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Arizona Geological Survey
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10/14/87

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES FILE DATA

PRIMARY NAME: SANTA MARGARITA GROUP

ALTERNATE NAMES:
MAGNETITE IRON GROUP

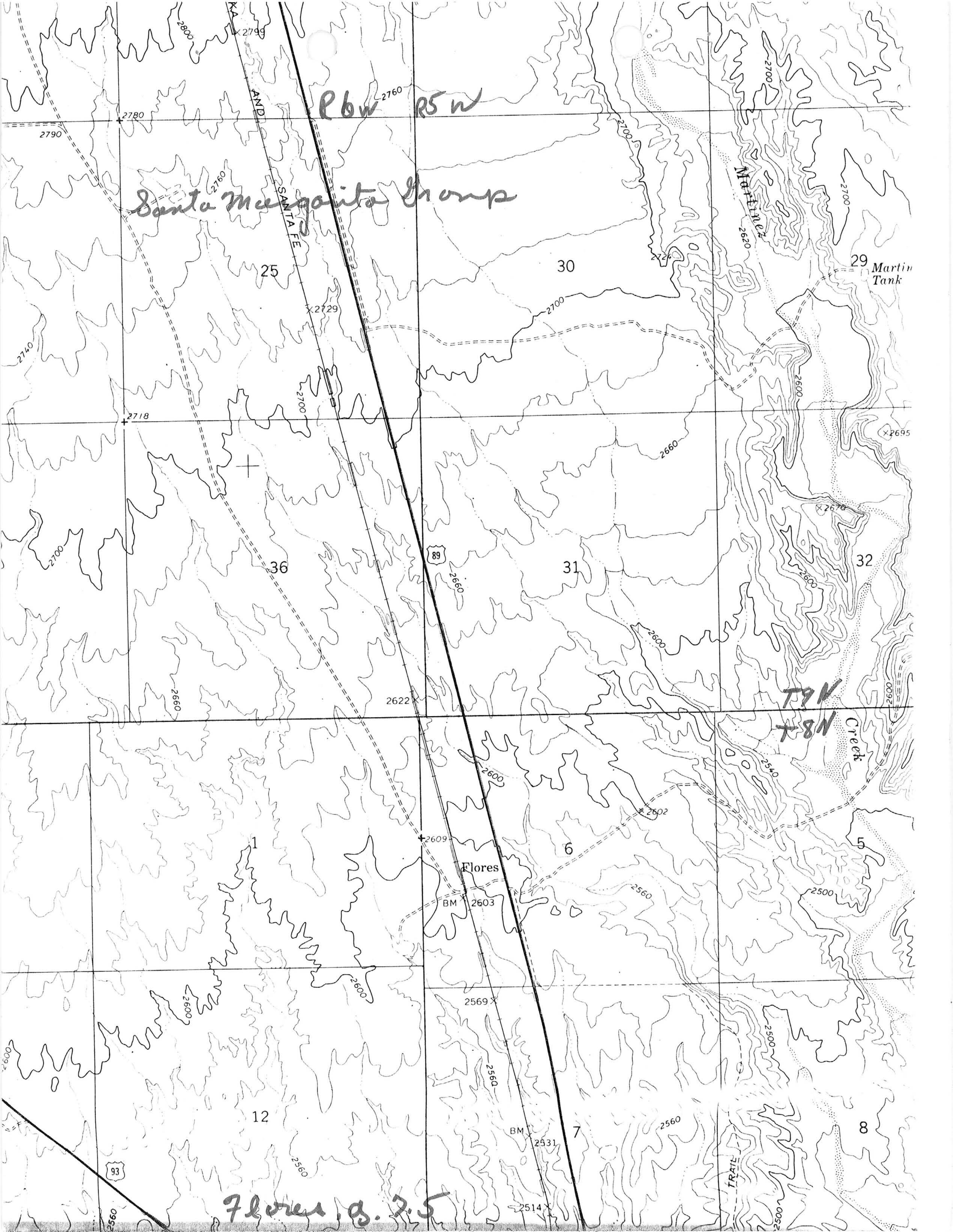
YAVAPAI COUNTY MILS NUMBER: 310

LOCATION: TOWNSHIP 8 N RANGE 5 W SECTION 6 QUARTER C
LATITUDE: N 34DEG 03MIN 59SEC LONGITUDE: W 112DEG 48MIN 54SEC
TOPO MAP NAME: FLORES - 7.5 MIN

CURRENT STATUS: EXP PROSPECT

COMMODITY:
IRON MAGNETITE
TITANIUM ILMENITE
MANGANESE

BIBLIOGRAPHY:
ADMMR SANTA MARGARITA GROUP FILE
HARRER, C.M. RECON OF IRON RESOURCES IN AZ
USBM IC 8236 1964 P 115
ADMMR MAGNETITE IRON GROUP FILE
CLAIMS EXTEND INTO SEC. 8 & 17 AND
SEC. 14, 23, 25 & 36 T9N-R6W


R6W R5W
Santa Margarita Group
T9N
T8N
Flores Q. 7.5
SANTA FE
AND
Martinez
Creek
Martin Tank
Flores
BM 2603
BM 2531
89
93
TRAIL
25
30
29
36
31
32
1
6
5
12
7
8
2799
2780
2790
2760
2729
2718
2724
2695
2670
2622
2609
2602
2569
2514

Santa Margarita (file)

STATE OF ARIZONA
DEPARTMENT OF MINES AND MINERAL RESOURCES

August 27, 1987

N. Edward Bottinelli, Chairman
ZIA Technology Inc.
4839 Ridgeside Drive
Dallas, TX 75244

Dear Mr. Bottinelli:

Thank you for stopping by our office yesterday to discuss your plans for establishing new iron and steel production in Arizona.

Enclosed are copies of the iron chapter from Mineral and Water Resources of Arizona. Although the statistical data is very out-of-date, the technical information might be useful.

It is unfortunate that the alluvial iron deposits in the Congress area are not even mentioned.

Please keep us informed of your progress and good luck on your project.

Sincerely,

Ken A. Phillips

Ken A. Phillips
Chief Engineer

KAP:ss

cc: Santa Margarita Group Mine file
Charles E. Gouin
4570 W. Laurie Lane
Glendale, AZ 85302

Mineral Building
State Fairgrounds
Phoenix, Arizona 85007
(602) 255-3791

416 W. Congress
Suite 161
Tucson, Arizona 85701
(602) 628-5399

SANTA MARGARITA YAVAPAI COUNTY

The Santa Margarita Magnetite Placer is located in Townships 8,9,10 N and Ranges 5 & 6 W, covers 42 claims and 24,000 available acres. This is owned by Melvin H. Jones, Box 807, Congress, Arizona. The placer is reported to contain approximately 5 percent of magnetite. This result was obtained from several general samples ranging from 2-10 feet in depth. These were taken from three major drainage channels, which range from a few feet to 1,000 feet in width. The concentrates from these samples assayed close to 60 percent iron. No reserve figures are available and further testing is contemplated.

SANTA MARGARITA GROUP YAVAPAI COUNTY

KAP WR 5/10/85: Rich Lundin called and reported that Dan Jacobs is promoting a placer operation at the Santa Margarita Group (f) Mohave County under the name Magnet Mining Co (c), P O Box 437, Congress, Az. A two-page prospectus offers shares for $15,000 with a total offering of $450,000. The prospectus also reports 5 oz combined gold and platinum assays on placer black sand concentrates.

KAP WR 8/28/87: Charles E. Gouin, 4570 Laurie Lane, Glendale, Arizona 85302, phone 939-3025, (formerly with Marathon Steel) brought in N. Edward Bottinelli of Zia Technology Inc., 4839 Ridgeside Drive, Dallas, Texas 75244, phone (214) 634-1270. Mr. Bottinelli is trying to promote a direct reduction iron plant in Arizona to produce iron from newly mined ore. He thinks he can produce placer iron ore from the Santa Margarita Group (file), Yavapai County and reduce it using modern technology to iron cheaper than by using scrap. He said he has been talking with Magma Copper at Superior about erecting the steel mill on their property. Mr. Gouin's interest is an a source of steel to manufacture grinding balls. They both feel Magma would be a logical joint venture partner because they consume grinding balls and could recover hematite from their tailings for feed to a iron plant.

NJN WR 9/11/87: Mr. Bottinellizia, Zia Technology (card) called to report that a Mr. Smith from the New Mexico School of Mines is bringing two graduate students to drill the magnetite sand at theold Magnet Mining Company placers (Santa Margarita Group - file) in the Martinez District of Yavapai County. The Department engineers are invited to view the operation at any time. Mr. Bottinellizia may be reached in Phoenix at 866-2823.

SANTA MARGARITA GROUP YAVAPAI COUNTY

Interviewed Dan Jacobs, Deputy Sheriff, at Arrowhead Junction re reported disputes regarding location work by Magnet Mining Co. on State, Federal and private land. The Magnet Mining Co. Inc. (Jones, Howard et al) has entered into an option and sale agreement with an eastern group (name of Company confidential) to further prospect and develop this large iron placer. They are putting down large deep (40' average depth) auger holes and apparently have done some of the work on privately owned land and upon unleased state land. Also the local cattlemen, principally Conghlin Cattle Co. are objecting strenously to the large deep holes on land for which they hold grazing permits. Jacob says the private land and state land matters are being straightened out amicably, and that the operators have offered to fence the deep holes on the grazing land and post bond if demanded. Apparently the cattlemen are not yet entirely satisfied. Meanwhile the exploratory drilling is continuing.
TPL WR 2-24-62

At Arrowhead visited Jess Noah and David Brown, manager and director of the U.S. Magnetite Corp., Rancho Grande Motel, Box 781, Wickenburg. These people recently took over from the Magnet Mining Co. (Jones, Howard et al) and are continuing with the drilling of the Santa Margarita iron deposit on Highway 93 south of Congress Junction. TPL WR 3-17-62

Visited the Santa Margarita development project. 36" holes are being drilled by auger and sampled to depths of 40' to 45' by auger rigs. Three men were working. Martin H. Swanson, consulting engineer for the Magnetite Mining Co. Inc. was present. TPL WR 3-24-62

Visited the Santa Margarita iron deposit and interviewed 2 people re its present status. No work is in progress here nor on the similar nearby property of Black Gold Exploration Co.
TPL WR 6-29-62

Reference: IC 8236, p. 115

CJH WR 3/4/80: Mrs. Shirley Jewel, Reynolds Electrical & Engineering Co. Inc., P.O. Box 14400, Las Vegas, Nevada 89114, phone (702) 734-3235. She is interested in purchasing black sand concentrates for use in drilling muds at the D.O.E. Nevada Test Site. She was rather vague on the specifications but thought the Sp.Gr. should be at least 5.07 and the moisture minus 1% for one grade and minus 0.79 for another. She will send specifics. Upon the advise of Mr. Jett, I suggested that she contact Mr. Dan Jacobs, Arrowhead Bar, Congress, Arigona. Among others, Mr. Jacobs holds the Santa Margarita claims in Yavapai County.

Mgr. John Lott.

CHRONOLOGICAL REPORT

The Santa Margarita and MAG Iron Placers.

Magnet Mining Company, Inc.

Congress, Az.

E X H I B I T S

A .....Claim map

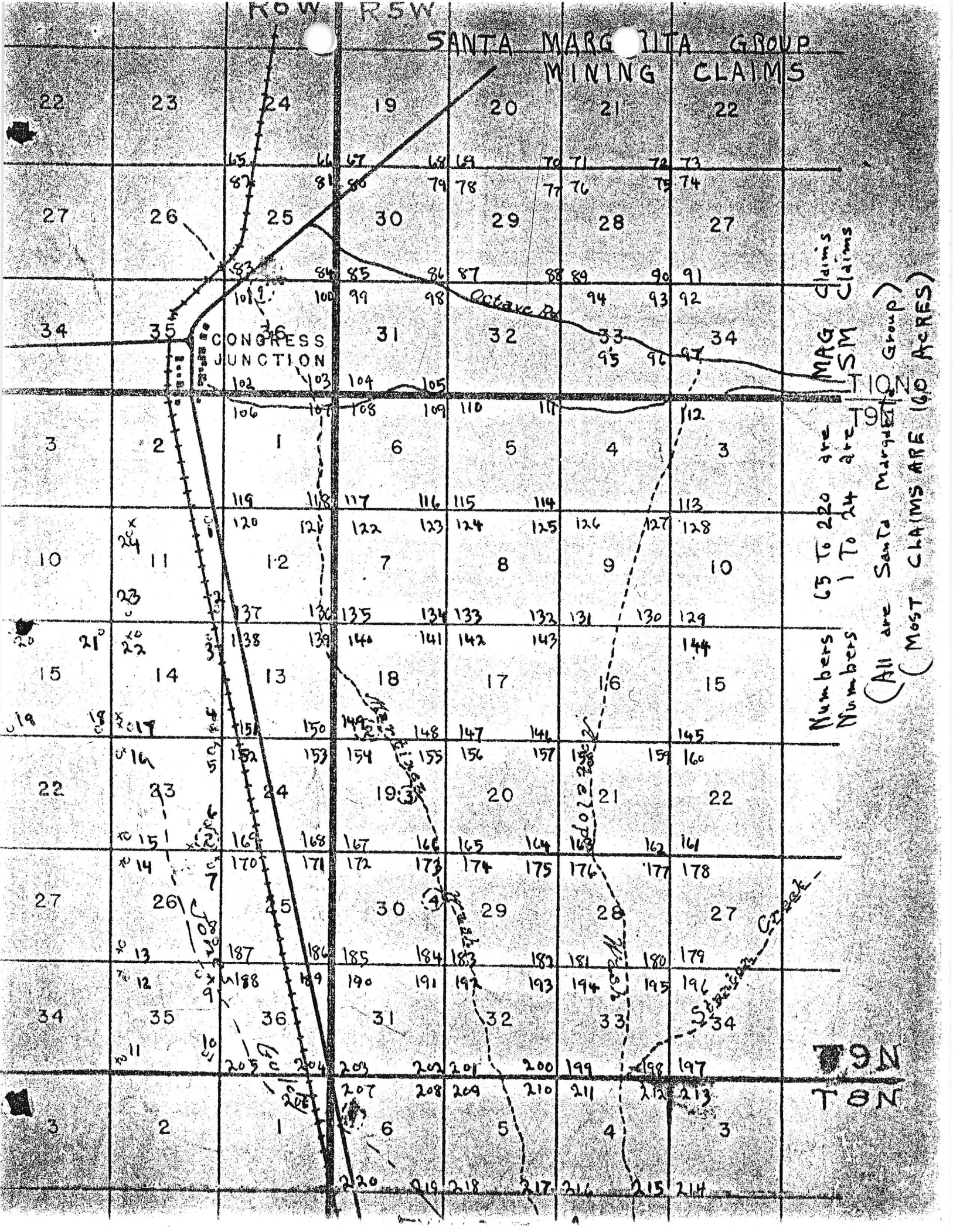
B.....Sampling map

C.....Sample testing

D.....Spectrographic certificate

E.....Assay certificate

F.....Photo of German bucket wheel excavator


R6W
R5W
SANTA MARGARITA GROUP
MINING CLAIMS
CONGRESS JUNCTION
Octave Pk
MAG SM Claims
(All are Santa Margarita Group)
Numbers 65 to 220 are SM Claims
Numbers 1 to 24 are MAG Claims
(Most claims are 160 acres)
T9S
T8S
Stevens Creek

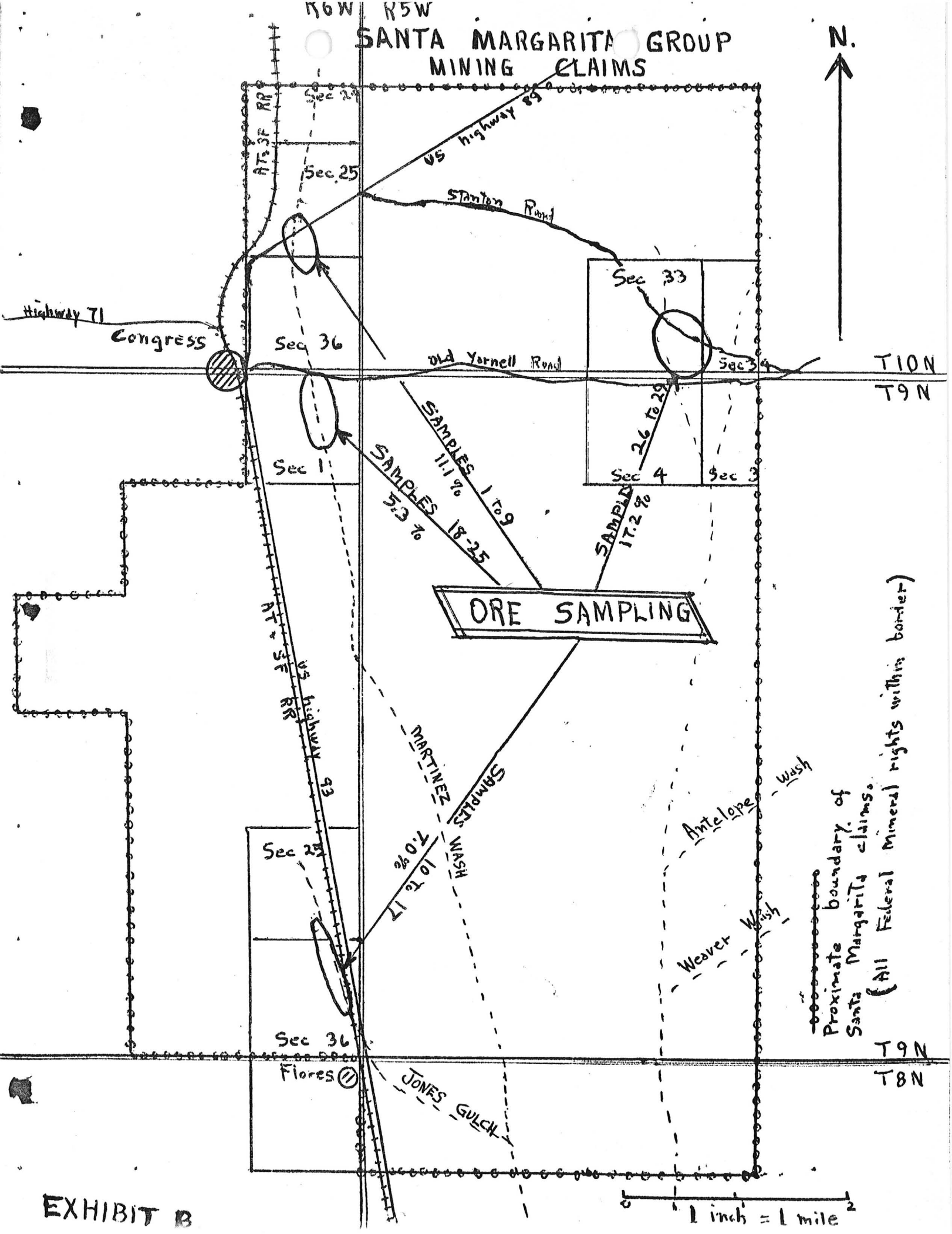

R6W
R5W
SANTA MARGARITA GROUP
MINING CLAIMS
N.
Sec 24
ATSF RR
Sec 25
US highway 89
Stanton Road
Sec 33
Highway 71
Congress
Sec 36
Old Yarnell Road
Sec 34
T10N
T9N
SAMPLES 1 to 9
11.1 %
SAMPLES 18-25
5.3 %
Sec 1
26 to 29
Sec 4
Sec 3
SAMPLES
17.2 %
ORE SAMPLING
ATSF RR
US highway 93
MARTINEZ WASH
SAMPLES
10 to 17
7.0 %
Antelope Wash
Weaver Wash
Sec 25
Sec 36
Flores
JONES GULCH
T9N
T8N
Proximate boundary of
Santa Margarita claims.
(All Federal mineral rights within border)
0
1
2
1 inch = 1 mile

EXHIBIT B

Samples taken on Santa Margarita group from pits averaging 10 feet.

