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PRINTED: 05/30/2002

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES AZMILS DATA

PRIMARY NAME: PIG IRON MINE

ALTERNATE NAMES:

GILA COUNTY MILS NUMBER: 403A

LOCATION: TOWNSHIP 8 N RANGE 12 E SECTION 32 QUARTER E2  
LATITUDE: N 33DEG 59MIN 40SEC LONGITUDE: W 111DEG 10MIN 00SEC  
TOPO MAP NAME: PICTURE MOUNTAIN - 7.5 MIN

CURRENT STATUS: EXP PROSPECT

COMMODITY:  
IRON HEMATITE

BIBLIOGRAPHY:

ADMMR PIG IRON MINE FILE  
HARRER C M RECONN IRON RES AZ USBM IC 8236  
1964P 47-51  
DEPOSIT EXTENTD INTO SEC 20, 29 & 30-T8N-R12E  
AND SEC 36-T8N-R11E

DEPARTMENT OF MINERAL RESOURCES  
STATE OF ARIZONA  
FIELD ENGINEERS REPORT

Chalk Mountain Iron Deposits

Date October 4, 1957

Act Spring Creek, Gila County

Engineer Lewis A. Smith

Subject:

Owners:

Jip Tute ✓ *G. E. Toot*  
Loch Kline ✓  
W. Hardy Stockman ✓  
Andrew Grantham ✓

Property: 22 claims, with bulldozer cuts and roads for location.  
Sec. ~~14 & 23~~, T9n, R11E, north side of Chalk Mountain.

*Sec. 32 T8N R12E*

Geology: The preliminary tests indicate about 20-48% iron with low silica.  
Sample sent to Arizona Bureau of Mines to test for beneficiation.

The iron is in the form of limonite and hematite around the grains  
of country rock which looks like sandstone.

*Corrections from R. McCauley, USBM.*

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**U. S. DEPARTMENT OF THE INTERIOR**

**BUREAU OF MINES**

**DIVISION OF MINERAL TECHNOLOGY, REGION III**

**SOUTHWEST EXPERIMENT STATION**

**Tucson, Arizona**

**METALLURGICAL REPORT No. TMR-474-1**

**PRELIMINARY BENEFICIATION TESTS  
ON AN IRON ORE FROM THE FIG  
IRON DEPOSIT, TONTO BASIN,  
GILA COUNTY, ARIZONA**

*SPRINGS CREEK DIST*

**By: William A. McKinney**

**September 23, 1957**

**OFFICIAL USE ONLY**

**PRELIMINARY BENEFICIATION TESTS ON AN IRON ORE FROM  
THE PIG IRON DEPOSIT, TONTO BASIN, GILA COUNTY, ARIZ.**

**By: William A. McKinney**

**INTRODUCTION AND SUMMARY**

A cursory laboratory investigation was made on an iron-bearing quartzite to determine if the ore could be treated by reductive roasting and subsequent magnetic concentration or by flotation to yield a high grade iron product. The ore sample, assaying 18.6 percent iron, was from the Pig Iron group of claims in Section 16, 17, 20 and 21, T. 8 N., R. 12 E., 12 miles northeast of Tonto Basin, Gila County, Ariz. The sample was submitted by L. A. Stewart, mining engineer, Southwest Experiment Station on July 26, 1957, and was taken from an outcrop 600 feet in height, 1,500 feet wide and 3 to 4 miles long. Estimated size of the deposit is about 100 million tons of ore.

In view of the significant tonnage of ore in sight the preliminary beneficiation tests were made to determine if further testing of larger samples from the deposit would be warranted. Reductive roasting and magnetic separation of minus 200-mesh feed or finer recovered 84.7 percent of the iron in a product that assayed 48.84 percent Fe. The magnetic concentrate also contained 8.84 percent  $TiO_2$  in the form of ilmenite. The principal contaminants in the concentrate were muscovite and quartz which contained micron inclusions of magnetic iron. These particles could not be rejected from the concentrate in the Davis tube even at the minimum magnetic intensity.

Anionic flotation of the siliceous gangue from charges of the ore ground to pass 200 mesh proved unsatisfactory. Although clean quartz was rejected from the flotation feed, the mica and interlocked quartz, and cryptocrystalline silica were not amenable to flotation. Because of the high titanium content of the sample and the intimate interlocking of the iron with the gangue minerals, recovery of high grade iron concentrates by magnetic separation of reduced feed or by flotation of the siliceous gangue is not feasible.

