
FeO STRINGERS.

.03 TD-12 111-112? RED
RED, MED. GRAINED. FAIRLY SOFT. ALT TUF.
SOME MnO. VERY RED. (HEMATITE)

NIL TD-13- 112- 116
WHITE. MED, GRAINED, FAIRLY HARD, ALT. TUF.
FeO STRINGERS, FeO ~~SPARKING~~ AWAY FROM STRINGERS.

TR. TD-14 116 - END
GRAY FAIRLY ALT. PORH.
JOINTING: N52W 58SW & N72E VERT
N8E 74SE

TRENCH - E 9-10-79

.03 TE-1 0-10
GREENISH-GRAY, MED. GRAINED, HARD. UNALT. PORPH.
N45E VERT JOINT

TR. TE-2 10-11½
YELLOW; MED GRAINED, HARD., ALT POR.
MnO_2
CONT. / N60E 86 NW

.02 TE-3 11½-12
YELLOW, MED, GRAINED, FAIRLY SOFT, ALT TUF.
FIBEROUS MnO_2 STRINGERS, CRUMBLY.

.03 TE-4 12-13
RED, MED GRAINED, FAIRLY HARD, ALT. TUF.
HEMATITE AFTER PYRITE?
N 60E 86 NW
N 45 W 68 SW JOINTS

TR. TE-5 BLACK VEIN AT 13' N75E 69NW
MnO_2, FeO_s;

.15 TE-6 QUARTZ VEIN ¼" THICK AT 13½"
N50E 69 NW CALICHE COATING

TR. TE-7 13-15
WHITE, MED. GRAINED, FAIRLY SOFT. ALT TUF
50% KAOLINITE. L.A.P.

N.L. TE-8 15-17½
YELLOW, MED. GRAINED, FAIRLY SOFT.
ALT. TUF. FeO STAINS

TE-9 4" VEIN N72E 79NW
CRUMBLY, MnO, & FeO

TE-10 17½ -75
ON ALT. TUB

TRENCH C

FROM ROAD NORTH

.02 TC-1 0-3.

TAN, FINE GRAINED, HARD. LIMONITE AFTER PYRITE. SOME GRAY MINERAL UNKNOWN.

.03 TC-2 3-3½

RED, FINE GRAINED, HARD, SILICIOUS. ROCK WAS ZONED WITH RED AT CORE GRADING TO BROWN AT SURFACE WITH LIMONITE AFTER PYRITE AT SURFACE.

TR TC-3 3½-5½

WHITE, FINE TO MED. GRAINED, HARD. SILICIOUS. BANDED. JOINTS N75E 38 NW

TR TC-4 1½" VEIN

VEIN IS GREENISH IN PLACE. CONTAINS VERY FINE YELLOW CRYSTALS.

~N 40-50E 60-70 NW

TR TC-5 3"

ROCK NEXT TO VEIN.

RED, FINE TO MEDIUM GRAINED, HARD, FINE YELLOW CRYSTALS IN FRACTURES. BANDED.

TR TC-6 6-8

GRAY, FINE TO MED. GRAINED. VERY HARD.

BANDING & JOINTING N61 E 58 NW

JOINTING N71 W 66NE

.02 TC-7 10" ZEAR ZONE

PINK, FINE TO MED. GRAINED. SOFT. BANDED. FINE LIMONITE AFTER PYRITE.

N35E 51NW

.02 TC-8 @ -20

RED, MED. GRAINED, FAIRLY SOFT.

ALT. TUF. FINE HEMATITE AFTER PYRITE.

.15 TC-9 20-23 26" WIDE 3 QUARTZ VEINS.

SOME LIMONITE AFTER PYRITE.

VEINS ARE @ 1" THICK AND TREND APPROX.

~N 60-70E 21NW

WALL ROCK IS WHITE ALT. TUF.

TR. TC-10 23-60

WHITE TO PINK, MED. GRAINED. HARD ALT TUF.

ABUNDT. LIMONITE AFTER PYRITE.

JOINTING N 60E 21 NW

N14W VERTICAL.

TR. TC-11 60-65

WHITE MED. GRAINED, HARD. ALT. TUF.

FEO STRINGERS. LIMONITE AFTER PYRITE BECOMES FINER AWAY FROM STRINGERS.