Sample No.	location	Total magnetics +14 mesh	Total magnetics -14 mesh	Remarks
1.	Upper Martinez wash area,	6.8%	10.5%	Arsenacious (to pea size)
2.	Sec. 25, R6W, T-10-N. "	4.3%	9.1%	" "
3.	" " " "	15.3%	19.0%	" (course)
4.	" " " "	10.1%	14.6%	" "
5.	" " " "	22.2%	24.4%	" (w/fines)
6.	" " " "	11.5%	21.0%	" "
7.	" " " "	15.1%	41.0%	" "
8.	" " " "	9.3%	10.3%	" (top silt)
9.	" " " "	5.5%	12.7%	" (w/fines)
	Average	11.1%	18%	
10.	Jones gulch area,	3.9%	7.6%	Argillacious&Arsenacious
11.	Sec 36, R6W, T-8-N.	1.7%	3.2%	" (w/caliche)
12.	" " "	7.2%	10.9%	Arsenacious (w/fines)
13.	" " "	9.5%	17.9%	" "
14.	Sec 25, " "	4.5%	13.3%	Argillacious-Arsenacious
15.	" " "	16.1%	24.3%	Arsenacious (w/fines)
16.	" " "	2.7%	9.1%	" (course)
17.	" " "	10.7%	18.8%	" (w/fines)
	Average	7.0%	13.1%	
18.	Big pit, Martinez wash -Sec 6.	6.7% (*1)	8.5%	Arsenacious (silt to pea)
19.	East of Congress, Martinez wash	3.8%	5.3%	" (sandy)
20.	Sec 6, R5W, T-9-N	6.6%	10.2%	" -Argillacious
21.	" " " " "	4.2%	7.7%	" (sandy)
22.	" " " " "	10.6% (*2)	7.6%	" (course)
23.	" " " " "	2.3%	2.4%	" (angular quartz w/mica -biotite)
24.	" " " " "	3.4%	4.4%	Arsenacious-argillacious
25.	" " " " "	5.1%	8.1%	" (red w/sand)
	Average	5.3%	6.7%	
26.	Stanton road area (East)	9.1%	11.1%	Arsenacious (w/silt-pea)
27.	Sec 33, R5W, T-10-N.	15.0%	18.6%	" "
28.	" " " "	36.3% (*3)	37.5%	Soil (w/sand-caliche)
29.	" " " "	8.8%	14.4%	Arsenacious (sandy)
	Average	17.2%	20.4%	

Certified correct MHJ

Notes: (*1) Tested on gram balance was 105.4 grams to get 6.7% magnetics, after screening to -14 mesh, discards (tails) were 52.7 grams.

(*2) The magnetics were unusually big particles of quartz embedded with magnetite. With -14 mesh screening percentage went down.

(*3) Magnetics had large particles of foreign matter attached. This appeared to be hard pieces of dirt.

General information: The pits where samples were obtained were 100 to 200 yards apart. Testing of samples was accomplished on 23 and 24 January 1964. The weight of material tested was approximately 100 grams, obtained from total sample by Jones sample slicer. As mentioned above, some sample percentages are abnormally high due to foreign matter with magnetics.

EXHIBIT C.

METALLURGICAL LABORATORIES
CHEMISTS • ASSAYERS • SPECTROGRAPHERS

1142 HOWARD STREET • SAN FRANCISCO 3, CALIFORNIA
UNDERHILL 3-8575

Date September 26, 1963

Submitted by Mr. Melvin H. Jones
Box 386
Yarnell, Arizona

Sample of Mineral #3

Qualitative Spectrographic Analysis

METALS FOUND AND PERCENTAGE RANGE

LESS THAN 0.01%	.01 TO .10%	.10 TO 1.0%	1.0 TO 10.0%	MAJOR	LAB NO.
Strontium	Magnesium	Tungsten	Silicon	Iron	9313-3
Nickel	Sodium	Aluminum			
Cobalt	Potassium	Titanium			
Chromium	Vanadium	Calcium			
Lead	Zirconium	Manganese			
Copper	Columbium *				
Zinc	Rare Earths*				
Boron					

REMARKS: * Questional due to poor spectrographic sensitivity

METALLURGICAL LABORATORIES

By _____
SPECTROCHEMIST

EXHIBIT D

Shop No. 403A
File No. 1417 MA

Date 3 FEB 1964

CHAS. A. DIEHL
(Registered No. 682)

Arizona Assay Office

Phone ALpine 3-4001

815 North First Street
Phoenix, Arizona
P. O. Box 1148

VALUES
Latest Quotation

1 oz. Gold.....
1 oz. Silver.....
1 lb. Copper.....
1 lb. Lead.....
1 lb. Zinc.....

THIS CERTIFIES
Samples submitted for assay contain as follows:

MAGNET MINING CO
BOX 87
CONGRESS
ARIZ

Short Ton ..... 2000 Lbs.
Short Ton Unit ..... 20 Lbs.
Long Ton ..... 2240 Lbs.
Long Ton Unit ..... 22.4 Lbs.

MARKS	SILVER PER TON Ozs.	SILVER PER TON Tenths	VALUE PER TON	GOLD PER TON Ozs.	GOLD PER TON 100ths	VALUE PER TON	TOTAL VALUE PER TON of Gold & Silver	% PERCENTAGE IRON	REMARKS
Fe. COMPO								25.90	

EXHIBIT E

Charges $ 3.00

Assayer Jack Stone '64

ANDY CHUKA, PRINT

SANTA MARGARITA REPORTS

(]) Mining report-Santa Margarita Placers
W.J.Salisbury,Mining Engineer Oct.]5,]964

(2) Santa Margarita Magnatite Placers
Martinez Mining District, Yavapai County, Arizona.
Mason W. Rankin Dec.]2,]96].

(3) Santa Margarita Placer Geology]964 M. H. Jones
includes suppliments 8/]8/65 and 8/25/65

(4) Magnet Mining Report]962 G. R. Wynne.

(5) Geology Report- Santa Margarita group of mining claims,
Congress, Arizona.
Lee Hammons, Geologist. 4/25/6].

(6) A Supplemental Report on Santa Margarita Placers.
W. J. Salisbury, M.E.]/25/65.

(7) Supplemental Report on the Santa Margarita Group.
Lee Hammons 8/]/6].

(8) Evaluation Report- Santa Margarita Group.
W. R. Sholes, Geologist.]/]0/65 and]/28/65.

(9) Miscellaneous Assay Reports as follows:
Chas. A. Diehl assay report]2/8/6].
Shattuck Denn assay report]0/i/64 Rankin tests.
Shattuck Denn assay report]0/]/64 Salisbury tests.
Cost estimates- Santa Margarita project- Salisbury]/]/65.
Salisbury to MacDonald letter]/30/65.
Dings letter 2/5/62.
Hualapia pits assays- Mason Rankin no date.
Arizona Assay Office- 9/]8/62.
Chas. A. Diehl 4/20/6].
H. W. Morgan - Spectographic report 8/25/62.

MAGNET MINING CO., INC.

FIELD OFFICE, ARROWHEAD STATION
BOX 87 - CONGRESS, ARIZONA

August 25, 1965

IRON BEARING SANDS - CONGRESS, ARIZONA WATER WELL.

This study was primarily made to obtain some information on the consistancy of the iron bearing sands of the Quarternary-Tertiary alluvium deposits in the vicinity of Congress, Arizona. Apparently the village of Congress, with the assistance of the Federal authorities, obtain- the capital necessary to drill a water well for the community needs. A well was drilled near the West border of Section 1, R6W, T9N, SR B&M, that adjoins some of the Magnet Mining claims, by using a churn type drill. Thusly, it should be understood that only the sludges from this operation could be sampled. This also gives information on depth of alluvial apron.

The rather sporatic sampling is due to the writer being unaware at first that the well was being drilled, until it was down to the 300 foot level, and then leaving on a trip to Utah before the well was completed. However, Mr. Daniel C Jacobs of Congress, Arizona obtained the latter samples. Testing was accomplished in the Magnet Mining laboratory at Yarnell, and gold sampling was likewise accomplished by panning by the undersigned, and the values are rough estimates, only, using the numbers of "colors" that were found. It should be understood that "magnetics" listed below are primarily magnetite Fe_3O_4.

Date of sampling	Depth	Magnetics (% by wt)	Remarks
June 23,1965	325 ft	.034	Bulk of sample argillaceous. Particles pea size to -300 M. No Au noted.
June 25,1965	425 ft	.023	Bulk of sample argillaceous. Particles course sand to -300M. No Au noted.
June 27,1965	525 ft	.063	Sample arenaceous-argillaceous. Course sand to -300 M. Note that Fe went up. Au - Neg.
June 29,1965	625 ft	.051	Sample getting more arenaceous. Pea gravel to - 300 M. Some granites in particles. Found Au color - Est.10 cents per Yd.
July 1, 1965	720 ft	.065	More silts again, but particles pea gravel to -300 M. Found one small lodestone (1.1 Gm) picks up pin. Au about the same (10 cents per yd)
July 7, 1965 (Jacobs' sample)	900 ft	.091	Sample now primarily arenaceous Pea gravel to -50 M. Magnetics going up. Au $.30 per yd. In panning for Au, found other heavy particles difficult to separate from magnetite.
July 10, 1965 (Jacobs' sample)	985 ft	.125	Arenaceous (hole is in water). Pea size to -50 M. In cuttings found quartz, granite, dolerite, feldspars, sericite. Au $.40 per yd(est). Note that FE is high.

August 20,1965 (Jones sample)	0 to 2 ft (channel cut)	.089	This is a surface sample at the well site for comparison purposes Sierozen soil mixed with ferric (red) sand. The bulk of sample is arenaceous. No Au found.

As the driller was gone by the time I returned to the Congress area, I had no opportunity to talk to him about the latter stages of drilling. The following information was obtained by Mr. Jacobs: Sand,cliche, gravel,etc down to 816 feet. At 816 feet hit 4 feet vein of water bearing sand. At 835 feet hit 5 feet of water bearing gravel. 875 feet- sand and gravel. At 957 feet hit 2 to 3 feet of water bearing gravel with 5 feet of water bearing sand directly underneath. This made the well; it pushed sand and gravel up the casing for 30 feet. Hit solid granite at 1010 feet. At 835 feet - 5 gpm; 875 feet-15 gpm (water now understood to be 25 gpm) . 12 inch steel casing all the way. Total cost of well (drilling,casing, testing, setting test pump)-$19000.00 approx. Total cost with pump installed will be approx. $24000.00 .

The well site is about 1.2 miles South of the foothills of Date creek mountain; thusly, in the opinion of the writer, the well is not on a pediment. Granite at 1010 feet is interesting. Samples taken from pits in Martinez wash, about one-half mile to the East, were between 4-5 % magnetite. It is the view of the undersigned, that if an open pit iron operation was started, gold and rare earth minerals, could be recovered from the lower sediments.

Melvin H Jones

MELVIN H JONES
Geologist

August 18, 1965

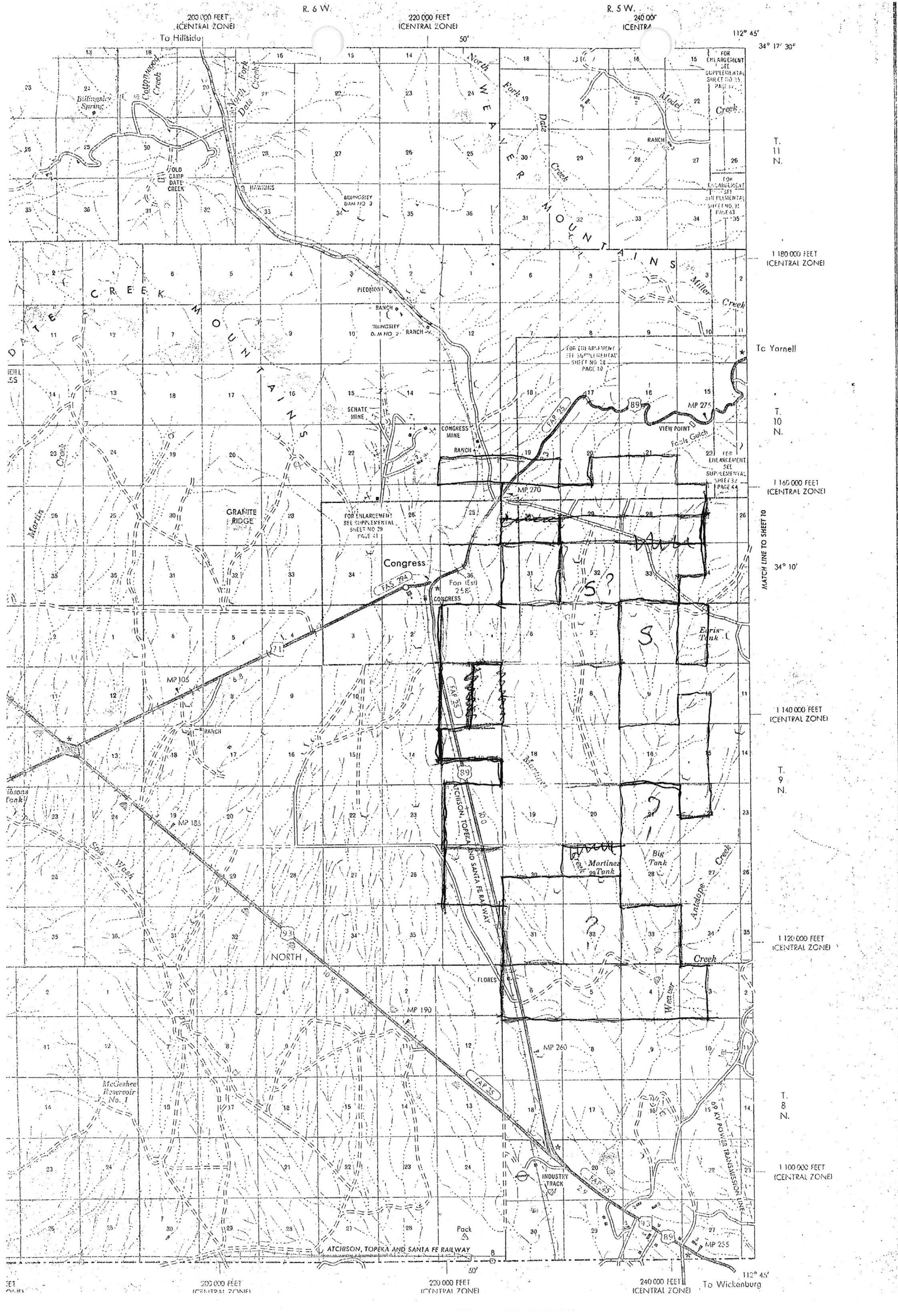
Amendment to Geology Report on the Santa Margarita Placers, 1964.

As it has become apparent that capital cannot be raised to operate the property on the scale envisioned in the basic report, the following comments have been requested on the possibility of a small market (comparatively speaking) for sponge iron to be used in copper leaching by copper operations in the vicinity of the Santa Margarita iron claims. A reported price of $55.00 per ton for sponge iron, FOB mine, to be used instead of tin cans, opens the gate for a lucrative operation of the iron claims. The apparent market for 50 tons of sponge iron per day would bring in a net of $2750.00 per day, or $82,500.00 per 30 day month.

As I am not a metallurgist, I will venture no guesses on the cost of producing sponge iron from the magnetite concentrates, but I will make a rough estimate on the mining and milling costs on the contemplated small scale operation. Under the circumstances, the milling plant could be set up on one of the richer areas on the property, where the magnetite in the sands will be 10% or more. It would appear that the fine grinding to delete the TiO_2 for the proposed Japanese market would be largely eliminated.

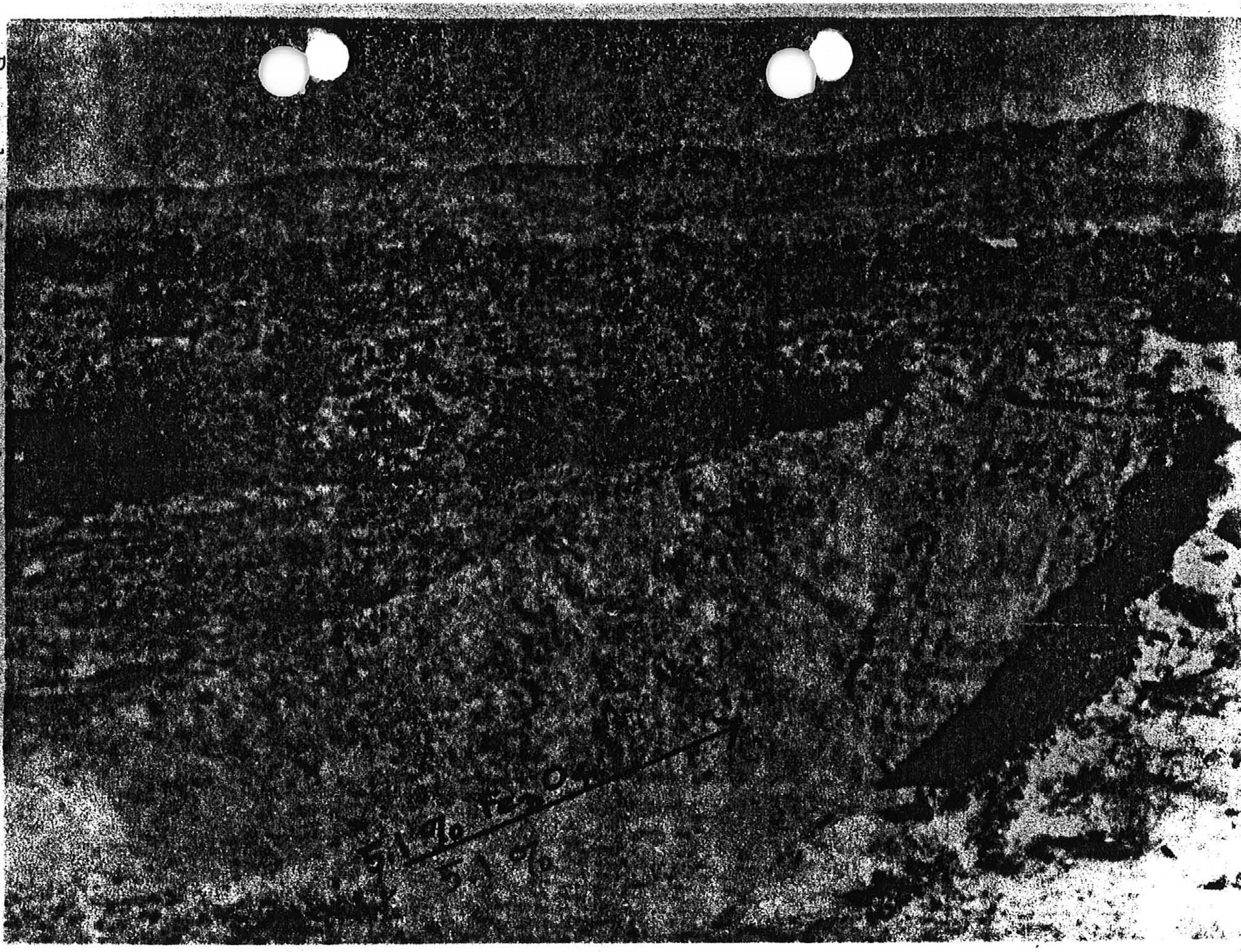
It will take about 84 tons of 60% Fe concentrates to produce the 50 tons of iron. I would double the cost figure I have in the basic report(the increase mainly being in removing ore from the orebody) and will use the figure of $3.00 per short ton for mining and milling to produce the concentrates. This would indicate a cost of $252.00 per day for the 84 tons of 60% Fe concentrates. Thusly, with a net return of $2750.00 per day of operation, minus the $252.00 for mining and milling, leaves $2498.00 per day. Someone else will have to estimate the cost of producing the 50 tons of sponge iron from the concentrates, (and deduct this cost from the given figure) for an overall approximation. I have envisionaged the sponge iron plant and the mill on the Santa Margarita claims.