## DESCRIPTION OF THE SAMPLE

The sample was an impure quartzite containing an appreciable quantity of fine-grained muscovite, hematite and limonite. Some of the hematite particles were partly altered to limonite. The bulk of the hematite was disseminated uniformly throughout the ore in grains ranging in size between 28 and 400 mesh. About one-fourth of the iron content was represented by limonitic stains and micron-size hematite inclusions in the muscovite and quartz. A large portion of the limonite occurred as micron inclusions in both the muscovite and hematite. A partial analysis of the ore follows:

Assay, percent		
Fe	TiO <sub>2</sub>	SiO <sub>2</sub>
18.59	3.32	57.1

## REDUCTIVE ROASTING AND MAGNETIC SEPARATION

A portion of the ore was dry-crushed to pass 28 mesh and roasted in a revolving drum furnace for 30 minutes at 550°C. using hydrogen to reduce the hematite and limonite to the magnetic form. After the roast the charge was cooled to 150°C. in a reducing atmosphere. The cooled charge then was ground to several different mesh sizes and separated magnetically in a Davis tube. Results of concentration tests on minus 28, 65, 107, 200 and 400-mesh portions of the reduced ore are summarized in table 1.

Optimum results were obtained by magnetic concentration of feeds finer than 200 mesh. Treatment of the minus 200-mesh charge recovered 84.7 percent of the iron in a concentrate assaying 48.84 percent Fe, 8.84 percent TiO<sub>2</sub> and 16.7 percent SiO<sub>2</sub>. The principle gangue contaminants were muscovite and quartz. About 63 percent of the contaminating material was included in the iron particles whereas the remaining 40 percent was present as free grains that contained micron inclusions of magnetic iron and limonite.

## FLOTATION

Cursorv anionic flotation tests also were made on the ore to determine if the iron could be concentrated by removal of the siliceous gangue. The tests were made on charges of the ore wet ground to minus 200 mesh. Lime activation of the silica in conjunction with starch depression of the iron followed

**Table 1. Summarized results of magnetic concentration tests on roasted  
Pig Iron ore**

<u>Grind, mesh</u>	<u>Products</u>	<u>Weight, percent</u>	<u>Assay, percent Fe</u>	<u>Distribution, percent Fe</u>
20	Concentrate	75.3	23.01	96.1
	Tailing	24.7	2.86	3.9
	Composite	100.0	18.03	100.0
65	Concentrate	45.3	36.43	59.4
	Tailing	54.7	3.57	10.6
	Composite	100.0	18.45	100.0
100	Concentrate	35.8	44.72	86.3
	Tailing	64.2	3.97	13.7
	Composite	100.0	18.55	100.0
200	Concentrate	31.9	48.84*	84.7
	Tailing	68.1	4.12	15.3
	Composite	100.0	18.39	100.0
400	Concentrate	30.3	49.30	81.0
	Tailing	69.7	5.03	19.0
	Composite	100.0	18.44	100.0

\* Assayed 8.84 percent  $TiO_2$  and 16.7 percent  $SiO_2$

by flotation of the gangue with tallol collector gave a good rejection of the clean quartz. However, the contaminated and iron-stained quartz and the muscovite mica failed to float so that the grade of iron product was low. The iron concentrate assayed only 33.3 percent Fe and accounted for an iron recovery of 52.1 percent.

### CONCLUSIONS

Cursory reductive roasting and magnetic concentration tests on the finely-ground pig iron ore have demonstrated that 85 percent of the iron can be recovered in a product assaying about 49 percent iron. Recovery of a higher grade iron product proved unfeasible even from charges ground to pass 400 mesh owing to intimate interlocking of mica and quartz gangue with the hematite. Concentration of the iron by anionic flotation of the silica was unsuccessful.

If further work is undertaken on the sample, the feasibility of treating the ore by a combination of magnetic separation and flotation is worthy of consideration. High-iron products might be obtained by anionic or cationic flotation of the quartz and micaceous gangues from the magnetic concentrates. However, it is extremely unlikely that rejection of the titanium from the material would prove successful.