TR. TC-12 65-67½

GRAY, HARD, MED. GRAINED ALT. TUF.

LIMONITE AFTER PYRITE FEO STAINING AT JOINTS

N14E 63 NW CONTACT

TR TC-13 67½ - 70
GRAY-GREEN, MED. GRAINED, HARD, UNALT. TUF.
LIMONITE & HEMATITE AFTER PYRITE.

TR. TC-14 VEIN N74E 22NW
GREENISH WHITE, VERY FINE GRAINED, VERY HARD
QUARTZ VEIN N74E 22NW

NIL TC-15 70-73
REDISH-BROWN, MED. GRAINED, FAIRLY SOFT, ALT. TUF.
ABUNDANT LIMONITE AFTER PYRITE

.05 TC-16 VEIN ~N74E 22 NW
YELLOW, MED GRAINED, FAIRLY SOFT.
ALT. TUF, FINE GRAINED LIMONITE AFTER PYRITE.
FeO STRINGERS.

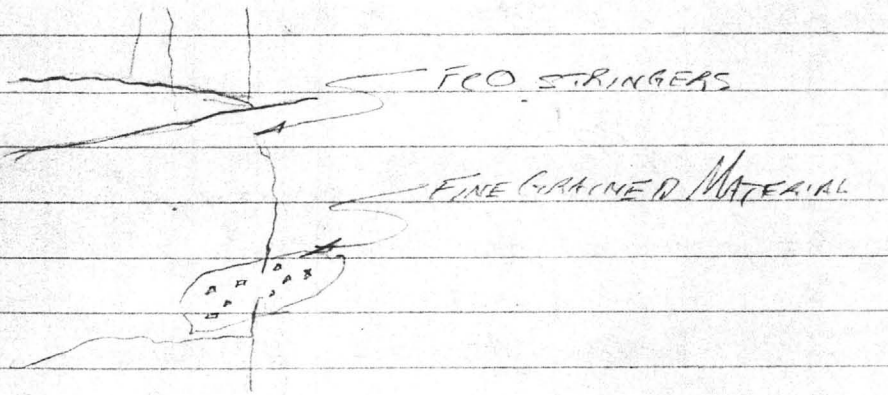
.04 TC-17 73-80
BLACK, MED. GRAINED, FAIRLY SOFT, ALT. TUF.
STONG MnO STAINING WITH FeO STAINING.
LIMONITE AFTER PYRITE.
N 22 W 22 SW CONTACT

TR TC-18 80-86
GRAY, MED GRAINED, HARD, ALT. TUF.
ABUNDANT LIMONITE AFTER PYRITE.

.04 TC-19 86-99
WHITE, MED. GRAINED, FAIRLY SOFT. ALT TUF.
SMALL (~2 mm) PARTICLES OF A GREEN MINERAL (CHLORITE?).

.09 TC-20 99-105

WHITE, MED GRAINED, FAIRLY HARD. ALT. TUF.
SMALL VEINLETS OF FeO IN FRACTURES.
ROCK HAS INCLUSIONS OF A FINE GRAINED MATERIAL
WITH ABUNDANT LIMONITE AFTER PYRITE. AN FeO
VEINLETS IS CUT BY A PARTICLE OF THIS MATERIAL



TC-21 NO SAMPLE

.08 TC-22 105-117

BLACK, MED. GRAINED, FAIRLY HARD, ALT. TUF
WHITE IN CENTER OF ROCK WITH FeO STAINING
AROUND CENTER. LIMONITE AFTER PYRITE.

.39 TC-23 117-119 SOUTH (FOOTWALL) OF STOPE
F.A. Ag .56
Au TR. WHITE (GREENISH), MED. GRAINED, FAIRLY HARD
ALT. TUF. SOME COMMONLY WHITE (KAOLINITE?)
CRYSTALS HAVE TURNED PINK. MnO FILLINGS
IN FRACTURES.

JOINTS N 32 E 84 NW
N 39 W 75 SW
N 72 E 35 NW SAME AS THE VEIN

.69 TC-24 VEIN (STOPED) 2½-3' WIDE
FA. Ag 2.12 ABUNDANT QUARTZ, FeO, MnO, SOME
Au TR. HORN SILVER SEEN IN THE FIELD. VERY BROKEN GROUND

14.4 TC-25 GOB 6' WIDE.
FA. Ag 13.18 GRAB SAMPLE.
Au .04

TR. TC-26 124-145
GREEN, MED. GRAINED, HARD, UNALT. TUF.