William H. Jones

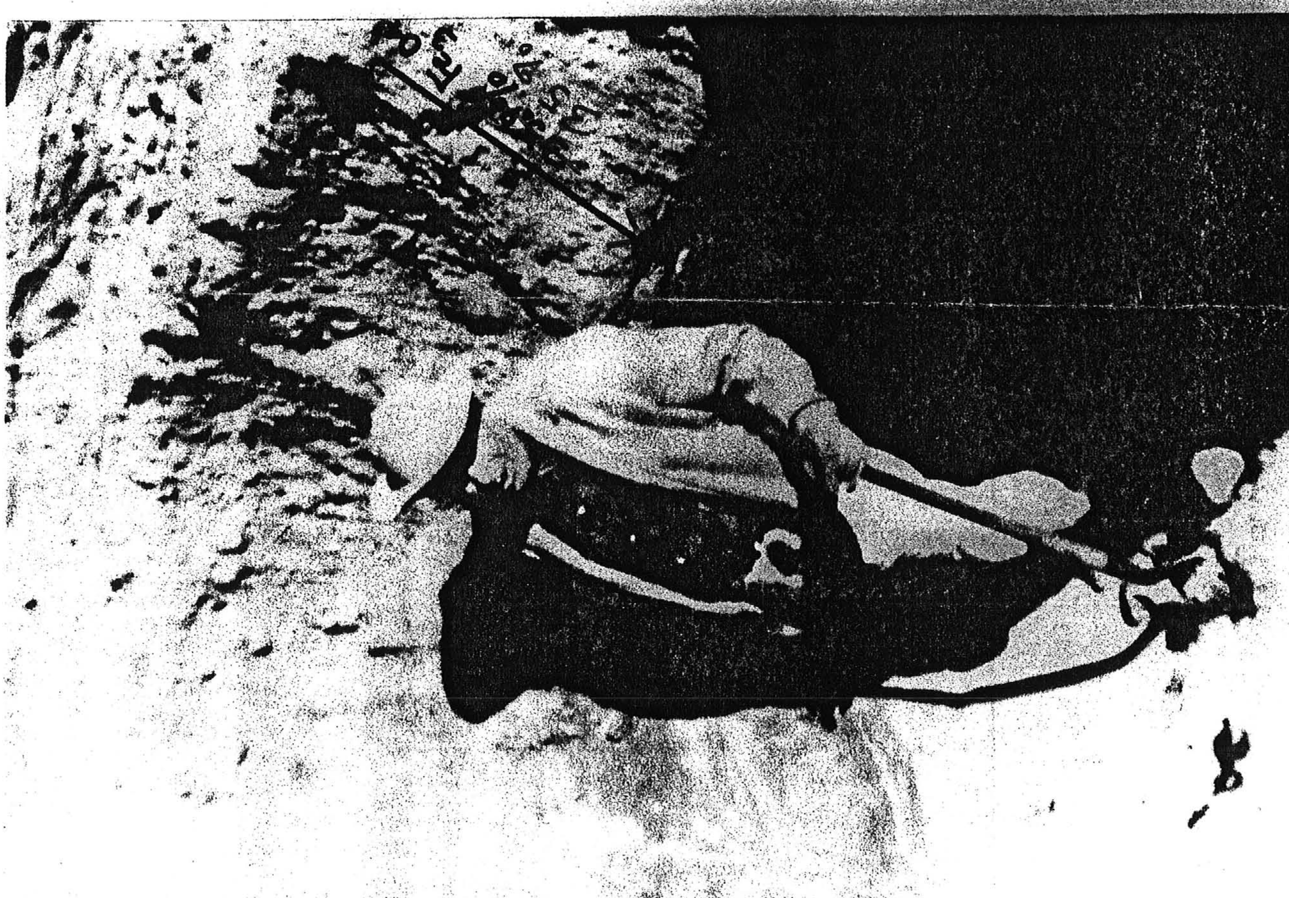


R. 6 W.
R. 5 W.
200 000 FEET (CENTRAL ZONE)
220 000 FEET (CENTRAL ZONE)
240 000 FEET (CENTRAL ZONE)
To Hillside
112° 45'
34° 17' 30"
50'
T. 11 N.
T. 10 N.
T. 9 N.
T. 8 N.
1 180 000 FEET (CENTRAL ZONE)
1 160 000 FEET (CENTRAL ZONE)
1 140 000 FEET (CENTRAL ZONE)
1 120 000 FEET (CENTRAL ZONE)
1 100 000 FEET (CENTRAL ZONE)
34° 10'
MATCH LINE TO SHEET 10
To Yarnell
To Wickenburg
Billingsley Spring
Cottonwood Creek
North Fork Date Creek
OLD CAMP DATE CREEK
HAWKINS
BILLINGSLEY DAM NO. 3
WEAVER MOUNTAINS
Model Creek
RANCH
FOR ENLARGEMENT SEE SUPPLEMENTAL SHEET NO. 35 PAGE 47
FOR ENLARGEMENT SEE SUPPLEMENTAL SHEET NO. 31 PAGE 43
DATE CREEK MOUNTAINS
PIEDMONT
BILLINGSLEY DAM NO. 2
Miller Creek
FOR ENLARGEMENT SEE SUPPLEMENTAL SHEET NO. 28 PAGE 40
SENATE MINE
CONGRESS MINE
FAP 25
89
MP 275
VIEW POINT
Fools Gulch
FOR ENLARGEMENT SEE SUPPLEMENTAL SHEET NO. 32 PAGE 44
MP 270
Martin Creek
GRANITE RIDGE
FOR ENLARGEMENT SEE SUPPLEMENTAL SHEET NO. 29 PAGE 41
Congress
FAS 394
Pop (Est) 258
CONGRESS
71
Earls Tank
MP 105
RANCH
ATCHISON, TOPEKA AND SANTA FE RAILWAY
Martinez Creek
Martinez Tank
Big Tank
Antelope Creek
Weaver Creek
93
NORTH
FLORES
MP 190
MP 185
MP 260
McGeehee Reservoir No. 1
69 KV POWER TRANSMISSION LINE
INDUSTRY TRACK
Pack
MP 255
S
S?
?

~~Deep backhoe exploration pit. Near "Jones gulch".~~
~~South portion of MAG claims.~~



Bulldozed exploration pit. SANTA Margarita claims



Deep backhoe exploration pit. Near "Jones gulch".
South portion of MAG claims.

Note.

Mr. Kenneth W Hebner is retired and lives in Wickenburg, Arizona. He has been mill superintendant for several large mining companies in the past. He is the inventor of the Hebner dry gold separator. Mr. Hebner is well known in the Wickenburg area as a gold expert. He is frequently engaged by firms and individuals to test mining claims for gold.

MHJ

ATL
ARIZONA TESTING LABORATORIES
A DIVISION OF CLAUDE E. McLEAN & SON LABORATORIES, INC.
PHONE 254-6181 817 WEST MADISON ST. P. O. BOX 1888 PHOENIX 1
PHONE MAin 3-3331 1516 EAST 20th ST. P. O. BOX 2508 TUCSON
Chemists . . . Engineers

For Mr. Kenneth W. Hebner
Post Office Box 312
Wickenburg, Arizona

Date May 26, 1964

Sample of Ore

Received: 5-25-64

Submitted by: Same

ASSAY CERTIFICATE

Gold figured at $ 35.00 per ounce. Silver figured at $ 1.00 per ounce.

Lab. No.	Identification	Gold		Silver		Percentages	
		Oz. per Ton	Value	Oz. per Ton	Value		
107599	Placer Concentrate	=	$0.21 per cubic yard				
	Amt. previously panned		0.19				
	Total		0.40 " "	"	"		

REGISTERED ASSAYER
CERTIFICATE EXPIRES
CLAUDE E. McLEAN
DEC. 31, 1964
ARIZONA, U.S.A.

Respectfully submitted,
ARIZONA TESTING LABORATORIES

Claude E. McLean

K. W. Hebner
P.O. box 312
Wickenburg, Arizona
May 28, 1964

Magnet Mining Company, Inc
Box 87
Congress, Arizona

Dear sirs:

In compliance with your request to sample the sand on your mining claims in Section 33, T9N R5W, you are advised that on May 23, 1964 I obtained a good representative sample (1 cubic yard) from the recently dug large pit. The purpose of this was to determine the gold content.

This sample was processed and concentrated with the following results:

		Value per Cu. Yd.
a	Recovered by panning (concentrates)	$ .1924
b	Recovery by fire assay of concentrates	$ .21
	total combined value	$ .40

I did not have a fire assay run on silver or other minerals which are no doubt present in addition to the gold.

In my estimation, while your are processing the sands and gravels to recover magnetite (iron), it would be entirely feasible and possible to add the one step necessary to recover the concentrates containing gold, which would be most profitable on a large scale operation.

Trust this is the information you desire and will be glad to cooperate and furnish any further information that may be of interest to you.

Yours very truly,

K. W. Hebner

K. W. HEBNER

Inclosure:
Arizona Testing Lab report(5/26/64)

FMC CORPORATION

INORGANIC CHEMICALS DIVISION

BOX 1728, POCATELLO, IDAHO • CEDAR 3-1911

May 20, 1964

Mr. Melvin H. Jones, Geologist
Magnet Mining Company, Inc.
P. O. Box 87
Congress, Arizona

Dear Melvin:

It was pleasant hearing from you and I have envied you your past six months of weather. However, the past two weeks we too have seen some sunshine and our snow-drifts are disappearing fast.

Due to our market departments negative results in developing a sale for the magnetite at that time the metallurgical work was not carried out to the fullest extent. The enclosed inter-office memos are only initial opinions from preliminary work and a conclusive opinion by any of us about your property would be premature and possibly unjust. We certainly did not have enough negative information to rule it out of the picture. The samples we did take implied an erratic deposition of concentrate. However, the samples were so widely spread that there was ample room for economical deposits of large tonnage. I'm sorry that we were not able to be of more help to you than we were. Development of your property is a real challenge and I wish you the best of luck in its success.

Very truly yours,

Russell J. Hayden

RJH/dc

Enc.

COPY TO

HBFowler
KCVincent
RJHayden

MINERAL DEVELOPMENT DEPARTMENT

INORGANIC CHEMICALS DIVISION
FMC CORPORATION

OFFICE MEMORANDUM

TO Mr. W. E. Eastmoore, Jr. DATE July 19, 1963

FROM J. W. Lowry POCATELLO, IDAHO
P. O. BOX 1718

SUBJECT ALLUVIAL IRON SAMPLES FROM WICKENBERG, ARIZONA

I have just completed processing the alluvial surface samples which you collected May 25 from the Wickenburg area. The samples were screened at 6-mesh and the minus 6-mesh fraction processed in our electro-magnetic drum separator. It was planned that the cobber concentrate made from each of these samples would be ground and cleaned by several more stages of magnetic separation to make a finished concentrate so that we could better evaluate this deposit. But our work load precludes doing this at the present. Following is a tabulation of the sample descriptions and corresponding cobber concentrate weights:

Sample No.	Sample Description	Cobber Concentrate-% Weight
32173	Section 6, T 10 N., R.6 W. 1000 ft W. of NE Corner, Section 6	4.72%
32174	Near N 1/4 corner, section 32, T. 10 N., R. 5 W.	5.30%
32175	Cuttings from 30 ft., drill hole 1000 feet east of W 1/4 corner section 34, T. 10 N., R. 5 W.	3.13%
32176	Near SE corner, Section 4, T. 9 N. R. 5 W.	5.25%
32177	Near S 1/4 corner, Section 5, T. 9 N. R. 5 W.	5.29%
32178	Near SW corner, Section 6, T. 9 N., R. 5 W.	4.28%
32179	From gravel pit 10 ft deep, south of N 1/4 corner, Section 1, T.9 N. R.6 W.	4.84%
32180	Drill hole cuttings at SW corner, Section 18, T. 9 N., R.5 W	4.34%
32181	SE corner, Section 18, T.9 N.R.5 W.	3.01%
32182	West of S 1/4 corner, Section 13, T. 9 N., R. 5 W.	5.02%
32183	SE corner of corral near center of section 29, T. 9 N. R. 5 W.	4.18%

COPY TO

MINERAL DEVELOPMENT DEPARTMENT

INORGANIC CHEMICALS DIVISION

FMC CORPORATION

OFFICE MEMORANDUM

TO Mr. N. E. Eastmoore, Jr -2 DATE July 19, 1963

FROM J. W. Lowry POCATELLO, IDAHO
P. O. BOX 1726

SUBJECT ALLUVIAL IRON SAMPLES FROM WICKENBERG, ARIZONA

Sample No.	Sample Description	Cobber Concentrate- % Weight
32184	From pile of drill hole cuttings at NW corner, Section 31, T.9 N., R.5 W.	5.28%

The average percent weight of the cobber concentrates is 4.55% While we have been hoping to attain 5.0% or better, some authorities have computed that 2.8% is "break even" alluvial iron in a mass production type of field operation.

Jack
J. W. Lowry

JWL:rl

GORDON ROBERT WYNNE

MARKETING · METALLURGICAL · MINING CONSULTANT

Box 1019
Palo Alto
California

499 Market
San Francisco 4, California
DOrdan 7-1285

Aug. 15, 1962

Magnet Mining Company, Inc.
Melvin H Jones, Res-Mgr.
Box 87, Congress, Arizona

Dear Mr. Jones:

In answer to your question, specifically on the marketability of the iron ore in the Magnet Mining claims, I will have to answer this in general terms, based on my many years with U.S. Steel Corporation and other major Companies.

There is an old saying, "mines are not found, but made" and this is essentially true. After examining all of the geology reports and spending a week looking over the claims in the vicinity of Congress, Arizona, it is my studied opinion, that if you can obtain adequate financing to place the property in operation to produce 500,000 to 1,000,000 tons of concentrates a year, you can compete on the world market and find a market.

Iron, is no different in this respect than copper, silver, lead, zinc, beryllium, etc., and similiar metals (exclusive of Manganese and Tungston that are currently depressed due to cheap foreign imports). By producing a high grade iron concentrate, in quantity, and with your lack of impurities such as Titanium, sulphur, aluminum, phosphorus, and so on, and with the spread of profit shown by your engineering studies, there is no question of finding a market.

Feel free to get in touch with me at any time. Any help that I can give is yours for the asking.

Yours truly,

Gordon R. Wynne

GORDON ROBERT WYNNE

~~Box 1215~~
~~Palo Alto~~
~~California~~

MARKETING • METALLURGICAL • MINING CONSULTANT

~~DAvenport 4-4700~~

499 Marina Blvd.
San Francisco 23, Calif.
JOrdan 7-1330

February 9, 1962

Magnet Mining Company, Inc.
C. W. Sippel, Vice-President
1894 - 31st Avenue
San Francisco 22, California

Dear Mr. Sippel:

It has been a pleasure to work with you and your associates in the development of Magnet Mining Company Black Sands.

Attached is my first preliminary report outlining the initial steps to be taken in marketing your product. Most of this report is by "arm-chair conjecture" without substantial field back-up. The objective is merely to outline basic possibilities for further studies that you could follow up in case my other business interests should necessitate my neglect.

It is a pleasure to a consultant to see a project on which he is working, moving along in a consistent, engineered and well defined path, such as yours. Many different paths have to be followed simultaneously in order to reach your goal. The work you are doing presently on freight rates, testing, atomic shielding, cement plants, etc., will all provide a stable base and background from which you can construct a realistic picture of your feasibility study. When the field results of quantities, costs and analysis are available, you will be ready.

Attached to this report are several articles and tabulations that I thought would be of pertinent interest to you.

Feel free to call me at any time. I would be very pleased to see you build this relatively undeveloped field into something of significant value. Any help that I can give you is yours for the asking.

Yours very truly,

Gordon R. Wynne

Gordon R. Wynne

GRW;c

MAGNET MINING COMPANY, INC.
Arrowhead Station, Congress, Arizona

The object of this report is to provide a background of information that will give the owners of Magnet Mining Company a quick knowledge of the overall requirements and pricing to foreshorten their own marketing study. No attempt has been made to update information that is two years old for economy of report reasons. Considerable editing of information is done for the sake of brevity. Expansion of information in any particular line can be done quickly upon request. This report, in other words, is a brief outline for purposes of familiarization to the novice entering the iron field.

The marketing prospects of black sands from Arizona can be divided into three catagories: (1) Japanese Steel, (2) Domestic Steel, (3) European and other outlets.

The Japanese market is probably the most readily available for initial sales followed by other outlets and finally domestic steel. A sales program should be initiated with emphasis in that order. Security cannot be achieved by dependance on one source of outlet alone. Investigation and study should be carried on simultaneously with all three outlets.

Before the Steel industries interest in the purchase of concentrates can be aroused (whether Japanese, domestic, or European), it will be necessary to have a fairly complete and reliable sampling and analysis program completed. This does not mean that such a program has to be carried to completion before negotiations are started. However, some idea as to total tonnages in claims, the analysis of the concentrates, and a rough idea of the minimum sales price delivered to the steel mill will be necessary. The geologists have already provided a general idea of overall tonnages available. There appears to be sufficient to warrant further study of the properties. The analysis of the concentrates appear meager to this consultant. A hand magnet is a poor testing device for true results. It is recommended that more attention be given in this direction. The steel mills will be extremely interested in the expected analysis of not only the iron, but of such constituents as titanium, phosphorus, sulphur, copper, alumina and silica. Preliminary studies of this phase could be run quite reasonably in several laboratories, such as University of Arizona, Utah Construction and Mining (in Palo Alto), Colorado School of Mines, University of Minnesota, Stearns Magnetic Separator and Dings, are a few of the better qualified sources. This preliminary test work should reveal a rough idea of the ratio of concentrations and the analysis of the concentrates. For control purposes it is suggested that the sample be submitted in three different parts. Possibly one sample to University of Arizona and one to Utah Mining and Construction. The recommendations of both can be compared, and in case of wide discrepancies in results, further checks could be made. These laboratories could prepare samples (from concentrates) to be sent to other Chemical laboratories. All of the laboratories mentioned have had considerable experience along these lines and can make good recommendations.

The sample that is sent to these laboratories should be as carefully taken as possible. Results from this could cause abandonment of the whole project without further study, or the "plowing in" of much more capital and time, if the results show substandard or submarginal mineral results. It is here recommended that Magnet Mining Company attempt to obtain the services of Odin A. Sundness who stays at the Santa Rita Hotel in Tucson, Arizona. Mr. Sundness has had considerable experience in sampling iron ores, especially black sands. His advice could foreshorten improper sampling techniques and provide valuable experience. The results from "hand magnet" testing is worthless for the purposes of economic study and chemical analysis of concentrates. In order for Magnet Mining to interest an operator in working the properties or to start studying the operation from their own point of view, the

results would be too misle ing to be of any value.

For Magnet Mining to properly plan their work and exploitation of the properties, it is therefore suggested that the following approach be taken: (1) A generalized market research study is given in this report. Approaches should be made to a few of the better sources of outlet immediately, outlining what has been done on the properties and what will be done. Do not hesitate to be frank about lack of finalized data. This is merely to create an interest and possible support of further investigations. (2) Odin Sundness be consulted, if even for a few hours to discuss sampling techniques, laboratory findings, etc. (3) University of Arizona in Tucson and Utah Construction and Mining Company Laboratory in Palo Alto be investigated and a quotation on preliminary laboratory test be obtained. (4) Sampling of a reasonably good area of the claims on which an operation could be started. It is suggested that one of the better areas be selected for this in hopes that this could subsidize development of the other claims. (5) Preliminary laboratory tests be made in possibly both laboratories with Jones and/or Sippel being present to observe and discuss result. (6) The laboratories prepare samples for chemical analysis with a supplemental control sample being submitted to Wynne for cross check on results. (7) With the results of the chemical analysis, reception to the steel mills again be checked. (8) Predict the ratio of concentration, recovery, and flow sheet data (as obtained from the laboratories) and start an economic feasibility study. (9) Re-check railway freight rates, ocean freight costs, etc. (10) With the above accumulated generalized picture, further programing can be gone into. Without this required information, the future staking out of more claims and accumulation of assessment work to be done each year will soon spell doom to Magnet Mining Company, no matter how good their claims.

There appears to be no reason why most of the parts of this program can't be carried on simultaneously with the present participation manpower available in Magnet Mining and at very little additional expense. This phase of the project is very critical in any exploitation of mining properties. Caution is given that the participants not be carried away by vast reserves of iron bearing sands with low titanium and high iron concentrates possible. The economic feasibility is all time important. Both ends have to be checked to arrive at the profits available, i.e., the anticipated market price, less the production and shipping costs, etc. The data submitted to date is too meager to even rashly predict that the project is economically feasible. Shipping costs will play an important element. It appears that Columbia Geneva's plants cannot be reached economically. This does not eliminate Colorado Fuel and Iron, Kaiser, or even blending ore for Columbia-Geneva.

It should be noted by Magnet Mining that Marcona Iron Ore Project in Peru does not sell to one outlet. They have at least thirteen. They do not sell one grade of iron ore from the Mesabi range; there are twenty-six grades of ore. A broad-based diversified market research will pay dividends as a guard against possible collapse of any one outlet. This not only is taken into account by the supplier, but by the supplied. Kaiser Steel, for instance, even though they can produce cheaper from Eagle Mountain, would not be unreceptive to another source of iron units. Proper furnace operations quite often demand this diversification in ores. Columbia-Geneva even with Atlantic City pellets and Cedar City direct shipping and gravity separation concentrates at a lowered delivered cost could still be receptive to Magnet Mining's concentrates at a premium of $2.00 per ton over these other sources. The exploitation of your properties will be very dependant on the "dogged" attitude with which you conduct your studies. This not only applies to the marketing studies, but the concentration studies. Do not take the first negative as final.

It is suggested that little attention be given to the agglomeration of the black sand concentrate. To date the steel mills will not acknowledge the increased value of agglomerates. Only $1.00 premium is allowed for agglomerates while the cost to agglomerate is $1.60 per ton up to $2.50 per ton. Most of the steel mills have

sintering facilities available and the black sands should sweeten the sinter to their advantage. Besides the capital investment per annual ton of sinter is about $5.00 and $8.00 per annual ton of pellets.