September 23, 1957

Memorandum

To: Walter R. Storms

From: Carl Rampacek

Subject: Metallurgical Report No. TMR-474-1: Preliminary Beneficiation Tests on an Iron Ore from the Pig Iron Deposit, Tonto Basin, Gila County, Ariz.

Submitted herewith are copies of TMR-<sup>474-</sup>~~464~~-1, entitled, Preliminary Beneficiation Tests on an Iron Ore from the Pig Iron Deposit, Tonto Basin, Gila County, Ariz., for your information.

*Carl Rampacek*  
Carl Rampacek

Enc:

cc: JBClemmer (2)  
LAStewart

T-Met-6  
3-11-57

UNITED STATES DEPARTMENT OF THE INTERIOR  
BUREAU OF MINES  
SOUTHWEST EXPERIMENT STATION

SAMPLE REPORT

Date August 22, 1957

To: Carl Rampacsek From: Walter R. Storms

Name and location of property or project: Fig Iron group, iron deposit.  
20 road miles northeast of Tonto Basin, Gila County, Ariz.  
in approx. secs. 16, 17, 20 and 21, T. 8 N., R. 12 E., unsurveyed

Number of samples in shipment: 1 in 1 bags. Total weight 10<sup>0</sup>

Shipped: \_\_\_\_\_; GBL No. \_\_\_\_\_ Carrier L. A. Stewart

Nature of ore and general comments:

Low-grade iron in quartzite (?)

Identification of samples with tests or analyses desired:

#15203. These pieces were given to me by one of the owners who thinks the  
area on the northeast side of the deposit is somewhat better than  
where I took sample #15201.

I did not cross the canyon to investigate that part of the group.

Assay for Fe

(Please save a small piece of this ore for me.)

CC C. Rampacsek (Orig. & 1)  
467-Iron  
DF

LAStewart/frj

467- Iron

September 12, 1957

will

**Memorandum**

**To:** Carl Rompcek  
**From:** Lamar G. Evans  
**Subject:** Heavy-Liquid Separation of a Low-Grade Hematite Sample from the Tonto National Forest. (Ref. No. ME-791)

Herewith are the results of heavy-liquid separation and cursory microscopic examination of a low-grade hematite sample from the Tonto Basin area. The sample was received from W. F. Paine, Scottsdale, Arizona, on August 28, for preliminary testing. The deposit is west of the Bee Line Highway about 15 miles due west of Tonto Basin near the Pine Mountain Mercury deposit. It is reported to be 200 feet wide and several miles long.

Microscopic examination showed that the sample was composed predominantly of hematite and fine-grained chalcedonic quartz with minor amounts of magnetite and trace amounts of manganese, titanium and aluminum. Polished surfaces of the hematite revealed that the intergrowth between hematite and quartz ranged from as coarse as 1/2 inch down to approximately 325 mesh. Virtually all the chalcedonic quartz was stained red with micron inclusions of hematite.

An exploratory sink-float separation in acetylene tetrabromide, specific gravity of 2.94, was made on the minus 1/2 inch plus 10 mesh fraction of the sample. The minus 10 mesh portion was not concentrated. Results of the

screening and sink-float tests on the sample are given in the following table:

<u>Product</u>	<u>Weight, percent</u>	<u>Fe</u>	<u>Distribution, Fe</u>
-1/2 inch + 10 mesh (sink)	54.6	49.09	70.4
-1/2 inch + 10 mesh (float)	25.4	14.52	9.7
-10 mesh	20.0	37.90	19.9
<u>Composite</u>	<u>100.0</u>	<u>38.07</u>	<u>100.0</u>

The iron concentrate from the sink-float gave a 70 percent recovery of the iron in a product assaying 49 percent Fe. The titanium content of the sample concentrate was low as determined spectroscopically. Interlocking of chalcedonic quartz with the hematite in the fine sizes accounted for the low grade of the concentrate.

LaMar G. Evans

cc: JBClemmer  
WRStorms (2)  
LGEvans

467-F WPS  
NOT MET-6

September 12, 1957

**Memorandum**

**To:** Carl Rampacek  
**From:** LaMar G. Evans  
**Subject:** Magnetic Concentration of Date Creek Placer Sand  
(Ref. No. ME-788)

WRE

Herewith are the results of magnetic separation tests with a small hand-magnet on the Date Creek Placer sand obtained from William Paine, Scottsdale, Arizona, on August 8, 1957. The placer sample is from Date Creek near Highway 93 northwest of Congress Junction, Maricopa County, Arizona. It is reported to extend for 30 miles and in several locations the depth of the sand is 100 feet.