NIL TC-27 145-150
VEINS OF CALCITE ~1" THICK
NO SEVERE ALTERATION ONLY MORE FRACTURING.

NIL TC-28 150-185
GREENISH BROWN, MED. GRAINED. FAIRLY SOFT.
ALT. TUF. BROWN CHLORITE AFTER BIOTITE CRYSTALS
ARE ABUNDANT.

NIL TC-29 185
WHITE-TAN. FINE GRAINED, HARD.
SMALL LIMONITE AFTER PYRITE. BANDED

TC-30 195
SAME AS TC-29 ONLY SOFT

} 10' WIDE VEIN

NIL. TC-31 195-320
GREEN, MED. GRAINED, FAIRLY SOFT. ALT (SLIGHTLY) TUF.
LIMONITE AFTER PYRITE IN CHLORITE.

TRENCH B 7-15-79

.02 TB-1 0-4 (0-3)

YELLOW-GRAY, MEDIUM GRAINED, FAIRLY SOFT. MOD. ALTER. TUP. MnO₂ FRACTURE FILLINGS, FeO STAINING ALONG FRACTURES.

.05 TB-2 4-7 3½

WHITE, MED. GRAINED, SOFT. ALT. TUP. FeO STAINS & FILLINGS. JOINTING N85E 85NW

.02 TB-3 7-8 3½-3

YELLOW, MED. GRAINED, FAIRLY SOFT, ALT. TUP. FeO STAINED. LIMONITE AFTER PYRITE (SOME IN EUHEDRAL CHLORITE CRYSTALS).

TR. TB-4 8-16

UNALT. TUP.

JOINTING N41W 67SW

.02 TB-5 12-16 2½

WHITE, MED. GRAINED, SOFT, ALT. TUP. FINE LIMONITE AFTER PYRITE, MnO STAINING & FeO STAINING. VEIN AT SURFACE OF WEST WALL DIPPING TO THE WEST.

TR. TB-6 16-20 3

YELLOW-GRAY, MED. GRAINED, FAIRLY SOFT MOD ALT. POR. TUP. FINE LIMONITE AFTER PYRITE. FeO STAINING.

TR. TB-7 20-26 4

WHITE, FINE GRAINED, VERY SOFT.
LIMONITE AFTER PYRITE, FE STAINING.

TR. Au TR. TB-8 26-31½ 4½

GRAY, MEDIUM GRAINED, HARD. MOD ALT.
TUP. SOME LIMONITE AFTER PYRITE. SOME FINE
GRAINED GRAPHITE INCLUSIONS

JOINTING: N 30 E 74 NW
N 30 W 64 NE
N 23 W 70 SW

TR. TB-9 31½-34½ 4

WHITE, MED GRAINED, SOFT, ALT. TUP.
LIMONITE AFTER PYRITE. FE STAINS.

NIL Au TR. TB-10 34½-67 3½

JOINTS N 58 E 64 SE
N 21 W 63 NE

SEE TB-8

NIL TB-11 67-80 3

SEE TB-8 ONLY MORE LIMONITE
AFTER PYRITE

NIL TB-12 80-83½ 3

SEE TB-8

NIL TB-13 83½-117 4

WHITE-TAN, FINE GRAINED, SOFT, ABUNDANT
LIMONITE AFTER PYRITE (FINE).

CONTACT ~ N 10 E 62 NW

NIL TB-15 90-100 A

BROWN, MED. GRAINED, SOFT, ALT. TUF.
ABUNDANT FINE LIMONITE AFTER PYRITE.

NIL TB-14 197-160

SEE TB-8

JOINTING N20W 66NE
N55E 44 N.W
N74W 83 SW

STATE OF MAINE MINE

TRENCH A ROCK DESCRIPTIONS

7-27-79

AG SHAKER N 34 W : TRENCH BEARING
TEST OF MAN

? .54 CONTAM.? TA-1 0'-2.5' LENGTH (1.5') DEPTH OF TRENCH
WHITE, MEDIUM GRAINED, HARD. LIMONITE AFTER PYRITE CASTS (<1mm). SOME FeO STAINING ON ROCK SURFACES.