The blast furnace operators are just beginning to realize the advantages of a beneficiated feed of high iron, low silica and agglomerates on their furnaces. Here in the United States, the average quality fed to the blast furnaces ten years ago was 50% Fe, 10% SiO_2. Five years ago this was raised to 57% Fe and within the next 5 years it is anticipated this will be 63% Fe. The production of the blast furnace from the 50% Fe to 63% Fe charge will result in over 50% increase in productive capacity and a 50% decrease in coke. With 20% of Japan's coking coals coming from the Eastern seaboard of the USA, the impact of higher grade ores on their economics is greatly magnified. Philippine ores that can be delivered at half the cost of other high grade ores, but having an analysis of 56% Fe vs 63% Fe of others, will not even be considered. In a steel plant that has, say, four furnaces in Japan and production has to be increased 25%, the steel mills would have more of a tendency to buy a higher grade ore at $4.00 or $6.00 premium, than to invest $40,000,000.00 for a new furnace and auxiliaries, as well as bring in 20% more coking coal for its continued operation. The blast furnace operators have been slow to acknowledge these benefits, but the figures have been proven by those bold enough to try. The study of the benefits by the iron ore producers has also been neglected and could be used to great advantage in the sale of higher quality iron concentrates. If a premium of $6.00 or $7.00 per ton for black sand concentrates running 65% Fe can be obtained (as compared to 58% Fe ore), this technique of sales engineering should be tried. Few iron ore merchants have the knowledge to provide such a study. In other words Magnet Mining should be cautioned that usually it is a case of the purchaser of iron ore knowing the economic value of the high quality concentrates and the seller being completely unaware of its intrinsic overall value.

Besides the steel producers requirements for iron, there are other possible outlets that may be of significant value. For instance the Ideal Cement Plant in Redwood City, California, purchase 750 tons per month of iron concentrates to blend in with its cement. I believe they require about 1% to 5% Fe for cement production. The Atomic Energy Commission in "Atomic Industrial Forum" June 1955, forecast shielding aggregate use as follows:

1960	10,000	Tons
1961	20,750	"
1962	41,100	"
1963	58,000	"
1964	62,700	"

Prices for this have been F.O.B. RR Nevada:

	4.4 Sp.G	4.5 Sp.G.	4.6 Sp.G.
4 Mesh sand	$23.94	$30.42	$36.90
10 Mesh sand	$26.23	$32.71	$39.19

This forecast may not be up to expectations with the advent of the missile age and deemphasis of the Atomic Energy, but the demand may be worth checking.

During the war considerable black sands were mined along the coast of California for ballast in the Liberty ships. It is doubtful that this source would be worth checking at the present time.

The Port of Stockton advises that the European Market can be reached with a $.65 decrease in West Coast iron ore shipping costs. Maybe reduction in profits to this

market should be tried to open up exploitation of this out t. Railroads and Ports could possibly help such a venture.

JAPAN

The Japanese market is probably the best ready market to start investigations. Japan's steel production has been growing by leaps and bounds. The following chart gives an idea of the growth in the past few years.

CONSUMPTION OF RAW MATERIALS (1000 Metric Tons)

Year	Iron Ore	Iron Sand	Pyrite Cinder
1955	6246	695	1277
1956	7529	857	1192
1957	8524	1007	1250
1958	8801	1222	1457
1959	11441	1419	1300
1960	14900	1600	1400

The projected need in 1965 is 20,000,000 tons of iron ore. 30% to 40% of the cost is ocean freight.

In 1960 imports of iron ore amounted to 76.2% of their requirements, split up as follows:

Malaya	5,354	36%
India	2,442	16.4%
Goa	1,997	13.2%
Latin Am.	1,233	8.2%
Philippines	1,202	8.1%
Canada	1,084	7.3%
USA	825	5.5%
Others	720	.1%

Average imported prices in 1959 in US dollars per M/ton.

Malaya	$13.
India	16.
Goa	13.
Philippines	12.
Canada	16.
USA	16.
Average	$14.

Coking coal imports to Japan in 1959 averaged as follows, CIF:

USA	$19.
Sakhalin	14.
Australia	14.
Canada	15.
USSR	15.
Average	16.

It should be born in mind by Magnet Mining Company that if trade is ever established between Red China and Japan that this market could collapse completely. Red China has vast sources of good quality ores that could be obtained at a low price.

The average grade of iron ore consumed in 1959 was 52% Fe. 30% was of domestic origin and average distance of transport was 3481 ton miles. Japanese production was:

1,300,000	tons	iron ore
1,500,000	tons	iron sands
1,500,000	tons	pyrite

A visit was made to Port of Stockton by Charles W. Sippel, Melvin H. Jones and G. R. Wynne on December 28, 1961. The Port Director, Elmo Ferrieri and Manager of Bulk Materials, Floyd L. Dunlop, expressed interest in helping develop the Magnet Mining project. Mr. Ferrieri will contact Ishyama as a possible ore broker, and also recommends Takashi, Ocean Bulk Carriers, Overseas Central and Continental Ore, as possible brokers. Mr. Ferrieri recommended a price of $9.00 per ton FAS ship spout as a price objective at 60% Fe. He believes a higher price at lower quality will not interest the Japanese. Mr. Dunlap suggested that basic delivered cost to ship is not the only consideration to be taken into account. Demurrage of railroad cars, ship demurrage and turn around, etc., have to be taken into account in selecting an export port.

Example of iron sand determination with foregoing figures of 1959.
(assumed costs per metric ton 12/30/61)

Cost of sands, Arizona FOB	$4.00	
Railroad freight to Stockton	4.00	
Dock loading	.80	
Ocean freight	5.00	
Broker's fee	.35	
Cost per ton delivered Japan FAS	$14.15	
Unloading and stockpiling costs	.60	
Sintering and blending costs	1.50	
Total costs to blast furnace	$16.25	(at 60.% Fe = $.27 per Unit Magnet Mining Company sands)

If this is compared with the published figures for 1959 we would have:

$14.00 per metric ton with 52% Fe		
Dock unloading and stocking	$ .60	
Assume 1/2 is sintered	.75	
Total cost to blast furnace	$15.35	or $.294 per unit

This shows that at $9.00 per ton delivered to the ships at Port of Stockton, that the Japanese would be securing a price advantage of $2.40 per metric ton against their average costs in 1959. It is a known fact that the costs of iron ore has decreased since 1959 due to more supply and larger ore carriers, but not $2.40 decrease.

To roughly evaluate this pricing advantage carried thru the blast furnace we have Saussman report (page 6): 1500#/Ton Hot Metal coke rate at 52% Fe and anticipated coke rate of 1100#/Ton H.M. at 60% Fe or 400# coke per ton of ore savings $20/ton of coke = another $4.00 T.H.M. that could be added to the cost/unit of iron in Japan to the advantage of Magnet Mining Company ore.

Since the capacity of a blast furnace is proportional to the rate that coke can be burned, this decrease in coke of $\frac{1500-1100}{1500} \times 100 = 26.7\%$ should mean at least a 26.7% increase in furnace capacity. This should represent at least $4.00/T.H.M. value on the Magnet Mining Ore from a capital investment point of view. Other factors such as decrease in limestone, cooling water, slag disposal cost, labor, dust loss, overhead, etc., are roughly evaluated at $1.50/T.H.M. savings on Magnet Mining ores by the author with the Japanese cheaper labor taken into account.

Adding the above savings together and looking at the overall advantages to the Japanese, it can be conservatively evaluated that 60% Fe sands delivered in Japan for

about $20.00/Ton would be equivalent to 52% Fe delivered for $14.00/Ton in 1959. Therefore, a price of about $12.50 aboard vessel should be competitive if overall costs to make a ton of hot metal are taken into account.

The following exhibit shows the freight rates and cost of iron ore to Japan in 1960. From this it can be seen that ore delivered to Japan in the 60% to 65% quality is running:

Goa	$7.70 to 8.80 + 6.35 to 6.37	=	$14.05 to $15.57
Malaya	$9.90 + 5.45	=	$15.35
Nevada	$10.70 + 5.10	=	$15.80
S. Africa	$11.14 + 7.47	=	$18.61
Brazil	$11.50 + 8.00	=	$19.50

Therefore, the $14.15 price of Magnet Mining Company appears low in relation to others.

WESTERN U. S. STEEL COMPANIES

The Western United States presently accounts for 6% of the nations annual steel production, or 6.5 million short tons. The principal producers include Kaiser Steel, Pacific States Steel, Colorado Fuel and Iron, Columbia-Geneva Division of U. S. Steel and Bethlehem Steel.

Kaiser should be interested in Magnet iron sands, especially if they could be pelletized for open hearth furnaces. They have run tests on Marmaraton, Canada pellets in their open hearths with good results. For these furnaces they should be interested in 144,000 tons of Magnet pellets per year.

With closer study it is possible that Kaiser could become interested in blending in some black sands to their sinter machine feed to produce variations on their ore grades available for blast furnace use.

Pacific States Steel has a new blast furnace capable of producing 250,000 tons per year that hasn't been started up yet. They are at present exploring their own iron mine.

Colorado Fuel and Iron has a capacity of 883,000 tons of pig iron, using ores from Cedar City, Utah, at 52% Fe and from underground mines in Sunrise, Wyoming, at 51% Fe. It is easily conceivable that substantial savings could be realized by them if black sands were blended with their low grade sinter feed. Freight rates to Pueblo should be investigated immediately for this marketing of a possible 300,000 tons per year.

Columbia-Geneva at Provo and Ironton, Utah, are capable of producing 1,000,000 tons of pig iron per year. To supply the iron ore, they have just developed Atlantic City Wyoming, and have direct shipping ores at Cedar City, Utah. With the relief on their sinter machines generated by the Atlantic City pellets, it is conceivable that they could become interested in black sands to up-grade their Cedar City ores from 52%.

Bethlehem has a need for 42,000 tons per year of steel furnace charge ore. If a source of briquetting or pelletizing the black sands could be arrived at, this market could be captured. They have also installed a direct reduction furnace in Los Angeles. Charles Sippel is investigating this thru Hydro Carbon Research Corporation to see about reactivating in view of what would appear to be an ideal feed.

OTHER OUTLETS

Charles Sippel (Magnet Mining Co.) is working on the possibility of using these black sands as a heavy aggregate for atomic shielding. This market appears promising.

Tests should be made as s[illegible] as enough concentrates are ob[illegible]ned. A suggested laboratory for these tests is Hershey Laboratories in Oakland. This market could be lucrative.

An investigation should be made on the cement plants that could be supplied from this source. Iron units are blended into cement for its manufacture. This market demand could be substantial and the black sands ideal.

There are also other possibilities such as Bethlehem Steel shipping pig iron thru the Panama Canal to its Western Steel mills. Possibly rather than return with empty bottoms to the East coast, maybe iron sands could be used on the return haul to Sparrows Point.

C
O
P
Y

8/1/61

LEE HAMMONS, GEOLOGIST
6243 West Missouri Avenue Glendale, Arizona YE 7-6008

SUPPLEMENTAL REPORT ON THE SANTA MARGARITA GROUP

This report will add to the information contained in a report entitled A PRELIMINARY VALUATION REPORT ON THE SANTA MARGARITA GROUP dated April 25, 1961. It is based on some additional sampling done in Sections 21, Township 9 North, Range 5 West and 6, Township 8 North, Range 5 West.

No detailed mapping has been done, therefore these figures are still to be considered preliminary. Every effort has been made to stay on the conservative side when making estimates. This additional work is a portion of that recommended in the original report. It has born out the prediction that the grade would improve with depth.

Sampling

This sampling was accomplished by trenching with a tractor and backhoe for the most part; 2 holes were dug with a hand auger. The trenches were sampled from top to bottom by cutting a channel in the straight side walls. The auger holes were sampled by mixing the pile of cuttings and taking a shovelful from each quarter of the pile.

Composite samples were made from each Section and a magnetic separation was made with a hand magnet. Since these holes were deeper than those employed in the first samplings, the results are more representative. The holes averaged 7 feet in depth and varied from 3 to 9 feet. This still leaves much to be desired as far as depth is concerned.

All of the 14 holes located in Section 21 were placed in the bottoms of dry washes on approximately 1000 foot centers. The washes vary from 100 feet to over 1000 feet in width. Antelope Creek and several tributaries cross the Section; as a consequence, roughly half of the surface area is made up of bottom material.

The composite sample from Section 21 contained 4.5% magnetic material in the gross sample. The minus 20 mesh material ran 12.2% magnetic material.

In section 6, the trenches were dug along the more prominent washes and in the adjoining banks. There are 11 trenches and 2 hand auger holes. More than one quarter of the Section can be said to have been sampled; intervals varied from 200 feet to about 2000 feet.

The bank samples showed an average of 1.2% magnetic material in the gross sample. A composite sample from the creek bottoms assayed 7.0% magnetic material in the gross sample, and 12.9% in the minus 20 mesh material.

The low assays on the bank material indicate that it should be stripped as waste. This material is approximately 10 feet thick and consists of loose dirt and sand. However, a composite sample made from portions of all samples ran 3.7%. In a working face, there is a good chance that the higher values below this lean material would carry the full face.

Tonnage

It is estimated that Section 21 contains 13,900,000 square feet of creek bottom area. This material was trenched and sampled to an average depth of 7 feet. Allowing a conservative 24 cubic feet per long ton, calculations show 4,054,167 long tons of ore averaging 4.5% magnetic material. This is proven tonnage where no stripping is required.

In Section 6, approximately one fourth of the Section, or 6,050,000 square feet, was sampled. Most of this area may need to be stripped of its top 10 feet, which is far below commercial grade. The top 4 feet of the creek bottom areas average 7.0% magnetic material. It is logical to assume, because of the geological nature of this deposit, that this grade and thickness will persist beneath the intervening bank areas.

These figures give a calculated reserve of 1,158,333 long tons. This tonnage can be called probable ore.

In both Sections it is obvious that the bottom of the enriched sand had not been reached by the trenches. It is entirely logical to believe that the above tonnages are only a part of the total available in these 2 Sections.

Every subsequent sampling effort has resulted in holes being dug a little deeper and in discovering a significantly higher grade of mineral. It is predicted, therefore, that still greater depths will uncover still greater enrichment.

The work reported on here strongly indicates that a profitable mining operation on the Santa Margarita group is possible.

Respectfully submitted,

August 1, 1961

REGISTERED GEOLOGIST
CERTIFICATE EXPIRES
LEE HAMMONS
DEC. 31, 1963
ARIZONA U.S.A.

C
O
P
Y

LEE HAMMONS, GEOLOGIST
6243 West Missouri Avenue Glendale, Arizona YE 7-6008

SUPPLEMENTAL REPORT ON THE SANTA MARGARITA GROUP

This report will add to the information contained in a report entitled A PRELIMINARY VALUATION REPORT ON THE SANTA MARGARITA GROUP dated April 25, 1961. It is based on some additional sampling done in Sections 21, Township 9 North, Range 5 West and 6, Township 8 North, Range 5 West.

No detailed mapping has been done, therefore these figures are still to be considered preliminary. Every effort has been made to stay on the conservative side when making estimates. This additional work is a portion of that recommended in the original report. It has born out the prediction that the grade would improve with depth.

Sampling

This sampling was accomplished by trenching with a tractor and backhoe for the most part; 2 holes were dug with a hand auger. The trenches were sampled from top to bottom by cutting a channel in the straight side walls. The auger holes were sampled by mixing the pile of cuttings and taking a shovelful from each quarter of the pile.

Composite samples were made from each Section and a magnetic separation was made with a hand magnet. Since these holes were deeper than those employed in the first samplings, the results are more representative. The holes averaged 7 feet in depth and varied from 3 to 9 feet. This still leaves much to be desired as far as depth is concerned.

All of the 14 holes located in Section 21 were placed in the bottoms of dry washes on approximately 1000 foot centers. The washes vary from 100 feet to over 1000 feet in width. Antelope Creek and several tributaries cross the Section; as a consequence, roughly half of the surface area is made up of bottom material.

The composite sample from Section 21 contained 4.5% magnetic material in the gross sample. The minus 20 mesh material ran 12.2% magnetic material.

In section 6, the trenches were dug along the more prominent washes and in the adjoining banks. There are 11 trenches and 2 hand auger holes. More than one quarter of the Section can be said to have been sampled; intervals varied from 200 feet to about 2000 feet.

The bank samples showed an average of 1.2% magnetic material in the gross sample. A composite sample from the creek bottoms assayed 7.0% magnetic material in the gross sample, and 12.9% in the minus 20 mesh material.

The low assays on the bank material indicate that it should be stripped as waste. This material is approximately 10 feet thick and consists of loose dirt and sand. However, a composite sample made from portions of all samples ran 3.7%. In a working face, there is a good chance that the higher values below this lean material would carry the full face.

Tonnage

It is estimated that Section 21 contains 13,900,000 square feet of creek bottom area. This material was trenched and sampled to an average depth of 7 feet. Allowing a conservative 24 cubic feet per long ton, calculations show 4,054,167 long tons of ore averaging 4.5% magnetic material. This is proven tonnage where no stripping is required.

In Section 6, approximately one fourth of the Section, or 6,050,000 square feet, was sampled. Most of this area may need to be stripped of its top 10 feet, which is far below commercial grade. The top 4 feet of the creek bottom areas average 7.0% magnetic material. It is logical to assume, because of the geological nature of this deposit, that this grade and thickness will persist beneath the intervening bank areas.

These figures give a calculated reserve of 1,158,333 long tons. This tonnage can be called probable ore.

In both Sections it is obvious that the bottom of the enriched sand had not been reached by the trenches. It is entirely logical to believe that the above tonnages are only a part of the total available in these 2 Sections.

Every subsequent sampling effort has resulted in holes being dug a little deeper and in discovering a significantly higher grade of mineral. It is predicted, therefore, that still greater depths will uncover still greater enrichment.

The work reported on here strongly indicates that a profitable mining operation on the Santa Margarita group is possible.

Respectfully submitted,

August 1, 1961

Chronological Report.

THE SANTA MARGARITA AND MAG IRON PLACERS, in the vicinity of Congres, Ariz. (Magnet Mining Company, Inc.)

During 1959, two comparatively young men, William (Bill) Johnson and Gordon Howard, from the State of New Mexico, arrived in Arizona to prospect for iron ore. Apparently, some one had informed them that there was a potential large market for "Black Sands", if tremendious masses of this material could be found. It Could be a most valuable iron ore. Also, they learned that this material was magnetic (the iron Magnetite), and could be easily found by prospecting with small hand magnets. Rumor has it that Johnson and Howard had been officials in some New Mexico Loan company, and that they were responsible for the firm making unsecured loans of some thousands of dollars to some prospectors, who informed them of the alluvial iron possibilities in Arizona. Anyway, according to the story, the individuals receiving the loans defaulted, and the Loan Company dispensed with the services of Johnson and Howard.

They moved to Arizona and became prospectors. Not long after their arrival, and apparently 'steered ' by their other prospector friends(who obtained the loans), they located about 145 iron placer claims in the detrital and alluvium terrain between Congres and Wickenburg (Arizona). This was mostly on Federal land. Each of the claims had eight(8) signers (friends or relatives of Johnson and Howard) and each claim covered 160 acres. Thusly, about 23000 acres of land were encompassed in these mineral claims (later, a few of the claims were dropped as they had been inadvertantly and mistakenly placed on State of Arizona owned land (and mining rights)). The enormity of this group of placer claims is impresive. It covered a length of about nine(9) miles, largely near Congress. They called them the Santa Margarita and MAG groups (as outlined on the top of this page).

The first claims located were called "SM" (an abreviation for Santa Margarita, but the majority and later claims were called "MAG" (which means Magnet). The presence of iron ore on the claims is easily ascertained by scraping a small hand magnet along the prevalent sands (at one's feet) and then bringing up the magnet for observation. It will be found to be covered with small black particles (Magnetite iron Fe_3O_4), This Magnetite had been pulled out of the sand matrix. Trace amounts of gold are there, (in most areas), but no attention was paid to this element, in the early days of Magnet. Early studies show that a 2.4% iron content is the cut-off point for making a profit. Another study has this up to 3.7% iron. This of course, is only possible with using large bulk handling equipage. Also, in those days, it was estimated that the average iron content on the claims was 5.0%. It is much higher at some locations, (and lower in a few).