Chemical analysis of a head sample gave 17.6 percent Fe. The principal minerals were quartz, feldspars and magnetite with minor amounts of hematite, chlorite, ilmenite, hornblende, limonite, muscovite, zircon and sphene.

The sample was screened into three products. Examination of the plus 20 mesh portion showed that the magnetite content was low and for the most part interlocked with the coarse gangue. This product was not treated magnetically. The minus 20 plus 65 mesh and the minus 65 mesh fractions were separated by means of a hand-magnet. The magnetic products were cleaned twice. Results of the magnetic tests were as follows:

	<u>Weight,</u> <u>percent</u>	<u>Percent, Fe</u>	<u>Distribution,</u> <u>percent, Fe</u>
+ 20 mesh	22.9	7.41	9.7
-20 + 65 mesh (magnetic)	11.9	68.04	46.2
-20 + 65 mesh (non-magnetic)	52.1	6.45	19.2
-65 mesh (magnetic)	5.9	67.84	22.9
-65 mesh (non-magnetic)	7.2	4.79	2.0
<u>Composite</u>	<u>100.0</u>	<u>17.5</u>	<u>100.0</u>

A recovery of 69 percent of the iron in a product that assayed 68 percent iron was obtained. Spectroscopic tests on the concentrate showed the titanium content to be low.

Lamar G. Evans

WRStorms (2)

Files

LGE

DF



UNITED STATES DEPARTMENT OF THE INTERIOR

BUREAU OF MINES

P. O. Box 4097  
Tucson 5, Arizona

No. \_\_\_\_\_

467- Iron

WAL

Report to Mr. W. R. Storms

Chemical Laboratory Report

Date received July 26, 1957

Date reported September 19, 1957

Serial No.	DESCRIPTION	Lot No.	% Fe	% TiO <sub>2</sub>	% SiO <sub>2</sub>								
	Pig Iron group, iron deposit, 20 road miles NE of Tonto Basin, Gila County, Ariz. In approx. Secs. 16, 17, 20 & 21, T. 8 N., R. 12 E., unsurveyed												
	Sample No. 15201 (TUC-474 head)		18.6	3.82	57.1								
	cc: L A Stewart TUC-474 533.1 DF												

Signed LaMar D. Evans

January 15, 1960

Memorandum

To: Robert W. Geehan

From: W. E. Young

Subject: Preliminary examination of Pig Iron Deposit, Gila County, Ariz.

The information in Mr. Stewart's letter is essentially correct and agrees with our findings except for the width of the deposit.

The deposit is in the Sierra Ancha Mountains about 25 miles southeast of Payson, Ariz. Gun Creek, which is a branch of the Tonto River, has cut a deep incision in the mountain range. The outcropping rocks of the range are principally horizontally bedded Cambrian formations of Dripping Springs quartzite and Mescal limestones. Gun Creek has cut through these formations exposing the underlying Precambrian schists and quartzites. These Precambrian rocks strike N. 55° E. and the dip varies between vertical and N. 75° W. The iron deposit appears to be of sedimentary origin, and to have been deposited syngenetically with a quartzite member. This quartzite is roughly 2000 feet thick. Iron mineralization is concentrated in the lower 500 feet of the formation. By visual analysis the upper 1500 feet becomes progressively leaner in iron content and is considered too low in grade to be an iron ore.

Samples were taken of the lower 500 feet of the formation along the bottom of Gun Creek. The analyses of the eight samples are listed below:

Sample No.	%Fe	%TiO <sub>2</sub>	%SiO <sub>2</sub>	%Al <sub>2</sub> O <sub>3</sub>	%CaO	%MgO	%P	%S	%Mn
1(a)	19.5	2.6	54.6	8.6	0.3	0.3	0.03	0.05	0.05
2(a)	26.5	4.1	41.6	8.8	0.4	0.4	0.04	0.09	0.15
1	22.6	5.3	47.0	10.0	0.1	0.3	0.05	0.11	-
2	24.3	6.2	44.6	10.0	0.1	0.4	0.07	0.08	-
3	22.8	6.1	46.8	10.0	0.1	0.2	0.08	0.08	-
4	25.2	6.1	43.6	9.6	0.1	0.2	0.09	0.08	-
5	25.4	5.9	45.0	8.8	0.1	0.2	0.07	0.08	-
6	28.2	7.6	39.6	8.2	0.1	0.2	0.04	0.06	-