? .25 CONTAM.? TA-2 2.5-7.0' (1.5)
PINK, FINE GRAINED GROUND MASS WITH SMALL (<1mm) WHITE CRYSTALS OF KAOLINITE(?). HARD.

.14 TA-3 7.0'-11.0' (2.0)
WHITE, MEDIUM GRAINED, HARD. SIMILAR IN APPEARANCE TO TA-1. LIMONITIC VEINLETS.

.05 TA-4 11.0-11.8 (2.0)
WHITE-TAN, MEDIUM GRAINED, SOFT. FAIRLY UNCONSOLIDATED.

.07 TA-5 11.8-16.0 (2-3½)
GRAY, FINE TO MEDIUM GRAINED, HARD. BANDING (OR FLOW STUCTURE) FOLLOWS DIP. LAST 6" IS VERY BROKEN. STRUCTURE (VEIN) ATTITUDE N80°E 81°NW

.04 TA-6 16.0-16.5' (3.5')
BLACK, MEDIUM GRAINED, FAIRLY HARD, VERY BROKEN MnO_2.

.04 TA-7 16.5 - 17.2 (3.5)

GRAY, FINE TO MEDIUM GRAINED, VERY HARD. BANDING, PYRITE CASTS (EMPTY). FeO STAINING ALONG FRACTURES. MnO IN FRACTURES.

.06 TA-8 17.2' - 20.5' (3.5)

F.A. .06
Ag .20
Au TR.

GRAY, MEDIUM GRAINED, FAIRLY SOFT. ALTERED PORPHYRY. 80% CLAY (KAOLINITE) 10% CHLORITE ~~BIOTITE~~, 10% QUARTZ. MnO FILLING FRACTURES. SOME FeO SOAKING INTO ROCK.

.04 TA-9 20.5 - 20.8' (4.0)

BLACK, MEDIUM GRAINED, SOFT, ALTERED PORPHYRY. ABUNDANT MnO. MINOR FeO. (N10W 70 NE) JOINTING.

.08 TA-10 20.8 - 21.8 (5.5)

WHITE, MED. GRAINED, FAIRLY SOFT. ALTERED PORPHYRY, MnO STRINGERS. MINOR FeO. (N10W 66SW) JOINTING.

.04 TA-11 21.8 - 29.0 (5.5)

BROWN, MED. GRAINED, SOFT. ALTERED PORPHYRY, MnO STRINGERS, FeO STRINER.

.05 TA-12 29.0 - 31.6 (6.0)

RED-BROWN, MED. GRAINED, FAIRLY HARD, ALTERED PORPHYRY. FeO STAINING, LIMONITE AFTER PYRITE. MINOR MnO.

.05 TA-13 31.6 - 32.6 (6.0)

BROWN-YELLOW, MED GRAINED, SOFT, ALTERED PORPHYRY. CRUSHED (UNCONSOLIDATED)

.09 TA-14 32.4 - 35.7 (6.0 - 6.5').
YELLOW-RED, MEDIUM GRAINED FAIRLY SOFT, ALTER. PORPHYRY. FRESH SURFACE IS SAME AS TA-8. FeO FRACTURE FILLINGS. SOME LIMONITE AFTER PYRITE. (N76W 16 NE).

NIL TA-15 35.7 - 39.2 (6.5)
GRAY-WHITE, MEDIUM GRAINED, FAIRLY SOFT. ALT POR. SAME AS TA-8. VEINLETS OF STONG MnO.

TR. TA-16 39.2 - 39.8 (6.0)
RED-YELLOW, MEDIUM GRAINED, FAIRLY SOFT, ALT POR. LIMONITE AFTER PYRITE. FeO STAINING.

NIL. TA-17 39.8 - 41.8 (6.0)
GRAY-WHITE, MED. GRAINED. FAIRLY SOFT. ALT. POR. SAME AS TA-8. ROCK IS SPOTTED WITH FeO STAINS FROM LIMONITE AFTER PYRITE.