At the time of the location of the SM and MAG iron placer groups, the idea of using alluvial sands as a source of iron ore was not new. In the Coolridge(Black Mtn.) area, hundreds of claims had been taken out, and a mill to process and concentrate the iron sands, had been built. Also, there was a plant there called the "Arkota Steel Company", which could use the Madras process to reduce the concentrates to sponge iron. According to information

received in those days, many operations on a small scale were attempted, but were not entirely successful (for reasons unknown to the writer). Later on, it is understood that an organization called "Soverign Industries" had the properties. Now (1980), it is understood that some company with the name of "Tioga" has taken over the operations, and they are producing and selling some concentrates. It is to be pointed out that the iron sands in the SM and MAG groups contain 1.0% (or less) of Titanium content. This is in the form of Ilmenite ($FeTiO_3$), which is a penalty item in the steel industry. The iron sands in the Coolridge area have a reputation of having a much higher Titanium content.

Johnson and Howard, some time after locating the mentioned claims (in 1959) met a geologist by the name of Wayne Fox of Berkeley,California. They had Fox take a brief look at the iron claims, and when Fox indicated he was enthusiastic with what he had seen, they made a verbal agreement that Fox would receive an interest in the iron placer groups for making a Geology report. Fox returned to California with several large containers full of alluvial sand samples. To give a little background on Fox, he had a BS in Geology and a Masters in Mining Engineering, and he was an Instructor at the University of California(Berkeley). He also taught some night school classes in San Francisco. It so happenes that Melvin Jones (who later would be a principal in Magnet Mining Company) had been a student in one of Fox's geology classes, and also was a personal friend of Fox. Fox had been a Major in the Army during WWII and Jones had been a Colonel. It is also recalled that Fox had a small mechanical hand operated magnetic separator, and he gave several demonstrations to his students of this easy way to remove the copious magnetite from the SM and MAG sands.

As time went on, Fox invited Jones to accompany him on a trip to Arizona to see the iron placer claims, and they made the trip in Fox's car. In Kingman, Arizona, they met Johnson and Howard, looked over some potential claims in that region, and then proceeded on to Congress, Arizona for a rapid 'look see'. Jones was quite impressed with the apparent high iron values. It was soon apparent that Fox and Johnson and Howard were not getting along very well together, at this time. Johnson and Howard were upset because Fox had not written the geology report that he had promised to have completed some months before. Then Fox was upset because he demanded a bigger interest in the claims, for what he was doing, including some promotional work. The 'Iron boys' did not concur in Fox's demand. Just when the ultimate breakup occurred, is not known. Later, Fox disclaimed any connection with the iron properties. Sometime after this, Jones received a telephone call from Johnson and Howard, inviting him to join them in the iron venture. For what they called 'small money' considering the large number of claims, $5,000.00 would buy a one-third interest (partnership) in the properties. Jones, who just completed his geology studies for a degree, accepted, and moved to Arizona. A quit claim deed was made and was duly recorded, giving Jones a one-third interest in the SM and MAG groups, as well as, others in the Kingman area. Also included were about 60 iron placer claims South of the Santa Maria river on US hwy 93 (and just West of the large Quarternary basalt mesas.) This was in 1960

Within a period of a year (1961), Edward Nagel, principal

owner of the "Orowheat Baking" cartel, (that is all over the West) became interested in the iron sand claims. He had been initially approached and promoted by Fox. He indicated that he had some 'tax writeoff money' that he would put towards development and promotion of the properties. Nagel's attorneys in San Francisco incorporated "Magnet Mining Company" in Nevada (at Nagel's expense). The iron mining claims were deeded to this Corporation, and Gordon became President, Johnson V-President, and Jones Secretary-Treasurer. Corporate stock was valued at $1.00 per share. It is recalled that Nagel initially put $10,000.00 into the Company for 10,000 shares. Howard, Johnson and Jones were also initially given 10,000 shares, respectively, for their claim ownership. The $10,000.00 in the company treasury was soon split up between Johnson, Howard and Jones for past services. As time went on, Nagel put more money in the company and became, by far, the leading stockholder. This money was used for development and exploration activities, and also to do the required assessment work and an annual basis.

Also, Charles Sippel, jr., of Martinez, California put a goodly sum of money into the Company, and he became the 'fifth' principal stockholder. Sippel had been a friend of Jones, and had been in the past, one of Fox's 'older' geology students. Sippel was an employee of the Bethleham Steel Company of San Francisco and was a metallurgist and one of the supervisory personel there. With his knowledge of the iron and steel industry, he considered that Magnet Mining Company had a great future. Some other individuals bought smaller amounts of the stock, but the stock was never promoted, nor offered to the public at large.

The Magnet Mining Company 'Resident Agent' who was required by law to reside in the State of Nevada was Rellis Wheatly (a friend of Jones) who lived in Montello, Nevada (where Jones had also been interested in mining). Wheatly, was also a minor stockholder. A 'Resident Manager' was appointed by the Board of Directors and he was to receive the salary of $200.00 per month (it was not considered to be a full time position). Initially, Howard assumed the title. Later, Jones took over this 'position' and was also listed as 'staff geologist'. Nagel continued to place money in the Company, but it was on the basis of a few thousand dollars, from time to time, as it was needed. One of the oddities about Magnet Mining Company was that one of the Articles of Incorporation (By-laws) made all issued stocks assessable for funds, for requirements such as annual assessment work, and other approved development activities. If a stockholder did not pay the assessment on his stock holdings, they would be forfeited or cancelled, by the Board of Directors. This accounts for the disappearance of some major stockholders thruout the years. Nagel kept the Company going for some years and then dropped out (by choice in 1964), giving up all of his stock holdings for no returns !!! The same thing happened to Johnson and Howard in later years. The remaining stockholders, thusly, greatly increased their ownership status, on this basis. The writer almost forgot to mention that some of the Nagel funds were used in staking out more placer iron claims near Yucca, Ariz. Later, these claims were abandoned (or dropped).

Earlier, Daniel Jacobs of Congress, Arizona, entered into the Magnet Mining picture, and as time went on, he became a principal

stockholder, and was Company President. He is a veteran of the Korean war, and had been a football player at Iowa State. Jacobs owned the Arrowhead Bar, Cafe, Service Station, and Trailer Court in Congress, which adjoins the Magnet Mining properties. In the early days of Magnet, he owned some heavy earth moving equipment which he himself operated. By doing work on the iron placers, such as building roads and digging sample pits, he obtained considerable stock holding in Magnet. His wife Ramona, also was a minor stockholder. Jones lived in Jacobs' trailer Court for some time, until he purchased a house in nearby Yarnell.

Along about this time, Nuclear Dynamics, Inc., of Phoenix,Az. started to show some interest in the iron properties. Herb Miller was President, and Kelsey Boles was the Manager, and they had a small group of Mining Engineers and Geologists, who visited the iron claims. One of thier inventions, at this time, was a small clam shell bucket that could dig deep holes of small diameter. With this clam bucket setup, they made about a two (2) foot wide hole, down to a depth of 100 feet (or more), near the South end of the Santa Margarita claims (in what was known as Jones wash). No outstandig values were found in this endeavor. Its hole location had been poorly chosen by Nuclear Dynamics.

During December 1961, some of the MAG claims were "jumped" (relocated) by some individuals from Phoenix, Arizona. Their names were Otto Lindermeyer (a lawyer) and a chap by the name of Burleau. Shortly after this illegal action was learned, Howard, Jones, and Jacobs chased the workers off the mentioned claims. They had been doing some work with a bulldozer. Jacobs, at the time, was a deputy Sheriff of Yavapai County, and it did not take long for the workers to move out with this'no nonsence action'. As a result of this confrontation, Lindermeyer brought a lawsuit against Magnet Mining Company in the Superior Court at Prescott, Arizona. A Judge by the name of Jack Ogg was presiding. The hearing was held in 1962, and Magnet Mining Company's ownership of the iron claims, was affirmed. Magnet had a lawyer in this case by the name of Hugh Kingsbury.

Not long after this (1962) an organization that claimed to have offices on Wall Street in New York City, called "U.S. Magnetite Corporation" moved onto the scene. Several of their representatives, including a Mr. Gates, visited the Magnet Mining claims and expressed great interest in obtaining a lease to mine the property. One of their Senior officials was a chap by the name of Tom Garrity (who was also a lawyer. A contract was entered into between Magnet and U.S.Magnetite Corporation, indicating the latter would get the Santa Margarita and MAG claims for the production of iron concentrates. They would be in operation at the end of one year, but the time could be extended if circumstances warrented. Magnet Mining was to receive fabulous returns, and it was planned to ultimately ship one million tons of concentrates per year. This Delaware Corporation also had a representative permanently on the claims. His name was Jesse Noah, and he had an attractive young wife with him, Dorothy. She had been a musical personality on Radio and T.V. shows. The Noahs were Wickenburg residents during 1962-63. Incidently, Nuclear Dynamics was greatly upset when the deal was made with U.S. Magnetite. They threatened legal action, but nothing happened.

U.S. Magnetite assumed control of the claims, and immediately

did considerable exploration, development and research activities Magnet Mining people did not participate in these operations, as the U.S. Magnetite group wanted their endeavors to be confidential. Two groups from the Iron Industries of Japan visited the claims and took samples, at U.S. Magnetite's invitation. Reports have it that they were seriously interested in investing a great deal of capital to get the operations started. Later, the bad news came out (for us) in the newspapers, of the tremendious iron ore discoveries in Australia. Whole mountains of iron ore was available to be mined, while the shipping of the same to Japan, was only half the distance to the West coast of the United States. The Japanese lost interest in the Santa Margarita and MAG iron claims, and soon after this, U.S.Magnetite Corporation began to disappear. Our friend, Noah left, as they were sending him no more money to operate on. Garrity and others,also disappeared. It was learned that Garrity and moved to Tucson, Ariz. where he opened up a law office. Later it was learned that he moved to Littleton, Colorado, where he was in some sort of mining venture again. Nagel's firm of lawyers brought a lawsuit against U.S.Magnetite Corporation, and found that it was only a 'paper' company, with no assets. The money they had in the past apparently came from unknown and mysterious sources. It was Magnets plan to obtain money from U.S. Magnetite for damages and monies owed to Magnet, but this was hopeless. Jones and Jacobs made an effort to get copies of the U.S. Magnetites records covering drilling results, metallurgical studies, and other information, but were unsuccessful. Before Garrity disappeared, he was contacted and he said Magnet could have the records for a payment of $5,000.00 in cash. As Magnet did not have this kind of money (at the time), the records were never obtained. This is the end of the story of U.S. Magnetite Corporation.....

Soon after this, Nagel told Magnet that he was withdrawing his financial support, and he was giving up his stock holdings, as he could see no hope for Magnet Mining Company to get into operation in the foreseeable future. Later, Magnet sent Nagel a statement of an assessment on his stock holdings, for annual assessment work. It was not forthcoming, so the Board of Directors (of Magnet) cancelled his stock. Soon afterwards, this same situation happened with Johnson and Howard, and their stock holding were also declared forfeited. These chaps just sort of disappeared. With these happenings, the principal stockholders of Magnet were Jones, Sippel, and Jacobs. Other stockholders remained, such as Curtis Marsh, A.M.Jones, Lewis Jomes, Rellis Wheatly, Ramona Jacobs, William Salisbury, Donald Morgan, John Sinkey, and possibly others, not recalled at this writing.

During 1963, some of the Field Engineers of Food Machinery and Chemical Corporation became interested in Magnet Mining Company iron placers. One of their people by the name of N.E. Eastmore made several visits and obtained many surface samples, mostly from the Northern portion of the properties. Eastmore was a Geologist and worked under the supervision of Russel J Hayden of their Pocatello, Idaho office. The samples averaged 4.55% fron (they hoped to get 5.00%). They sent a letter dated May 20,1964, indicating they were taking no more field work action. The following is a quote from their letter: "Due to our market departments negative results in developing a sale for the magnetite at that time, the metallurgical work was not carried out to the fullest extent xxxxWe certainly did not have enough negative information to rule it out xxxxxxSamples we did take implied an erratic deposition of concentrate xxxxxxxx Development of your property is a real challenge xxxxx" . The

foregoing is quoted to give the reader some idea of the problems involved in developing,and proving good iron sand properties to the point where they are conclusively anexcellent profit making operation. No complete and comprehensive study has been accomplished on the entire property, to date. There are only some piecemeal investigations, the bulk of which, have been most favorable.

During May, 1964,it was found that the Arizona State Highway Department had established a rock crusher and loading equipment, and were operating on MAG claim 198 (Sec.33,T-9-N,R-5-W), and MAG claim 212(on Sec.4,T-8-N,R-5-W),and were using the"ore" from the claims as surfacing material on nearby US Hwy 93. They had been operating for some time until Jones found they were on Magnet claims! Section 33 is a Federal section, and Section 4 is a State owned section (with Fed. owned mining rights).Both of these claims are close to and on the West side of "Round Mountain".The viewpoint of the State was, that the sand and gravel(or crushed rocks) they were using, did not qualify as ore, and they were entitled to use it. Magnet Mining Company had a contrary viewpoint and filed a lawsuit against the State for $100,000. 00 damages. Donald Morgan was our lawyer. The State hired the firm of "Still and Still" of Tucson,Az.(Mining Engineers and Geologists) and "David Lowell", Tucson,Az.(Geologist) to represent them. The Arizona Assistant Attorney General was the State's defense lawyer. In the opinion of the writer, the State's choice of these geologists was entirely poor. The Stills(father and son) were probably knowledge-able in gold, silver and copper, but not in iron mining. Lowell's reputation was as a "copper specialist". So, it became a battle betw-een the mentioned individuals, and the professionals representing Magnet Mining Company.

Witnesses for Magnet were: William J.Salisbury,P.E.,Mining Engin-eer (with experience in the iron Mines of Canada); Mason Rankin,Geolog-ist, former Superintendant at the Borianna Mine, and much experience in Utah,Nevada and Arizona mining; Lee Hammons, Geologist, and Curator of the Mineral Museum in Phoenix,and a consulting geologist: W.R. Sholes, geologist, retired after many years with the BLM, in all fields of mining; Charles Sippel, jr., Metallurgist, with 20 years experience with Bethleham Steel Company; and K.W. Hebner, a gold specialist, with many years experience on gold properties. He examined the MAG propert-ies in question and found'fair'gold there. Jacobs and Jones, also testified in favor of Magnet. The latter brought out that all of the mining claim posts, and notices, were there in the disputed area. The State just ignored these posts and notices, and made no effort to contact the claim owners. Doing this, in itself, plus large scale removal of the material present, is a crime ! All of the above prof-essional people had made studies, and written favorable reports.Irresp-ective of all of this weight favoring Magnet Mining,the Judge(Ogg) ruled in favor of the State? Several individuals who sat thru the week long trial, said it was a 'travesty of Justice'. The writer agrees that the ore in the questioned area was on the 'lean side'but it was still commercial ore.

Interest in the Magnet Mining iron claims became almost neglible during the following years, including up to 1971. Annual assessment work was accomplished on the claims as required by law.

Part of costs involved, were covered by some geological studies (which could be counted towards assessment labor). In 1971,Jones who felt that the claims would be mined at some time in the distant future, considered that it probably would not be mined in his time (he was getting old). Then again, gold had not reached its high values (almost $1,000.00 per oz.); it was still not much above $35.00 per oz. It will be well to point out that the SM and MAG black sands do carry some gold, but in the $35.00 per oz. days, it was not considered rich enough to bother with. The picture could be vastly different in current times. Studies of gold in the iron claims has been almost non-existant during Magnet Mining Company's tenure of the iron properties.

Anyway, Jones sold his stock holdings to a chap who was temparily living in Congress, by the name of Allen Young. Thusly, about one-third of the Magnet Mining ownership went to Young. It might be well to go into Young's background, at this time. He had been a football player at USC, and he was knowledgeble in chemistry, and very interested in mining. His specialty was in ion exchange recovery of elements in ore, such as gold and uranium. This was with the use of large containers having specially prepared resins. He owned a portable plant built on wheels of his own design. He spent some time at the Tom Reed mine in Oatman,Arizona in a gold recovery venture that was not entirely unsuccessful. Later, he had his plant at Mina, Nevada with John Sinkey on another gold operation, and he spent some months there.

Although a comparatively young man, Young was a heavy drinker of booze, and he died a couple of years later of cirrhosis of the liver at the Prescott VA hospital. He was a veteran of WWII and had been a paratrooper in combat with an Army Airborne division. He did have some friends (who had money) and he made some effort to promote the Magnet Mining properties. He also did some research on the iron sands, but the writer never learned of the results. His wife Nancy, inherited the stockholdings. She is now married again and lives in Kingman, Arizona under the name of Mrs. Nancy Fahrner. When Jones sold his Magnet stock to Young, all of the Magnet Mining Company reports, records, and claim forms,were turned over to Jacobs (President) on 2 Nov.1971. Actually, Ana M.Jones (Jones' wife) was the Secretary and maintained the records during those early years. (she was also a minor stockholder).

Some progress towards the placing of the Magnet iron property in operation came fast with the arrival of Frank K Senior of Phoenix, Arizona on the scene. He is a registered metallurgical engineer and had been Vice-President in charge of operations with Soverign Industries at the Coolridge-Black Mountain alluvial iron claims for three years. He spent some time on the SM-MAG claims and wrote three reports, as follows: the first one is dated 25 Nov. 1971, and entitled "Pre Feasibility appraisal, Integrated steel pellet production via Fuller Process", the second is dated 15 Jan. 1972, "Addendum to the metal pellet report of December 1971 for the production of 36,000 NT of forged steel grinding balls at Congress Juction,Arizona", the third report is dated January,1975 and is titled,"Resume and update of alluvial iron potential at Congress, Arizona.

A brief summary of Senior's information follows:
He estimates a minimum of 150 million tons of iron concentrates on the property.
At least 5000 contiguous acres have 5.0% Magnetite, that can be

concentrated to [illegible].3% iron. The depth of this ore is 100 feet. Gives the cost factors for mining, milling, pelletizing, and marketing.
Mentions the low titania content of the iron sands, as compared to other Arizona locations.

These comprehensive reports should be most encouraging for the stockholders of Magnet Mining Company, especially as a result of studies by an experienced and competant engineer in the iron mining field.

Many mining people are not cognizant of the costs involved in getting an iron mine in production. A property the size and scope of the SM and MAG groups would cost many 'millions' of dollars. In order to be competative with other mining interests, it has to produce tremendious tonnage for the operation to be economical (on a per ton basis).Getting a simple gold or tungsten mine going, as compared with the Magnet iron mine, is like a mule measured against a diesel locomotive. Lets take the Eagle Mountain and Fontana (California) iron operations of the Kaiser Industries. They probably have more than 100 million dollars invested. It might be possible at the present time to build a small iron concentrating plant on the claims, for the production of iron concentrates to be used as a heavy media aggregate in the making of concrete. This market would be very limited and use only a fraction of the potentiality of the whole property.

In 1975, Howard S. Gable of Kansas City, Mo., entered into the scene and leased the SM and MAG claims from Magnet Mining Company. It is understood that this lease continues to be in effect, at the present time (1980). Gable is a University graduate Chemist, and in the past years, has attained considerable recognition for his discoveries in the Chemical field. He owned a laboratory in Kansas City and had several chemists working under him. One of his inventions(patented) is a fluid(liquid) that is magnetic (the first ever to be discovered) that is made with Magnetite and certain organic chemicals. Other inventions are a sealer for plastics, and improved safety matches(for starting fires). He has received royalties from industries for the use of his inventions. In recent years, Gable has been an extensive investor in mining properties, including coal, perlite, phosphate, and uranium. On the SM and MAG claims, he has had several geology investigations accomplished, as well as, some drilling. One of the studies, under Gable's supervision, was a string of widely separated sample holes across the North portion of the Santa Margarita claims(East-West) in the alluvial sands. The average was 5.84% Magnetite (with very low titania). However, the big surprise was gold (sampled at the same locations as the iron) which ran at $9.90 per yard(about 1.2 tons) at todays prices for this precious yellow metal,(above $600.00 per oz.).These samples should be re-affirmed,(by taking new samples and sending them to a different assayer). This area, of course, takes in only a small portion of the Magnet Mining claims. Gable continues to develope and promote the Santa Margarita and Magnet properties.

June 13, 1980.

Malcolm H. Jones

SANTA MARGARITA GROUP

MELVIN H. JONES

YAVAPAI COUNTY, ARIZ.

1" = 1 MI. 4-7-61 REV. 8-1-61

A (1) SAMPLE NO.

--- GROUP BOUNDARY

Date Cr. Mts.

Weaver Mts.

Congress Jct.

PHOENIX

DRILL HOLE

Martinez Creek

Antelope Creek

Stanton Creek

SANTA FE R.R.

U.S. HWY. 89

Flores

T. 10 N.

T. 9 N.

T. 8 N.

R. 6 W. R. 5 W.

N

W. R. SHOLES
[illegible] W. CRITTENDON LANE
PHOENIX 31, ARIZONA

January 10, 1965.