.05 TA-18 41.8 - 46.8 (5.5-6)
F.A. 1/4 .16 Au TR.
BROWN (WEATHERED), GREEN (FRESH). HARD, UNALTERED PORPHYRY. CONTAINS CHLORITE (5%), QUARTZ (5%), FELDSPAR (60%), GREEN FINE GRAINED MATRIX (30%). FeO STAINING IN FRACTURES WITH MINOR MnO.
JOINTING: N76E 74 NW ; N0° 77E

.13 TA-19 46.8 - 49.8 (2 - 1½)
SEE TA-17 JOINTING: N84E 57 NW

.39 TA-20 49.8 - 50.5 (1)
BLACK, FINE GRAINED, VERY HARD. VEIN. HEAVY MnO (SOME VERY HARD & DENSE). STRONG FeO IN VUGS. SILICIOUS. ~N70E 64 NW

.15 TA-21 50.5 - 51.5 (½)
YELLOW-BROWN, FINE TO MEDIUM GRAINED, VERY HARD. VEIN, ABUNDANT FeO & MnO. CALCITE FILLED FRACTURES. SILICIOUS.

NIL TA-22 51.5 - 52.9 (½)
BLACK, FINE GRAINED, VERY HARD, SILICIOUS PORPHYRY (?), ABUNDANT FeO & MnO. REACTS WITH HCl.

NIL TA-23 52.9 - 53.9 (1)
DARK GRAY, MEDIUM GRAINED, HARD, ALT. PORPHYRY, GROUND MASS IS BLACK. BUT TEXTURE IS SIMILAR TO TA-18

NIL TA-24 53.9 - 70.0 (1½-2½)
SEE TA-18 JOINTING: DUE N 12 E
N10 W 90°
N60 E 36 NW

TRENCH BEARING: N 15 W

NIL TA-25 11.75 - 14.25 (3-4½)
YELLOW-RED, FINE TO MEDIUM GRAINED, FAIRLY SOFT. ALT. POR. SPOTTED FeO STAINING.

NIL TA-26 GRAB SAMPLE.
WHITE, VERY FINE GRAINED, VERY SOFT, FAULT GOUGE. POWDER.

NIL TA-27 14.25 - 20 (2)
SEE TA-18

TRENCH BEARING: N53W

NIL TA-28 2-2.5 (2)
YELLOW-RED, MEDIUM GRAINED, FAIRLY HARD, ALT. POR. SAME MINERALS AS TA-8. SPOTTED FeO STAINS.

NIL TA-30 2'8" - 8' (2)
GRAY, MEDIUM GRAINED, FAIRLY HARD. ALT. POR. FeO STAIN SOAKED INTO ROCK. MnO SPOTS IN FRACTURES. JOINTING: N80E 58 NW
N20W 65 NE
N47W 69 W

NIL TA-31 AT 0'
RED OUTSIDE, WHITE INSIDE, FINE TO MEDIUM GRAINED, SOFT. FeO STAINS WITH MnO SPOTS.

NIL TA-32 8 - 17' (1)
LIGHT GREEN, SEE TA-8. MORE CHLORITE GIVES GREENISH APPEARANCE.

NIL TA-33 17 - 22½ (3)
BLACK & RED. MEDIUM GRAINED, FAIRLY SOFT ALT. POR. FeO STAINING, STRONG MnO STAINING.

NIL TA-29 2.5 - 2'8" (1)
WHITE-TAN, MED. GRAINED, SOFT, ALT. POR.

TRENCH BEARING N 61 W

NIL TA-34 0 - 1' (3)
WHITE, MED. GRAINED, FAIRLY SOFT. SMALL FeO VEINLETS. ROCK IS PREDOMINANTLY CLAY (KAOLIN)

NIL TA-35 1-7 (3)
SEE TA-32

NIL TA-36 7-9 (3)
SEE TA-8

NIL TA-37 9-10 (3)
SEE TA-15

N 81 W TRENCH BEARING

NIL TA-38 0-7 (4-5)
SEE TA-32

NIL TRACE TA-39 7 - 8½ (5)
WHITE, GRAY MEDIUM GRAINED, HARD, FeO VEINLETS. ALT. POR.

NIL TA-40 8½ - 23½ (5-3)
GRAY-GREEN, HARD, MED. GRAINED. SIMILAR TO TA-18 ONLY MORE MnO.

N 84 - W TRENCH BEAR.