Magnet Mining Co.,
Box 87
Congress, Ariz.

Gentlemen:

On January 2, 1965, in company with Mr. Melvin Jones of your organization and Attorney Don Morgan, I made an examination of that portion of your properties in Sec. 32, T. 9 N., R. 5 W., and Sec. 4, T. 8 N., R. 5 W,, occupied by the workings from which I was informed a large quantity of ore had been taken by the State Highway Department to be used as road material.

The pits from which the material was removed were caved and filled or partly so with gravel and sand washed in by recent floods. A large pit in Sec. 5 was almost obliterated but the one in Sec. 32 was still pretty much intact. Two large sand piles remained in Sec, 32 and another, apparently half removed, was examined in Sec. 4.

Three pits dug no doubt with a bulldozer were observed in Sec. 32, dug, I was informed, by a Mr. Still for the purpose of sampling. Each was about 8 feet deep and contained vertical channel cuts about 1½ feet wide by 1½ feet deep along one side of each pit extending from top to bottom at the deepest point. There was probably a foot of caved material in each pit.

In the easternmost of the three pits I noted several horizontal layers or beds of gravel capped with surface soil. I considered that the surface soil was least likely to contain much black sand so in sampling I discarded that portion of the channel. I did sample the channel as follows: Starting 2 feet below the surface, I dug a second channel about 2 inches wide by 2 inches deep for two feet down. The material was collected in a pan and poured into a sample sack. It was labeled S-1. A second sample was taken similarly from the lower 4 feet and labeled S-2.

After cleaning off the surface of the sand pile in Sec. 32 at a point a few feet above the base, a sample shovel full was placed in a sample sack and numbered Sample 3. The sand pile was the o ne furthest west. Sample 4 was taken from the sand hill in Sec. 4 and consisted of a vertical channel cut 3 feet long in the approximate center of the cut from which sand had been removed.

The samples were under observation at all times. No. 1 was divided at Mr. Jones' and a portion, 121½ grams removed and the magnetic minerals removed. The weight of the magnetics was 11 gm. or about 9%.

The balance of Sample #1 and the reject from the portion separated were combined and all samples taken to Sholes' residence in Phoenix where they were carefully panned and most of the non-magnetics rejected. The resulting concentrates were dried and weighed then the magnetics from Samples 2 and 4 extracted with a small magnet. The concentrates from Samples 1 and 3 and the magnetics from Samples 2 and 4 and the magnetics from the work at Mr. Jones' lab. were taken to the Arizona Testing Labs. in Phoenix for assay. The magnetics from Sample #1 after weighing was combined with the concentrates of that sample. The following table shows the results.

Sample No.	1	2	3	4
Original weight				
Lbs.& oz.	3-13	5-8	3-2	5-13
Grams	1738½	2491	1416	2633
Wt. Conc. panned & dried, gms.....	170½		148	
Wt. magnetics, gms		19.0		61.0
% concentrates to original	9%		10%	
% iron in conc.	14.0	3.8	17.0	2.0
% iron in magn.		49.7		50.40

Until I analyzed the results carefully, I did not think that the assays showed satisfactory amounts of iron. Sample #1 from the pit is much better than #2 but shows less than 2% iron inthe entire sample. Sample #3 is likewise poor, showing less than 2%. Titanium, however, is in such small amounts as to be not considered. It shows also that the material can be easily concentrated and that the concentrates would be of sufficient quality as to be marketable.

I am enclosing one copy of the Assay sheet and am forwarding the original copy with a copy of this report to Attorney Morgan.

Sincerely,

Warren R. Sholes

Warren R. Sholes

ATL
ARIZONA TESTING LABORATORIES
A DIVISION OF CLAUDE E. McLEAN & SON LABORATORIES, INC.
PHONE 254-6181 817 WEST MADISON ST. P. O. BOX 1888 PHOENIX 85001

Chemists . . . Engineers

For: Magnet Mining Company
Congress Junction
Arizona

Date: January 8, 1965

Lab. No.: 158495

Sample: Ore

Marked: See Below

Received: -----

Submitted by: Mr. W. R. Sholes

Report of Laboratory Tests

Sample Marked:
#1 Magnesium Concentrate = Weight = 11.5 grams
Mag. (Magnetic) Conc.

Samples Marked:

	#1	#2	#3	#4
Weight	159.0 grams	19.0 grams	148.0 grams	61.0 grams
Iron (Fe)	14.00 %	49.70 %	17.08 %	50.40 %
Titanium (Ti)	1.05 %	1.10 %	0.85 %	1.30 %

Respectfully submitted,

ARIZONA TESTING LABORATORIES

Claude E. McLean, Jr.

CHEMICAL • RESEARCH • ASSAY • ORE TESTING • PHYSICAL TESTING

MAG	65	SW	¼	SEC.	24	T 10N	R6W
"	66	SE	"	"	"		"
"	67	SW	"	"	19	T 10N	R5W
"	68	SE	"	"	"	"	"
"	70	SE	"	"	20	"	"
"	71	SW	"	"	21	"	"
"	72	SE	"	"	"	"	"
"	74	NW	"	"	27	"	"
"	75	NE	"	"	28	"	"
"	76	NW	"	"	"	"	"
"	77	NE	"	"	29	"	"
	78	NW	"	"	"	"	"
"	79	NE	"	"	30	"	"
"	80	NW	"	"		"	"
"	81	NE	"	"	25	"	[illegible]W
"	82	NW	"	"	"	"	"
"	83	SW	"	"	"	"	"
"	84	SE	"	"	"	"	"
"	85	SW	"	"	30	"	R5W
"	86	SE	"	"	"	"	"
"	87	SW	"	"	29	"	"
"	88	SE	"	"	"	"	"
"	89	SW	"	"	28	"	"
"	90	SE	"	"	"	"	"
"	91	SW	"	"	27	"	"
"	92	NW	"	"	34	"	"
"	93	NE	"	"	33	"	"
"	94	NW	"	"	"	"	"
"	95	SW	"	"	"	"	"
"	96	SE	"	"	"	"	"
"	97	SW	"	"	34	"	"
"	98	NE	"	"	31	"	"
"	99	NW	"	"	"	"	"
"	103	SE	"	"	"	"	"
"	104	SW	"	"	"	"	"
"	106	NW	"	"	1	R6W-T9N	
"	107	NE	"	"	"	"	"
"	108	NW	"	"	6	R5W	"
"	109	NE	"	"	"	"	"
"	110	NW	"	"	5	"	"
"	111	NE	"	"	"	"	"
"	112	NW	"	"	3	"	"
"	113	SW	"	"	"	"	"
"	114	SE	"	"	5	"	"
"	115	SW	"	"	"	"	"
"	116	SE	"	"	6	"	"
"	117	SW	"	"	"	"	"
"	118	SE	"	"	1	R6W	"
"	119	SW	"	"	"	"	"
"	120	NW	"	"	12	"	"
"	121	NE	"	"	"	"	"
"	122	NW	"	"	7	R5W	"
"	123	NE	"	"	"	"	"
"	124	NW	"	"	8	"	"
"	125	NE	"	"	"	"	"
"	129	SW	"	"	10	"	"
"	132	SE	"	"	8	"	"
"	133	SW	"	"	"	"	"
"	134	SE	"	"	7	T9N	R5W
"	135	SW	"	"	"	"	"

Included are the Santa Margarita group of claims:
SM No. 1 to 24 incl. - Secs. 11, 14, 15, 26, & 35 — T9N, R6W

BOOK 800 PAGE 909

Claim No. - Discription

MAG	136	SE	1/4	Sec.	12	T9N	R6W
"	137	SW	"	"	"	"	"
"	138	NW	"	"	13	"	"
"	139	NE	"	"	"	"	"
"	140	NW	"	"	18	"	R5W
"	141	NE	"	"	"	"	"
"	142	NW	"	"	17	"	"
"	143	NE	"	"	"	"	"
"	144	NW	"	"	16	"	"
"	145	SW	"	"	"	"	"
"	146	SE	"	"	17	"	"
"	147	SW	"	"	"	"	"
"	148	SE	"	"	18	"	"
"	149	SW	"	"	"	"	"
"	150	SE	"	"	13	"	R6W
"	151	SW	"	"	"	"	"
"	152	NW	"	"	24	"	"
"	153	NE	"	"	"	"	"
"	154	NW	"	"	19	"	R5W
"	155	NE	"	"	"	"	"
"	156	NW	"	"	20	"	"
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"	160	NW	"	"	22	"	"
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"	168	SE	"	"	24	"	R6W
"	169	SW	"	"	"	"	"
"	170	NW	"	"	25	"	"
"	171	NE	"	"	"	"	"
"	172	NW	"	"	30	"	R5W
"	173	NE	"	"	"	"	"
"	183	SW	"	"	29	"	"
"	184	SE	"	"	20	"	"
"	185	SW	"	"	"	"	"
"	186	SE	"	"	25	"	R6W
"	187	SW	"	"	"	"	"
"	190	NW	"	"	31	"	R5W
"	191	NE	"	"	"	"	"
"	194	NW	"	"	33	"	"
"	195	NE	"	"	"	"	"
"	196	NW	"	"	34	"	"
"	197	SW	"	"	"	"	"
"	199	SW	"	"	33	"	"
"	202	SE	"	"	31	"	"
"	203	SW	"	"	"	"	"
"	207	NW	"	"	6	T8N	"
"	208	NE	"	"	"	"	"
"	209	NW	"	"	5	"	"
"	210	NE	"	"	"	"	"
"	211	NW	"	"	4	"	"
"	213	NW	"	"	3	"	"
"	214	SW	"	"	"	"	"
"	215	SE	"	"	4	"	"
"	216	SW	"	"	"	"	"
"	217	SE	"	"	5	"	"
"	218	SW	"	"	"	"	"
"	219	SE	"	"	6	"	"
"	220	SW	"	"	"	"	"

FRANK C. SENIOR
CONSULTING ENGINEER

1838 WEST VIRGINIA AVENUE
PHOENIX, ARIZONA 85007

August 11, 1972

Gentlemen:
Post Office Box 15155
Fort Worth, Texas 76119

Re: Black sand deposit
Santa Margarita
Congress, Arizona

Gentlemen:

I was asked by the group that controls subject deposit to drop you a line in response to your ad in the Denver Mining Record of June 28, 1972.

I am a consulting metallurgical engineer who was formerly vice president of operations of Sovereign Industries of Phoenix, and personally in charge of all exploration, development of mining plans, actual large scale (100 tons per hour) dry magnetic cobbing, wet milling and final concentration producing many thousands of tons of 70.5% Fe fine grind concentrate. This work actually involved over $3 million dollars and was performed by well known geologists and many of the large engineering and construction companies including Bechtel, Dravo, Eriez, M-K, Becker Drilling, Swindel-Dressler, Allis Chalmers and many others.

These groups, under my direction, finally enabled us to put together the optimum drilling and mining plan, a low cost dry and wet milling circuit, followed by pelletizing, reduction to metal pellet and finally to steel.

As a matter of fact, I actually installed a rolling mill and forge shop with Coates, on the deposit about 40 miles north of Tucson and we produced several hundred tons of 2" diameter forged steel balls of very high grade quality.

There are 4 known, very large, alluvium deposits of magnetite in valley fill in Arizona and one or two in the California deserts. One of these was Sovereign, with whom I was formally associated, and who proved up over 90 million tons of recoverable 70.4% Fe concentrate reserves in 3 areas of 4% to 10% grade.

This company, however, fell into the hands of stock promoters and real estate adventurers and was led to total disaster, long after I resigned. They are now in bankruptcy.

About 9 months ago I decided to look for another similar situation and re-contacted the group in Wickenburg and Congress who control the 25,000 acres of alluvium 15 miles north of Wickenburg. (The subject of this letter).

This deposit is crossed by the main line of the Santa Fe railroad at an elevation of 3,000 feet and could be thought to contain about 15,000 acres good for about 9,000 tons of 70.5% Fe concentrates down to 150 foot depth per acre.

There are many black sand alluviums and black sand beaches in the western USA but very few are amenable to easy and medium grind liberation of the titania, silica, phos etc., to yield a 70% to 71% Fe concentrate that is needed for oxide or metal pellets - or other iron products.

Enough preliminary drilling and metallurgy has been done on the Santa Margarita to convince me at least that this could be a very interesting property.

If you are interested, you could contact me and we will arrange a visit to the property.

Very truly yours,

F. C. Senior

cc: Dan Jacobs

Preliminary Appraisal of Capital Cost

The preliminary project costs involved in general feasibility or a financing program are about as follows:

1. Legal and "Acquisition" costs of mine and mill site

   These costs should be minimal - in the order of $2000 to $5000 maximum.

2. Drilling and beneficiation check program

   We established that the Becker Drill with drop-off bit is the best tool for establishing the true grade of an alluvium. We should only drill to 150 feet maximum and check 10 foot horizons. A crew of 3 men at the drill and 5 in sample preparation, screening, grinding and Davis Tube in the lab, plus the drill, bags and truck, including the drop off bit, will cost $850 per day for two 150 foot holes. Cost of supervision, geologists, dozers, repats etc. would average the cost at $1000 per hole.

   To develop and establish grade, at least 14 million tons of concentrate reserves should be proven. This will involve drilling on 1000 acres for a 150 foot deep (2000 square feet) mining plan.

   Drilling on 1000 foot centers, or one hole per 20 acres, is proper for these alluvium deposits, or a total of 54 holes for a 14 to 15 million tons of concentrate program.

   The Reserves Report can be completed for about $50,000.

3. Metal pellet test

   50 tons of concentrates should be prepared, possibly by renting the Sovereign facilities at Coolidge, Arizona, or shipping concentrates to a preparation lab. At least 10 tons of concentrates to be heat-hardened by Stirling, then reduced at Catasauqua using 4-Corners coal etc.

   This program will probably cost $50,000 to $60,000 to complete.

4. Final feasibility report

   Probably will cost $25,000 additional.

The Preliminary and Financing Report will therefore cost about as follows:

1.	Legal and Acquisition	$ 5,000
2.	Drilling Program	50,000
3.	Metal Pellet Tests	60,000
4.	Final Report	25,000
5.	Travel, Consulting and Miscellaneous	10,000
	Total Program	$150,000

ARIZONA TESTING LABORATORIES
A DIVISION OF CLAUDE E. McLEAN & SON LABORATORIES, INC.
PHONE ALpine 3-6272 817 WEST MADISON ST. P. O. BOX 1888 PHOENIX
Chemists . . . Engineers

Date: April 5, 1961

Sample: Ore

Lab. Nos.: 152491 and 152492

ASSAY CERTIFICATE

Composite of All Samples: Magnetic Portion — **Percent Magnetite = 1.55 %**

Iron (Fe)	60.48 %
Titanium dioxide (TiO_2)	0.05 %
Silicon dioxide (SiO_2)	11.20 %
Manganese (Mn)	0.50 %
Phosphorus (P)	0.24 %

Composite Creek Bottom Samples: Magnetic Portion — **Percent Magnetite = 1.75 %**

Iron (Fe)	60.70 %

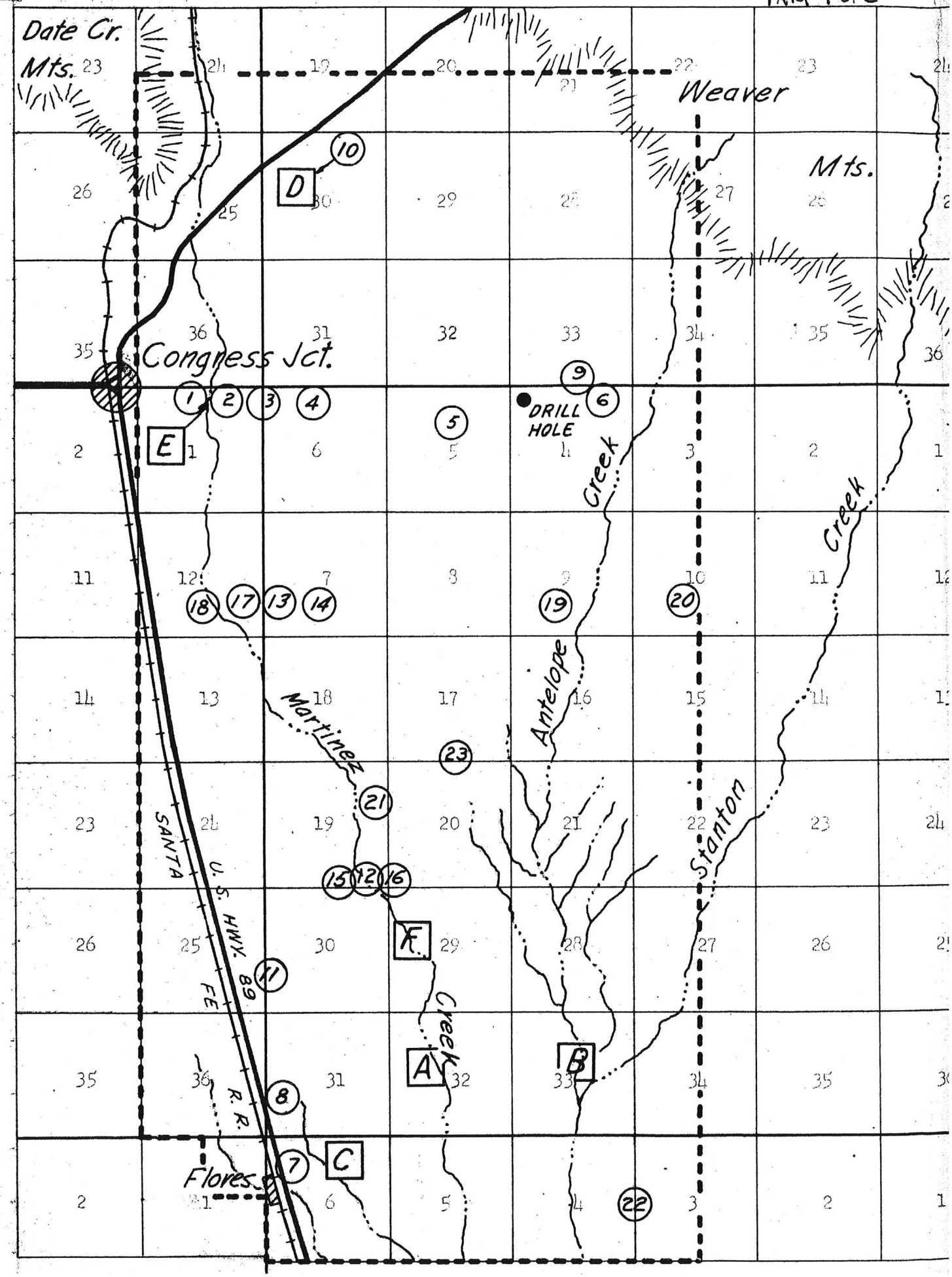
Respectfully submitted,

ARIZONA TESTING LABORATORIES

Claude E. McLean

REGISTERED ASSAYER
CERTIFICATE EXPIRES
CLAUDE E. McLEAN
DEC. 31, 1961
ARIZONA, U.S.A.