.06 TA-41 0-3 (3) YELLOW-RED MED. GRAINED, FAIRLY SOFT. ALT POR. SAME AS TA-8 ONLY THOUGHLY FeO STAINED

.03 TA-12 3-10 (2-3)
SEE TA-8

.04 TA-13 10-30 (1-3)
SAME AS TA-18 ONLY MUCH SOFTER.

N 76 W TRENCH BEAR

No Solution TA-14 30-33½ (4)
BLACK, RED, & YELLOW, FINE GRAINED, DOMANANTLY MnO. & FeO. HARD.

No Solution TA-15 33½-55 (5.5)
SEE TA-8

No Solution TA-16 N54W 55-115 N24W 115-137
FILL

.03 TA-17 137-170 (5.5)
SEE TA-13

N 4W

.03 TA-12 0-52 (3.5)

Nil TA-18 52-60 (3-5)
SAME AS TA-13 ONLY HAS WHITE VEINLETS OF VERY SOFT FINE GRAINED MATERIAL. WHITE MAT. REACTS WITH HCl

Nil TA-19 60-85 (3)
SEE TA-18

NIL TA-50 85-87 (3.5)
GRAY (MODELED), MED. GRAINED VERY SOFT.
SOME MnO & FeO, REACTS WITH HCl.
+ N 18E TRENCH BEARING
UNALTERED PORPHYRY 87-92½ (3)
SEE TA-18

DECOMPOSED UNALT. POR. 92½-100 (4-3)
SEE TA-43

.07 TA-51 100-104 (3)
WHITE, MED. GRAINED FAIRLY SOFT. ALT.
PORPH. FeO FILLING FRACTURES WITH SOME
Mn_2O_3.

UNALT. POR. 104-121 (2½)
SEE TA-18

NIL TA-52 121-122 (2½)
WHITE FINE GRAINED STRINGERS IN TA-43
MATERIAL.

DECOMPOSED UNALT. POR. 122-133 (2)
SEE TA-43

NIL TA-53 133-157 (2-6-5)
GRAY, MEDIUM GRAINED, FAIRLY SOFT.
ALT. POR. 20% CHLORITE, 30% SERICITE,
20% QUARTZ, 30% FINE GRAINED GROUND MASS
INTERMEDIATE ALTERATION BETWEEN TA-8
& TA-18.

NIL TA-54 AT 150 (5.5)
DARK BROWN, MED. GRAINED, SOFT.
HEAVY FeO & MnO STAINING.

UNALTERED PORPHYRY 157-174 (3½-4)
SEE TA-43

NIL TA-55 174-177 (4)
YELLOW, MED GRAINED, SOFT. FeO
STAINING. FINE GRAINED, POWDERY WHITE
VEINLETS THRU ROCK.

DECOMPOSED POR. 177-190 (4-3½)
SEE TA-43

UNALTERED POR. 190-210 (6-3½)
SEE TA-18

NIL TA-56 210-226 (4½-6)
SEE TA-32 MnO & FeO STRINGERS.

UNALTERED POR. 226-230 (6)
SEE TA-18

DECOMPOSED POR. 230-273 (6-5.5)
SEE TA-43

NIL TA-57 273-290 (3)
SEE TA-3; LIMONITE AFTER PYRITE.
MED GRAINED.

TR. TA-58 0-18 (3½-4)
SAME AS TA-8 ONLY HARDER. ($CaCO_3$ COATING. (FRACTURE FILLING).

.03 TA-59 AT 18 (3½).
BROWN, FINE GRAINED, HARD. MnO_2 VEINLETS. ROCK COMPOSED OF FeO_3.

NIL TA-60 18-30 (5)
SEE TA-8, LIGHT GREEN, FINE GRAINED, VERY SOFT MATERIAL ALONG FRACTURES.

TR. TA-61 30-33 (4-3)
SEE TA-8 (ONLY VERY HARD)

.04 TA-62 33-34 (2½)
YELLOW TO RED, FINE GRAINED, HARD. FIBEROUS MnO. ABUNDANT FeO

NIL TA-63 34-65 (5)
SAME AS TA-8 ONLY HARDER.

NIL TA-64 55-57 (5)
SAME AS TA-8 ONLY FRACTURES ARE FILLED WITH MnO. ROCK COLOR BECOMES BLACK.