EXHIBIT I


Date Cr.
Mts.
Weaver
Mts.
Congress Jct.
DRILL HOLE
Creek
Creek
Antelope
Martinez
Stanton
SANTA FE R.R.
U.S. HWY. 89
Flores
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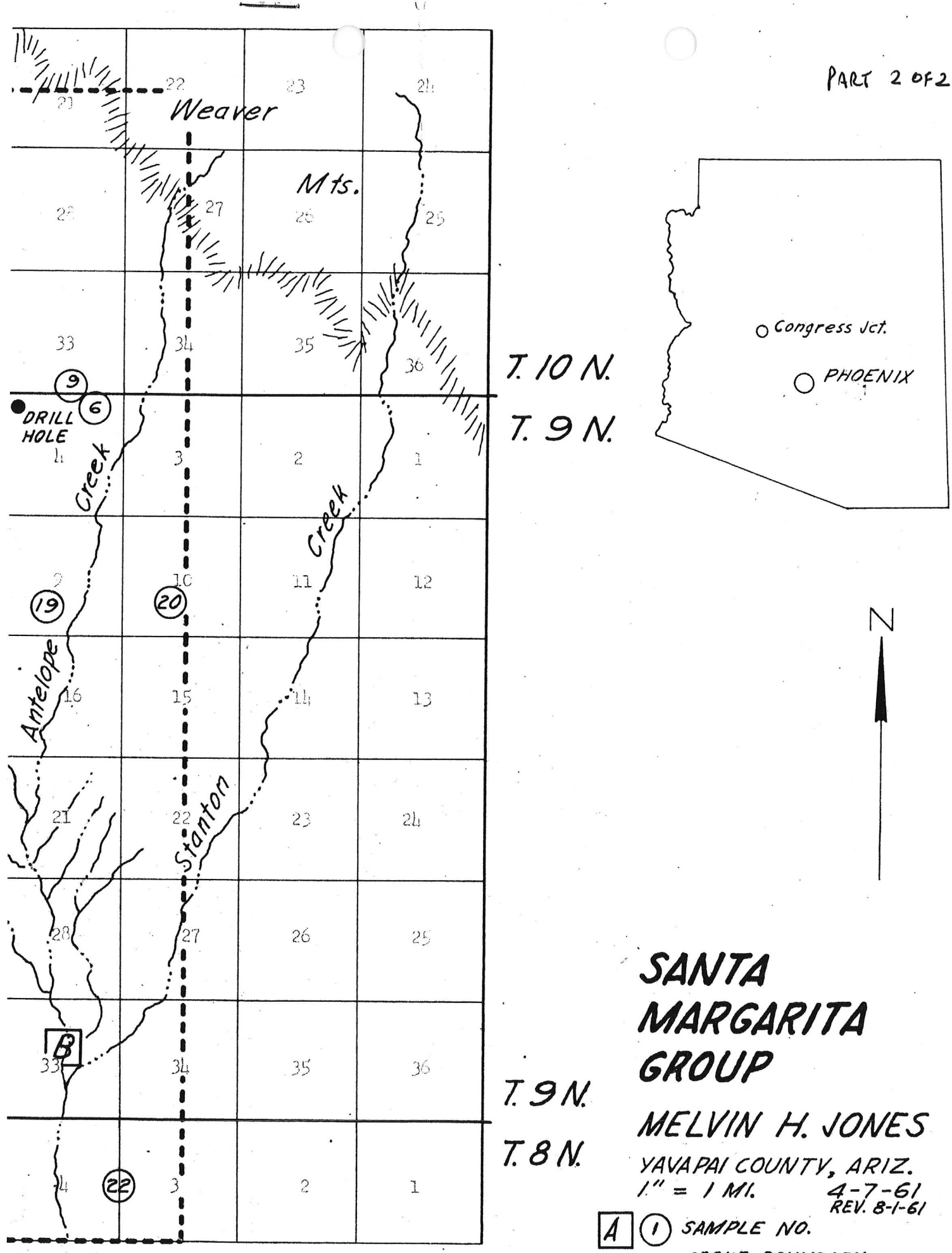
PART 2 OF 2


Weaver
Mts.
Creek
Creek
Antelope
Stanton
DRILL HOLE
T. 10 N.
T. 9 N.
T. 9 N.
T. 8 N.
Congress Jct.
PHOENIX
N
SANTA MARGARITA GROUP
MELVIN H. JONES
YAVAPAI COUNTY, ARIZ.
1" = 1 MI.
4-7-61
REV. 8-1-61
A (1) SAMPLE NO.
GROUP BOUNDARY

SANTA MARGARITA PLACERS

Octave Mining District

Yavapai County, Arizona

I N D E X

I INTRODUCTION:

This report has been prepared for the information and guidance of the Board of Directors, Magnet Mining Company, Inc., Box 87, Congress, Arizona. The report covers the general geology of the Santa Margarita group of placer mining claims and is supplemental to the preliminary geological valuation reports of Mr. Lee Hammons, dated April 25, 1961 and August 1, 1961, respectively; and the preliminary economic geology report of Mr. Mason W. Rankin dated December 12, 1961; and the preliminary marketing report of Mr. Gordon R. Wynne, Metallurgical Engineer, of January 29, 1962. A recapitulation of some general information on the mining property, (that may be well known to the Directors) is included for the purpose of consolidation and making a condensed record of the same.

The property under study is known as the Santa Margarita group of mining (iron) claims and is owned by the Magnet Mining Company and consists of 143 placer mining claims of 160 acres each (with a few exceptions) located in Townships 8,9, and 10, and Ranges 5 and 6, Salt River Base and Meridian (Arizona), totaling about 22,500 acres, in the immediate vicinity of Congress, Yavapai county, Arizona. (See map Exhibit A). The claims are recorded in the County Recorders' office, Prescott, Arizona as the "MAG" and "SM" claims and are now known as the Santa Margarita group. There is no need to go into the ownership of these claims, in great detail, for the reason that when Magnet Mining Company won the lawsuit from the claim jumpers, Burleau, et al, in 1963, the Superior Court Judge signed a finding on 28th of January 1963 stating that Magnet Mining Company is the owner (and listing the claims). Annual assessment work required by law to hold these claims has been accomplished and certificates to this effect are on file at said Yavapai county recorder's office. As observed by the writer, the staking is adequate as prescribed under Arizona mining law, but some stakes are now missing and should be replaced. The latter condition is apparently caused by cattle knocking down some posts, others washed away by heavy sporadic rains, or by thieving by individuals with malicious intent. Of tremdious importance to the valuation of the claims is the fact that the Santa Fe railroad crosses the property (with loading sidings) and the availability of electric power.

Investigation of this group of mining claims by the writer has been made on an irregular basis since April, 1961, with brief periodic studies made from time to time, often in association with others who are eminently qualified in geological examinations. This report will primarily be written around sampling that occurred during July and August, 1963, in connection with pitting accomplished as part of the annual assessment work. The sampling was accomplished by making channel cuts in pits about 12 feet deep that were dug with a power back hoe. Present with the writer at the time samples were taken was Mr. Frank Miller, Aztec court, Wickenburg, Arizona, who was also an employee of Magnet Mining Company, at the time.

II SUMMARY AND CONCLUSIO.

The so called "black sands" mining properties are a comparatively new and unknownfactor to most individuals who have been engaged in mining. Black sands were formerly considered as an obstacle to be overcome relative to placer gold mining. Some years back, it was little realized that the black particlem in the sands are almost pure magnetite, the iron mineral that is highest in iron content. By a simple process involving separation of this iron from the sand by magnetic separators, the iron can be recovered rapidly and inexpensively. By contrast, the normal source of iron ore involves drilling and blasting the ore out of solid rock, the subsequent crushing and milling and then magnetic separation, and this by comparison,a costly and time consuming process. The ore I have reference to is Taconite. The Santa Margarita claims are fortunately free from impurities such as, ilmenite(titanium),sulphides, zinc, phosphorus, aluminum, etc. Most of the other "black sand" properties are high in these impurities that are expensive to remove.

The big "break thru" for this type of mining was the invention of the giant excavator in Europe, a bucket wheel type of machine(mobile) that easily and rapidly eats into sand, gravel, soil, or any kind of alluvium. These machines are built in many sizes, up to a large one that will remove 13,000 cubic yards of material an hour, and it is operated by one man. These machines can dig up alluvial material at a cost of about from 1 cent to 3 cents a yard. It will be recalled that one yard(cubic) of black sand is about one and on-half short tons, thusly, if the machine is operating in sands that contain 5% magnetite, the cost of getting sufficent material out of an open pit to produce one short ton of magnetite concentrates (55% to 60% iron) is about $.43 (forty three cents). Large portions of the claims have magnetite that is way above the 5% figure mentioned, and in this case, the cost per ton is much less to mine. Following the removal of the ore from an open pit by the excavator, it can be transported on conveyer belts to high speed magnetic drum separators, that produce the iron concentrates at a small cost. Estimated processing costs are covered later on in this report.

With the depletion of the great iron reserves in the Eastern part of the United States, such as the Mesabi range, the demand for iron ore, particularly in the West, should be increased. There has been a population explosion in the SouthWest, and this in time, will result in iron and steel mills being built in the area. While, in the opinion of the writer, this mine can compete with other producers on long hauls, it would be a certainty on short hauls. Thus, the Santa Margarita group of claims are a most valuable property and the claims should be retained, maintained and developed into a producing mine.

The depth and full extent of the black sand (magnetite) has not been determined, but it can be safely estimated that there are 200 million tons of Fe_3O_4 (magnetite) in the general area. Assay reports indicate that the titanium content is under .01%. Most buyers of iron ore will take titanium up to .015% without penalty.

One of the possible outlets, that requires further examination,

is the use of the magnetite fines,(and pellets) in the beneficiation of low grade iron ores now used in the fabrication of high grade iron and steel. Further metallurgical studies are highly important and may create an additional demand for the magnetite sands (including some of the silica).

Another suggested use of the magnetite concentrates is for the leaching of copper from solution at copper refineries. At the present time junk tin cans are utilized and they are shipped long distances from city dumps for this purpose. Unverified information has it that the copper plant at Hayden, Arizona is now using magnetite fines. The market for this may be comparatively minor, but it would be fine to get production started.

III RECOMMENDATIONS

a That the Santa Margarita group be retained by Magnet Mining Company as a valuable mining property. If not sold (or leased), time should enhance the value of this iron property.

b That efforts be continued to find an operator(or buyer) with sufficient capital to place the property in production. It should be understood that a large amount of capital will have to be invested to cause large scale production and this will produce profits commensurate with the size and potentialities of the iron property.

c That extensive drilling and testing to determine probable(or proven) ore tonnage is not advised at this time. These activities are extremely expensive and the end will not justify the cost. The richer concentrations of iron ore should be worked first, with minor exploration work to located other rich bodies. The present known rich areas will produce a million tons of concentrates per year for several years. There is no need to lay out one hundred years of operation for the immediate future.

d That exploratory efforts be made to obtain ample water for milling purposes. While a "dry" operation is entirely feasible, it may be found,after engineering studies,that a "wet" magnetic separation in addition to the dry, may be desireable. Even in the middle of a hot Summer, it will be found that the sand a few feat below the surface is damp. This sand may have to be artificially dried for efficient separation on dry magnetic separators, and this could be costly. Water is available in the Peeple's valley and Wickenburg areas. However, it would be well to employ a competant Hydrologist to find ample water in claim area.

e That funds continue to be made available for continuing caretaking and maintenance of the property, including accomplishing the annual assessment work. The latter can be done mainly by further pitting and road building. Additional geophysical and metalurgical studies should be made.

f That, if funds can be made available, a small pilot plant be established on the Santa Margarita group.(Similiar to that outlined in the Hualapai report).

g Other recommendations (or findings) such as, procedure for processing the ore, best sites for initial production, etc., are elsewhere in

this manuscript.

IV GEOGRAPHY

The claims are located slightly to the West of the center of the State of Arizona, more specifically, in the immediate vicinity of the village of Congress, Yavapai County, Arizona. They skirt Congress which is on Highways 71, 89, and 93 (oiled roads). Congress is a regular stop on the Santa Fe railroad, and at the South portion of the mining claims, the railroad crosses the property. It is estimated that the distance from Congress to San Pedro (Port) California by rail is about 400 miles.

The property is in the Northern extremes of the Sonoran desert. Weaver mountain is immediately to the East and Date Creek mountain is to the North. In the immediate region of the claims are the ghost mining towns of Stanton and Octave (also Weaver) that were gold mining communities in the 80's. To the North are the fabulous old gold mines known as the Congress and Senate. At the present time, there are still some minor gold operations going on in the gold areas mentioned.

The claims are part of an alluvial bajada (series of fans or aprons of detrital or clastic material) formed by water erosion and deposition over millions of years, that slopes to the South and drainage goes Southward to the Hasseyampa river. Accessability is no problem with adjacent oil highways, however, it takes a 4 wheel drive vehicle to transverse the sandy dry stream beds and arroyos. Other geographical features are:

Climate is arid (desert).

Precipitation is under 10 inches annually. Most of the year is dry and rains occur on, perhaps, 5 days each year. They are sporadic and can be very heavy for short periods. Fixed equipment should not be placed in stream beds and washes, as "flash floods" after sudden rainstorms are not uncommon.

Elevation is 3032 feet above sea level at Congress and it is about 2595 feet in the South portion of the property.

Temperature gets up to 115 degrees F. in the Summer; low is about 20 degrees F. in the Winter.

Soil is Sierozen (pedical). The area is suitable for livestock ranching (ranchers have Federal grazing rights in the claim area). Water for cattle is a problem and during the dry months it is hauled by truck to cattle watering troughs. As mentioned elsewhere, water is a problem in this area.

Vegetation is desert Exerophytic plants (Yucca, cholla, spanish bayonet, pear cactus, octillo, sahuara, etc. - Palo verde trees are present, as is much mesquite).

V GEOLOGY

Of special interest is the antiquity of the mountains surounding the claims. The mountains are part of a batholith system that runs from Kingman Southeasterly accross the state and these are vast plutonic intrusives formed from magma deep in the bowels of the earth, that have now pushed up to their present heights. The Weaver mountain to the East that is mostly phanerocrystalline rocks (granite, quartz monsonite, diorite, etc) can be correlated to the Yavapai series that has an age of 1,600

million years (cr tozoic - archean). The sign icance of this is striking when one realizes that the Sierra Nevada mountains are Cretaceous (about 125 million years of age). As stated, the mountains are precambrian in the vicinity of the claims with the exception some quarternary basalts and tuffs at Blowout mountain at some distance to the East and tertiary andesites and tuffs in the vicinity of Peeples Valley. (these tuffs are locally called tufas, in error). One of the points I am trying to make is that there is a hiatus of in excess of one billion years in considering the present Weaver mountain formations. Thusly, the sedimentary alluvium in the valley below is composed of clastic rocks derived from formations that reposed on top of the present mountain in the ages past. The alluvium, whereon the claims are located has been mapped by the State Bureau of Mines as quarternary silts,sands, and gravels. They are exogenetic sedimentary deposits. For placement in a physiographic region, the property is in the Mountain Region of the Basin and Range Province.

The source of the magnetite in the sands in its present concentrations has never been satisfactorily explained and some geologists state that is is from the erosion of the granitic rocks in the area. This view is not concurred in by the writer as the ration of quartz and magnetite in the alluvium in no way compares to granites (in particular Quartz monsonites that are prevalent). Relative to the mentioned hiatus, there have been repeated formations that have been formed and eroded away and it is considered that ferromagnesiums such as gabbros, diabase, and some basalts have produced most of the black sands. In the Eastern states, it is generally accepted that Norite has produced most of the magnetite in the sands. It is of course understood that hypogene alteration of some minerals results in magnetite. For example, recrystalization of iron during alteration of biotite results in magnetite. Magnetite is often found with sulfide minerals, such as pyrite and chalcopyrite. It is of course, an important accessary mineral with diabase, gabbro and basalt. It is elementary that water,over millions of years,has eroded the rocks and minerals in the mountain and has transported this detrial material to the valley below where it was deposited as alluvium. Water has again and again reworked the deposits and the sediments have been abraded, degraded and aggraded (and sorted) many times. Wash and stream beds have constantly shifted over the area and this has resulted in alternating rich and lean deposits of magnetite. The alluvial material varies from clay to sand to gravel and all contain the particles of magnetite. Caliche is also found in limited amounts(also contains magnetite) and this of course was formed from ground water. As evidence of past water action, topset, foreset and bottom set beds, (and innumerable series of them,) can be observed through out the claims region.

The depth of this alluvium deposit is sometimes questioned. We have two drill holes that are down to 100 feet, but this has just scratched the surface. A rancher has a water well near the center of the claims that produces a small amount of water sufficient for watering cattle. This well goes down 1200 feet, and according to the driller, black sands were encountered all of the way down and bed rock was not touched (heresay information). A study of the stratigraphy of the claims region fails to indicate the presende of any pediment formations at the foot of the mountains. In the opinion of the writer, the alluvium goes down to great depths (at least two thousand feet).

At some time in the future, a complete petrographic study of the sand in the area should be made. A rather cursury study made by Geologist

Wayne Fox(with the writer present) in 1961 revealed: garnet, zircon, apatite, ilmenite, biotite, muscovite, sericite, silica, and magnetite in one sample, as I recall. No written record was made at the time. A thorough study will pin point the basic origin of the magnetite and provide other important information.

Gold has always been a matter of interest in any placer operation, and at one time, all placer activities in the West were for gold. At the upper part of Martinez wash during the period 1934 to 1949, the records of the state of Arizona reveal that $29,510.00 in gold was produced (Bulletin No.168, Arizona Bureau of Mines, 1961). In 1961, the writer was present when one sample was taken for gold from a dry creek bed near the Stanton road (Sec 3, R5W T10N) and the test revealed seventeen cents($.17) in gold per yard. No serious sampling has been undertaken for gold, however I did take three(3) samples in August 1963 that were tested by Geologist Mason Rankin. The sample from upper Martinez wash showed a trace of gold, the samples from Jones gulch and Stanton road(East part of claims) were negative. It is almost a certainty that there are minute quanties of gold thru-out the claims, but not in economically recoverable amounts. If and when iron is mined from the property, samples from areas where over-burden has been largely removed, should be obtained and tested. Gold possibilities should never be overlooked.

Also of interest, is the detection of Columbium and Rare Earths in a sample of the Martinez wash sand that was sent in for a spectro-scopic examination (See exhibit D). In the opinion of the writer, the rare earths are the mineral Fergusonite (a metaniobate and tantalate of yttrium) that is hard enough (H-6) to be water borne along with the quartz sands and not be completely abraded. Fergusonite and Columbite are known to be in the mining district. It is not believed that rare earths are present in adequate quantities sufficient to justify their recovery from the black sands.

Getting back to the more serious aspects of the mining claims, it may be of interest to go into the matter of sampling and testing that was accomplished(that is,the sampling) in August and July, 1963. (The testing was done in January 1964). Pits were dug that averaged from 10 to 12 feet in depth and the sampling was done by making a channel cut from top to bottom and about 5 lbs of the removed material was placed in an ore sack and properly labeled. The term "magnetics" as used in the report, means the material that can be lifted free from the ore sample by a simple hand magnet. It will be understood that this will be almost entirely magnetite, however some small particles of ilmenite($FeTiO_3$) may also be lifted, as-well-as small pieces of quartz or rock to which particles of magnetie are embedded or attached. Magnetite in pure form is 72.4% iron and 27.6% oxygen, and it should be clearly understood that the material picked up by a magnet, is mostly iron. We have learned in the past, that simple screening of black sand can greatly enrich the end iron product. Therefore, in the laboratory testing of the samples, we tested each sample two times. One time with magnetic removal from the sample "as is", and the other time after screening thru a 14 mesh screen. It is not intended to give the impress-ion that 14 mesh is best for screening, as better results may result from using much finer screens. This is something that will have to be

solved as a result of laboratory experimentation. The testing of the samples was accomplished by weighing the sample(heads) on a gram balance, then carefully removing the magnetic particles(mids) with a powerful hand magnet and weighing them on the balance. Of course the residue of the sample(the tails) is discarded. By simple arithmetical computation, the percentage of magnetics by weight is determined. From our "rule of thumb", the samples that are 5% or higher in magnetics, are considered as excellent. It is important to understand that the magnetite particles from the samples of some of the claims, break cleanly and freely from the sand upon magnetic removal and they run about 60% iron. The magnetics from other samples cling to particles of quartz and rock to which they are attached or embedded and these impurities are lifted by the magnet along with the magnetite. Upon assay of these magnetics, the end result may be 25% iron. However, during the milling phase of production, these foreign particles can be easily removed by "rolling". Four general areas of the claims were sampled(as mentioned previously) during the annual assessment work in 1963 and the following are the consolidated results; (See exhibit C)

Location	Total magnetics	+14 mesh	-14 mesh
Upper Martinez wash		11.1%	18.0%
Jones gulch area		7.0%	13.1%
East of Congress (Martinez wash)		5.3%	6.7%
Vicinity of Stanton road (East portion of claims)		17.2%	20.4%
	Average	10.1%	14.5%

A composite sample of all of the magnetics was sent to the Arizona Assay Office, Phoenix, Arizona for determination of iron content and the result is 26 % iron. (See exhibit E) It was possible that all of the samples should have been sent in for assay, but this was not done from the reason that it would be costly, and the end results would not justify the expense. So many samples have been assayed in the past (these reports are available) and there is a close consistancy in all of the results. At this time, it is well to mention that the areas sampled (as outlined above) are considered as among our richest. There are other areas on the mining property where the iron percentages are leaner (and probably others that will be higher). While others may not agree, the writer is delighted with the iron percentages listed.

Perhaps someone would like to question the figure of 200 million tons of magnetite concentrates on the mining claims, that I mentioned earlier. Actually, this is a most conservative estimate. A cubic yard has about one and one-half tons of sand (black sand category) and using a 5% magnetics (or better still, 5% magnetite) as a basis, each yard will produce 150 pounds of concentrates. Thusly, it takes about 13.3 yards(Cu) of alluvial material to produce one(1) short ton of magnetite concentrates. With an area 9 miles in length and 5 miles in width, and a depth up to several thousand feet, the tonnage will be fabulous. Computations reveal that one(1) square mile to a depth of fifty feet (50') will produce 3.8 million tons of concentrates. As none of these figures have been verified in a practical fashion, let us merely say there is sufficient tonnage, so that it is no problem. "Proven tonnage" will require extensive and expensive drilling at great depth.