NIL TA-65 AT 65' VEIN OF MnO (3)
MnO VEIN Dip ~ 21° S. IN WHITE, MED GRAINED, SOFT, ALT. POR.

NIL TA-66 At 70 (1' down)
Black, Med. Grained. Soft. Small
Pocket of Heavy Mn O.

.04 TA-67 65-90 (3)
Same As TA-8 only Harder.

=

Measurement from North End of Trench

Nil TA-68 235-215 (1½)
See TA-43

Nil TA-69 215-210 (1½-2½)
White, Med. Grained, Fairly Hard, Altered
Porphyry. Some Limonite After Pyrite. Fe O
staining.

Unalt. Tuff 210-180 (2½-6)

Tr. TA-70 At 180 (6)
White, Fine Grained, Very Soft (Powdery)
Small Vein in Tuff.

Pipe Line 180-170 (3)

Unalt. Tuff 180-170 (3)

.01 TA-71 170-167 (3-1)
White, Medium Grained, Very Soft, Fe O
staining.

UNALT. TUF 167-163 (4-6½)

NIL TA-72 163-160 (6½)
YELLOW, MED. GRAINED, SOFT. ALT. TUF.
LIMONITE AFTER PYRITE. FeO STAINED.

UNALT. TUF 160-148 (6½-4)

NIL TA-73 148-145 (4)
GRAY, MED. GRAINED, HARD. ALT. TUF.
CHLORITE ALTERATION GIVE A GREENISH TINT,
ESPECIALLY IN FRACTURES. FeO STAINS IN FRACTURES.

NIL TA-74 145-144 (3')
WHITE, MED GRAINED, HARD. ALT. TUF.
SPLOCHES OF FeO FROM LIMONITE AFTER
PYRITE.

TR. TA-75 144-140 (3)
WHITE, MEDIUM GRAINED, FAIRLY HARD, ALT. TUF.
LIMONITE AFTER PYRITE IN FRACTURES.

.09 TA-76 140-138 (3-2½)
GRAY, MED. GRAINED. HARD, ALT. POR (TUF).

.09 TA-77 138-135 (1½)
WHITE, MED GRAINED, HARD, ALT. TUF.

NIL TA-78 135-130 (1)
WHITE, MED GRAINED, HARD, ALT. TUF.
LIMONITE AFTER PYRITE

Nil TA-79 130-126 (1-3)
LIGHT GREEN TINT, MED. GRAINED, HARD.
ALT. TUF.

.23 TA-80 126-124 (3)
GRAY, MED. GRAINED, HARD ALT TUF.
FEOSTAINS & LIMONITE AFTER PYRITE IN ~~FRACTURES~~.

Nil TA-81 124-106 (3-4)
WHITE, MED. GRAINED, FAIRLY SOFT. ALT. TUF.
FEO STAINS.

Nil TA-82 106-104 (5)
WHITE, MED. GRAINED, HARD, ALT TUF.
LIMONITE AFTER PYRITE, FeO STAINING ALONG
FRACTURES.

PIPELINE.

UNALT. TUF. 104-0 (3-1½)

—

SMALL QUARTZ VEIN NEAR XXX SHAFT
N 45 E 41 NW

.05 FOOT WALL
RED, MED GRAINED, HARD. ABUNDT. FINE.
LIMONITE AFTER PYRITE.

.20 TR. VEIN
BROW → CLEAR (ALMOST PURPLE), QUARTZ CRYSTALS,
COARSE, VERY HARD & CRUMBLY.

.11 TR. HANGING WALL
WHITE MED. GRAINED HARD, LIMONITE AFTER PYRITE CASTS.

NIL TA-83 0-11
WHITE, MED. GRAINED, FAIRLY HARD. ALT. TUR.
ABUND. LAP. FeO STAINING, MnO IN FRACTURES.
N46W 60SW
N5-1E 3-1NW (MOST PROMINENT)

.03 TA-84 11-13 1½ FT VEIN
SAME AS TA-83 ONLY BROKEN & VERY CRUMBLY.
~N5-1E 3-1NW

NIL TA-85 13-15
WHITE, MED. GRAINED, HARD, ALT. TUR. LAP.

TR TA-86 15-20
WHITE, MED. GRAINED, FAIRLY HARD, ALT. TUR.
MnO IN FRACTURES

.11 TA-87 MnO VEINLETS IN TA-86
BLACK MnO, SOME FeO's.

?TR TA-88 15-32
WHITE, MED. GRAINED. SOFT. ALT. TUR.
VERY CRUMBLY.

.26 TA-89 AT 29 FT
QUARTZ VEIN (1 IN). MnO IN OPEN SPACES.
FeO's.
DUE EAST 66°N

TR. TA-90 At 34
RED, MED-GRAINED, FAIRLY SOFT, ALT. TUF.

.05 TA-91 At 31
VEIN OF MnO ¼" THICK.
N15E 29 NW

.52 TA-92 At 32
F.A. Ag .84 QUARTZ VIEN ~1" THICK
Au TR.

.02 TA-93 WALL ROCK FROM 90, 91, & 92.
WHITE, MED GRAINED, FAIRLY SOFT. ALT. TUF.
L.A.P.

HIGH GRADE VEIN IN DRIFT (MINED)
DUE E 44N

.52 TA 94
QUART (AMETHYST?) VEIN IN FOOTWALL OF DRIFT.
~N80E VERT

.45 TA-95 ROCK BETWEEN HIGH GRADE VEIN & 94.
F.A. Ag .40 WHITE, MED. GRAINED, FAIRLY HARD, ALT. TUF.
Au .01
L.A.P.

.15 TA-96 38-40
WHITE, MED. GRAINED, FAIRLY HARD, ALT. TUF.
L.A.P.

.42 TA-97 40
SAME AS TA-94 N34E VERT.

.07 TA-98 40 - 41½
RED, MED GRAINED, FAIRLY HARD, FLT. TUR.
GREEN CHLORITE CRYSTALS ~1mm.

1.22 TA-99 41½
F.A. Ag 1.66 Au TR
RED, MED GRAINED. HARD. ROUND QUARTZ
CRYSTALS (CLEAR) ~2mm. MnO
~N55E VERT

.04 TA-100 41½ - 44½
SAME AS TA-98 ONLY LAP,

.22 TA-101 44½
SAME AS TA-99 ONLY MORE SILICIOUS IN PLACES.

.07 TA-102 44½ - 50
WHITE, MED. GRAINED, FAIRLY HARD. FLT. TUR.
LAP.

.13 TA-103 AT 50 2½ FT VEIN.
VERY SILICOUS, ABUNDANT FeO (LIMONITE - HEMATITE)
MINOR MnO. ~N60E 52 NW

.12 TA-104 50 - 53
WHITE, MED. GRAINED, FAIRLY HARD. FLT. TUR.
VERY SPOTTED WITH HEMATITE (POSSIBLY AFTER PYRITE)

.07 TA-105 AT 53
VEIN, SILICIOUS, ABUNDANT FeO

TR. TA-106 53-70

WHITE to GREEN, MED. GRAINED, FAIRLY SOFT, ALT TUF.

NOT AS ALT. AS TA's 75-105.

R22E

T20

8

9

10

17

16

15

20

21

22

LINE NO. 1

LINE NO. 2

LINE NO. 3

LINE NO. 4

LINE NO. 5

LINE NO. 6

LINE NO. 7

N

U.P. SURVEY

AUSTRAL OIL CO.

TOMBSTONE AREA-COCHISE CTY.-ARIZ.

SCALE-ONE INCH=1000'

JULY 19

R22E

T20S

7 8 9 10

18 17 16 15

19 20 21 22

30 29 28 27

31 32 33 34

A-L1 A-L2 A-L3 A-L4 A-L5 A-L6 A-L7

C-L1 C-L2 C-L3

STEWART CO.

STEWART CO.

+5% FeS

2-8

INDUCED POLARIZATION AND RESISTIVITY SURVEY
COMPOSITE OF CAB AND AUSTRAL SURVEYS
TOMBSTONE AREA, COCHISE COUNTY, ARIZONA
SCALE 1:24000

SUFACE PROJECTION OF ANOMALOUS ZONES
DEFINITE
PROBABLE
POSSIBLE

STATE LEASE

I.P. LINES
A = AUSTRAL
C = CAB

NOV. 1968