VI ORE PROCESSING

Previous discussion in earlier portions of this report have covered some of the aspects of ore processing. I would like to make it clear now, that ore dressing comes under metallurgical engineering, and I do not claim to be an expert in this field.

For the Santa Margarita claims to be fully exploited and for production to be somewhat commensurate with the iron reserves that are available, will require equipment that can rapidly process large tonnages and this type of equipment is expensive. Of course, a market should be ascertained in advance, and the tonnages that can be sold will determine the capacity of the equipment to be installed.

To start with, a mobile excavator should be procured, perhaps a machine that can remove 2500 cubic yards an hour. It is understood that the larger excavators are made in Europe, but there are agents in the United States that handle them. It is understood that they are usually powered by electric motors, thusly, adequate electric power lines should be placed on the property. (See exhibit F for a picture of one of the excavators).

Adjacent to, or near the excavator, a portable grizzley and shaker screens should be set up to remove all waste material that is larger than +10 mesh (roughly estimated) and the tailings resulting therefrom should be disposed off on a conveyer belt to an unused portion of the property (or to the other side of the pit when operations have been going on for some time). The -10 mesh material should be moved by conveyer belt (or truck) to a semi-permanent mill installation that basically contains a battery of high speed magnetic separators. My idea would be that -10 mesh ore would initially go thru dry magnetic separators and following this, that magnetics would be rolled (by going thru a pair of giant steel rollers) down to about 60 mesh thusly breaking away particles of quartz and rock that will be disposed of by conveyer belt. Following this, the more concentrated magnetics to go into "wet" magnetic separators and the end result should be magnetite that should assay about 60% iron. I would like to add here, that if ample water is not available, then the final processing should be done with dry magnetic separators. In this case, dust disposal will be a problem. Following the magnetic separation, the concentrated magnetite can go into giant hoppers for storage with subsequent moval ~~either~~ by conveyer belt (or truck) to railroad cars for shipment purposes. If pellets are desired, a pellitizing plant should also be established.

The foregoing is my idea of a processing system. It would be well to have a thorough engineering study made before the procurement and installation of equipment is accomplished. There may be other more efficient systems for the removal of the magnetite. In any event, there should be no hesitation in the obtaining of ample water and electric power as an initial project.

I almost forgot to mention one of the problems that can be serious, if adequate water is not obtained. Several feet below the

surface, the alluvium is always damp, even in the desert climate during the hot days. The particles of magnetite in the alluvium separate poorly in the presence of a magnet, when the host material contains moisture. When the sand is dry, magnetic separation is complete and clean. In the absence of wet type magnetic separators(and it takes copious quantities of water to operate them), it may be necessary to place gas dryers (or infra red lamps) on the processing line.

VII ECONOMIC CONSIDERATIONS

As mentioned previously, there is a railroad on the mining claims and probable markets are not extremely distant. No attempt will be made to go into the initial cost of required major machinery, installation, and utilities, but let us say that it will take several millions of dollars.

Estimated cost of producing each short ton of magnetite concentrate, including transportation via railroad for marketing(and other factors) follow:

a Removing the ore from the orebody with the giant excavator at 3 1/4 cents per cubic yard(it is reported that one excavator operates in South America for slightly over one cent a yard). Using the figure of 5% magnetite in the raw material, one ton of concentrates will cost:

	$.43
Operating the grizzley and screens:	.12
Conveyer belt to processing plant:	.05
Magnetic drum separation (2 passes):	.38
Processing thru rollers:	.05
Haulage to railhead(2 miles) and loading:	.25
For factors unknown at this time:	.25
Estimated cost in cars at Congress:	$1.53

b Using the shipment to San Pedro port, California as a basis, it is reasonable to assume that a freight rate of $4.00 per ton can be negotiated for with the railroad. Estimated RR freight cost: $4.00

c Combined cost of production and shipment to possible market (one short ton of concentrates 51 1/2% iron) : $5.53

d Recently reported iron price (51 1/2% fines) $10.65
(58% to 60% iron should command a much higher price)

e Possible profit per/ton of concentrates: $5.12

It is also probable that revenue can be expected from other by-products of the production, such as, sand and gravel. The mining claims can be eventually patented and desert land has a value of about $40.00 per acre.

The undersigned will be glad to elucidate on, or substanciate, any of the subject matter covered in this report and will appreciate being contacted for this purpose.

February 3, 1964

Respectfully submitted,

Box 386
Yarnell, Arizona
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REGISTERED GEOLOGIST · STATE OF CALIFORNIA · Melvin H. Jones No. 841

MELVIN H JONES
Geologist

DEPARTMENT OF MINERAL RESOURCES
State of Arizona
MINE OWNER'S REPORT

Date 5 May 1961

1. Mine: Santa Margarita (placer)
2. Location: Sec. 42 Secs Twp. 8,9, and 10 North / Range 5 and 6 West. Nearest Town Congress Distance adjoins
   Direction ..... Nearest R.R. Santa Fe (crosses property) Distance .....
   Road Conditions U.S. highway 89 crosses property
3. Mining District and County: Octave - Yavapai county
4. Former Name of Mine: Imperial iron 7-13-61
5. Owner: Melvin H. Jones (now Magnet Mining Co.)
   Address: box 807, Congress, Ariz.
6. Operator: none
   Address: .....
7. Principal Minerals: Magnetite sands (also a minor percentage of gold)
8. Number of Claims: Lode ..... Patented ..... Unpatented none
   Placer ..... Patented ..... Unpatented 220
9. Type of Surrounding Terrain: Bajada or alluvial plain (bordered by Weaver and Date Creek Mtns.)

10. Geology and Mineralization: Alluvial sands and gravels
    main mineralization is in three major creek beds (Martinez, Antelope, and Stanton) and hundreds of minor tributaries that flow into same. Depth is not known, but is at least several hundred feet or perhaps several thousand. Creek beds vary from 100 feet in width to more than a 1000 feet.

11. Dimension and Value of Ore Body: This will be unknown untill full field exploration is completed. But should be in the millions of tons. Value is unknown at present stage.

Please give as complete information as possible and attach copies of engineer's reports, shipment returns, maps, etc. if you wish to have them available in this Department's files for inspection by prospective leasors or buyers.

Lee Hammons' preliminary Geological valuation report. (over)

12. Ore "Blocked Out" or "In Sight": No core has been blocked out, but the black (magnetite) sands can be seen on the surface universally.

Ore Probable: 100 million tons

13. Mine Workings—Amount and Condition: none

	No.	Feet	Condition
Shafts	none		
Raises			
Tunnels			
Crosscuts			
Stopes			

14. Water Supply: ~~Water will be difficult as this is in a desert area.~~ However very little will be required for the type of operation contemplated. ~~(dry magnetic separator)~~

15. Brief History: Area was originally staked out and filed on between March and July 1959 by Gordon Howard, W. R. Johnson and associates. Is primarily on U.S. government land. Later the orignal claiments incorporated under the name of Imperial Iron. Imperial Iron, Inc., sold the property to ~~Melvin H. Jones for an undisclosed sum in July 1961.~~ ~~Assessment work~~ has been completed each year and a certificates to that effect has been ~~filed with the Yavapai County Recorder.~~ ~~More definate developement work~~ is contemplated for the future.

16. Remarks:

~~In its present undeveloped state, owner values the property at~~ $100,000.00 .

Owner hopes to make a contract with an operator capable of handling large tonage. If this does not materialize, owner is contemplating doing his own operating on a smaller scale (100 tons a day)

17. If Property for Sale, List Approximate Price and Terms:

See remark above. No special effort is being made to sell the property, but owner would be interested in any reasonable offer

18. Signature: Melvin H. Jones

5 MAY 1961

Paper by John D. Saussaman, which was published after being presented at San Francisco November 7, 1958 at American Iron and Steel Institute meeting was not copied.

EFFECT OF VARIOUS FACTORS IN THE ORE ON BLAST FURNACE OPERATION

J. H. Strassburger,
Vice President in Charge of Engineering, Weirton Steel Co., Weirton, W. Va.

In the past several years the production of pig iron has become a more important factor in steel ingot production. With the large increase in steel production, which at present amounts to 115,000,000 tons yearly, the scrap supply has been unable to keep up with the demand so that more and more pig iron is required to maintain ingot production. At the same time, the price of scrap has reached a plateau which in the long-range picture is estimated to be higher than the cost of producing pig iron. Another adverse factor in the scrap situation is the deterioration of scrap quality, both in physical condition and chemical analysis. Alloy residuals in scrap are a definite deterrent to the ability for producing high quality, deep drawn steel. It is estimated by government and industry authorities that a 25% increase in ingot production will be required during the next 10 years to keep pace with steel consumption requirements. It is therefore evident that with this projected increase in steel production the scrap situation will become more critical and the necessity for using a greater proportion of pig iron will become an economic necessity.

At the present time the annual pig iron production in the United States amounts to about 84,000,000 tons a year. An increase of 25% in pig iron production to keep pace with increased ingot requirement would mean that 105,000,000 tons of pig iron will be required annually within 10 years, or an increase of over 20,000,000 tons a year. This would require the building of approximately 40 blast furnaces in order to supply the increased pig iron demand with the present proportions of pig iron and scrap for production of ingots. A present-day modern blast furnace of 28' to 30' hearth diameter, complete with coke ovens, requires an investment of between $40,000,000 and $50,000,000 per furnace without the cost of coal mines. It is evident that the investment requirement for blast furnaces to meet the projected demand would range between $1,600,000,000 to $2,000,000,000 in capital investment. It is therefore apparent that it is mandatory that every effort be made to increase the production of iron from existing furnaces so as to minimize the huge capital investment required for new units.

In order to obtain the optimum iron production in the blast furnace operation, it will be necessary to prepare all of the burden materials, including coke, ore and limestone, so that the maximum iron production can be obtained with the minimum use of raw materials. It is evident that raw materials of the correct chemical analysis and sizing must be available for feeding the blast furnaces. We will not dwell on the improvements necessary for coke and limestone other than to say that they must be of good quality and correst sizing. Our chief interest is in the beneficiation of the iron ore in the burden.

Up until recently most blast furnace operators have been well satisfied with iron ores which averaged about 50% Fe, 10% to 11% silica, and with other elements in correct proportion. With the advent of beneficiating processes for improving iron ore quality, together with the use of higher grade foreign ores, it has been found that the use of better ores has resulted in a remarkable improvement in blast furnace operation with increased iron tonnage and lowered costs due to reduction of coke and limestone requirements. At Weirton at the present time we are using about 40% Labrador ore in our blast furnaces. This ore is averaging about 54% iron and 5% silica. The operating results with Labrador ore in the burden has shown an increased iron production of about 10% with a decrease of almost 300 lbs. in limestone and over 100 lbs. saving in coke per ton of pig iron. With the results obtained from

the use of a proportion higher grade ore, we are convinced that all of the iron ore charged into a blast furnace should be upgraded for optimum results.

The following analysis shows the benefits of improving the quality of iron ore burden. Starting with an iron ore containing 50% Fe and 10.5% silica and by beneficiation processes improving this ore so that it contains 54% Fe and 8% silica, we estimate the following savings on the basis that any fines in the iron ore will be charged as sintered or agglomerated material:

Iron production increased by about 13%
Coke rate reduced 200 lbs. per ton
Limestone reduced 250 lbs. per ton

Assuming a basis of $10.00 coke and $2.00 limestone, the estimated savings would amount to approximately $0.75 per ton of pig iron taking into account the savings in coke, limestone, "cost above" and allowing for the cost of producing sinter from the ore fines. In taking a hypothetical operation which is stepped up to 6,000 tons of pig iron per day, the savings of beneficiation and agglomeration would amount to about $4,500 per day or $1,500,000 per year. In addition to the operating savings, the production of about 700 tons of additional pig iron from existing facilities would be equivalent to the saving of about $20,000,000 in capital investment for increased blast furnace and coke oven facilities.

From the above analysis it is our firm conviction that every effort must be made by the iron ore mining industry for research and development work so that economic processes can be developed for the beneficiation of the iron ores. It should be stressed that the decrease in silica is as important a factor in iron quality as the Fe content. Analyses have been made to show that 1% excess silica in iron ore would result in an increase of about 100 lbs. in slag volume, 40 lbs. additional coke per ton of iron, and 85 lbs. additional limestone, and a loss of over 2% in iron production. The evaluation of these factors is equivalent to about $0.35 per ton of iron and over $0.20 per gross ton of ore used. In developing processes for the beneficiation of iron ore, careful studies must be made so that an economic operation can be obtained. It is necessary that the highest yield of shippable ore be obtained in the beneficiation process so that the beneficiation will result in not only an improved quality of ore but also a higher yield of ore than could be obtained by ordinary washing methods.

There are, no doubt, many properties which will still produce a direct shipping ore which would not be economic for beneficiation. Such ores might range from 10% to 13% in natural silica so that it is necessary that the treated ores which are blended with the direct shipping ores in the blast furnace be of a sufficiently low silica content so that the blast furnace operator will have an overall burden of the correct analysis for the blast furnace smelting operation.

With the iron ore mines shipping high quality beneficiated ores to the blast furnaces, it will be necessary for the steel companies to provide facilities so that the ore fines which would naturally be increased in the beneficiation process can be agglomerated into sinter or pellets so as to provide a physically sized material for obtaining good gas solid contact in the blast furnaces and minimize channeling and dusting. It also behooves the blast furnace operator to produce the highest quality sinter possible with additions of lime for self-fluxing properties which would result in a further decrease in coke rate and increased iron production. The use of higher blast heats, slag analysis control, moisture control, oxygenation of blast, etc. are all necessary factors in obtaining the optimum in iron from any given blast furnace installation. If the production of the blast furnace in the United States can be increased by one-half ton per square foot of hearth area daily, we would obtain about a 20% increase in pig iron production. It is our opinion that this goal is realistic and that concerted efforts of all concerned in the production of pig iron starting with the ore, stone and coke, will be necessary.

Talk before AIME, Hibbing, Minn.

	Tons	Specs	Price	Freight
Tanbum	260,000			
Ah Kee	190,000	63/58	$9.90 FOB, + 30¢	
			- 40¢, 63 to 60%	
			- 80¢, 60 to 58%	
Lop	100,000			

India — 48s to 49s, or $6.768 to $6.909

North American Ore

Eagle Mine (proposed)			$14.60 CIF (shipper) 9.50 FOB (Steel Mills)			
Nevada	300,000	58-60/56%	$10.70 FOB	Mill	Owner	Last Year
	1,100,000	to be shipped from -	Vancouver	$5.10	$5.20	$4.95
	451,000	to be shipped from -	Stockton	5.25	5.40	5.10

South American Ore

Marcona	9,500	60/58	$16.00 CIF	
	30,000	60/58	14.40 CIF	
Brazil (proposed)			11.25 FOB (shipper)	$7.40 - Steel Mills
			10.45 FOB (Steel Mills)	8.00 - Shipper
		68.5/68	11.50 FOB (Brazilian export check price)	
Chili				
Muller Co. offer	2,500,000 (5 years)	65/65	9.50 FOB, for open hearth use	
		63/60	7.50 FOB, Blast furnace use	
Peru (proposal)			26¢ CIF per Fe 1%	

Korean Iron Ore

(proposed)		49s/8d, FOB ($7.003)	30s or ($4.23)

South Africa

Boschkop	13,000	65/65	79s, FOB (11.139)	53s, or ($7.473)

Proposed:

Mill	Owner
50s ($7.05)	52s to 53s ($7.332 7.473)

SUMMARY OF 1960 IRON ORE CONTRACTS WITH JAPAN STEEL MILLS

	Tons	Specs	Price	Freight
Philippines				
Mati	200,000			$3.62 - Yawata/Tobata 3.72 - Hirohata/Hanshin 3.91 - Keihin/Chiba 4.10 - Muroran/Kamaishi
Larap	1,000,000			$3.12 - Yawata/Tobata 3.22 - Hirohata/Hanshin 3.42 - Keihin/Chiba 3.59 - Muroran/Kamaishi
Sibuguey	275,000 (no definite agreement) 4,000,000 (proposed for 7 years)			

Report of Mr. Nagashima, Representative of Mitsue Bussan, Manila -

Ascertained ore quantity	Fe 57%	5,148,732 MT
Estimated ore quantity	Fe 55%	2,412,000 MT
Total	Fe 56%	7,560,732 MT

Quality of iron ore

Fe	Standard	57.%	Guaranteed Min.	54.00%
S	"	0.15%	" "	0.3.%
P	"	0.10%	" "	0.15%
Cu	"	0.07%	" "	0.10%
Si02 + Al203	"	13.00%	" "	17.00%
Ratio of Si02 to Al203	"	2 to 1	" "	2-1/2 to 1
Moisture	"	5.00%	" "	10.00%
Size	under 10 mm	10.00%		
	10 - 50 mm	25.00%		
	50 - 100 mm	50.00%		
	100 - 150 mm	15.00%		

Shipping plan -

July, 1960 to March 1961	-	275,000 tons
April 1961 to March 1962	-	550,000 "
April 1962 to March 1963	-	600,000 "
April 1963 to March 1964	-	625,000 "
April 1964 to March 1965	-	650,000 "
April 1965 to March 1966	-	650,000 "
April 1966 to March 1967	-	650,000 "
Total		4,000,000 tons

SUMMARY OF 1960 IRON ORE CONTRACTS WITH JAPAN STEEL MILLS

(Compiled from THE JAPAN COMMERCE)

	Tons	Specs	Price	Freight
Goa				
Shantilal Kantilal	3,000,000 (5 years)			
	550,000 (1960)	63/62	$8.80 FOB, bonus 14¢, penalty 23¢	
		62/60	7.70 " " none, " 30¢	
		58/57	5.80 " " " " 20¢	
Nugo Neu	100,000	62/60	98a/- CIF ($13.82)	
Vandacer	50,000	62/60	98a/- CIF ($13.82)	
Salgoocar	150,000 to 200,000		98a/- CIF ($13.82)	48s or $6.768 - owners 45s or $6.345 - charterer
Malaya				
Ipoh (MMC)	250,000	63/58	$9.90 FOB	$5.45
Kepong	320,000	63/58	9.90 FOB	
Dungun Ben A	2,200,000	60/57	9.50 FOB, ∤ 25¢ over 60% - 60¢, 50 to 57%	32s ($4.51) - Yawata/ Tobata
Sinter	250,000	58/55	7.35 FOB, ∤ 30¢, over 58% - 40¢, 58 to 57%	33s/1d (4.664) - Hirohata/ Hanshin 34s/9d - Muroran/ Kamaishi 34s/2d ($4.82) - Tokyo/ Yokohama
Sri Medan	420,000	61/57	9.20 FOB, ∤ 30¢ over 60% - 40¢, 58 to 57%	$5.22 - Yawata/ Tobata $5.33 - Hirohata/ Hanshin $5.48 - Keihin/ Chiba $5.62 - Muroran/ Kamaishi
Tomangan	500,000	55/52	56a/7d ($7.98), FOB	
Ipoh (EMC)	150,000	63/58	$9.90, ∤ 30¢ - 40¢, 63 to 60% - 80¢, 60 to 58%	$5.45

SUMMARY OF FREIGHT RATES FROM
FOREIGN PORTS TO JAPAN PORTS

(Compiled from THE JAPAN COMMERCE)

Philippines		
Mati	- $ 3.62 to $ 4.10	
Larap	- 3.12 to 3.59	
Goa	- from $ 6.345 to $ 6.768	
Malaya	- from 4.51 to 5.62	
India	- from 6.768 to 6.909	(under negotiation)
Korea	- 4.23	(proposed)
North America		
Vancouver	- from $ 5.10 to $ 5.20	(under negotiation)
Stockton	- from 5.25 to 5.40	(under negotiation)
South America		
Brazil	- from $ 7.80 to $ 8.00	(under negotiation)
Pacific Coast		(no information)
South Africa		
Boschkop	- $ 7.473	
	- from $ 7.05 to $ 7.473	(under negotiation)

SANTA MARGARITA GROUP

YAVAPAI COUNTY
OCTAVE DIST.

MAGNET MINING CO., Inc., Box 807, Congress, Ariz.
Gordon G. Howard, Pres. & Gen. Mgr.
Wm. R. Johnson, Gen. Del., Kingman, Vice Pres.
Charles Sippel, Vice Pres., San Francisco, Calif.
(Melvin)M. H. Jones, Sec. Treas.

Information from Lee Hammons, 7-17-61