Although the terrain is rough and covered with thick brush and trees Gun Creek and two of its branches expose the iron formation over a strike length of approximately 3 miles. At each end of this basin the iron formation is covered with the horizontal Cambrian formations and passes from view. Ransome reports the occurrence of iron ore in Precambrian quartzite in Del Shay basin 2 miles southwest of the Gun Creek exposure. G. E. Toot and W. H. Stockman report the iron-bearing quartzite is again exposed 1-1/2 miles northeast of the Gun Creek exposure. If these reported occurrences are true the iron-bearing quartzite has a strike length of six miles.

The horizontally bedded Dripping Springs quartzite was laid down over a very uneven erosion surface and consequently is variable in thickness. Apparently the iron-bearing Precambrian quartzite constituted a topographic high on this Precambrian erosion surface for the Dripping Springs quartzite is relatively thin over the iron and much thicker on each side. This condition favors stripping for openpit mining. In fact, large tonnages could be mined in the central area with a very minimum of stripping. These are preliminary observations and would have to be verified by close detailed mapping.

A copy of a memorandum regarding beneficiation work is included. Whether the Salt Lake Station has done additional metallurgical work on this ore is not known.

W. E. Young  
W. E. Young



UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF MINES  
REGION III

INTERMOUNTAIN  
EXPERIMENT STATION

August 5, 1958

1600 EAST 1ST SOUTH STREET  
SALT LAKE CITY, UTAH

Memorandum

To: C. H. Schack

From: J. V. Batty

Subject: Beneficiation of Iron Ores from the Pig Iron Claims, Gila County, Arizona

Physical beneficiation tests have been made on samples of titaniferous iron ore from the Pig Iron Claims located in Gila County, Arizona. The field examinations indicate that this is perhaps one of the largest potential reserves for iron in the western United States if a method for separating the iron and titanium minerals from the gangue could be devised. While exhaustive test work has not been carried out on these ores, enough ore dressing research has been done to indicate the improbability of making marketable products by conventional ore dressing methods. These findings have been verified by microscopic examinations. Examination of two table products, assaying 28 and 14 percent Fe, showed intimate hematite and gangue intergrowths most of which would require grinding to minus-1200-mesh or finer. The largest hematite areas observed were about 200-mesh with the average being about 1200-mesh.

The three samples tested contained from 19.5 to 26.5 percent Fe and from 4.3 to 6.8 percent  $TiO_2$ . The physical characteristics of the three samples were quite similar except that the low-grade sample contained much more of the iron as limonite than did the other two higher grade ores. Methods used for upgrading these ores included flotation, tabling, and magnetic separation. Best results by flotation were obtained on the intermediate grade ore. The sample was ground to minus-100-mesh and floated using 25 pounds of fuel oil--tall oil emulsion at a pH of 6.2. This upgraded the iron from 20 percent Fe to 43 percent Fe and 39 percent insol and contained 60 percent of the iron. Magnetic separation on this sample gave slightly better results. A sample was ground to minus-48-mesh, screened on 200-mesh, and the plus-200 fraction treated on the Stearns disk-type magnetic separator.

The magnetic fraction assayed 47.5 percent Fe, 9.0 percent  $TiO_2$ , 14.6 percent  $SiO_2$ , and represented 40 percent recoveries of both the iron and titanium. Magnetic separation of a reduced sample using the Davis tube gave inferior results. The reduced sample was ground to minus-100-mesh and treated in the Davis tube. The magnetic fraction assayed only 30 percent Fe and 5 percent  $TiO_2$ . The highest grade concentrate was produced by tabling the medium grade ore which had been stage ground to minus-65-mesh. A table concentrate was made which assayed 54 percent Fe, 12 percent  $TiO_2$ , and 6 percent  $SiO_2$ . This represented only 25 percent recovery of the iron and 19 percent of the titanium.

Because of the fine intergrowth of the iron, titanium, and gangue minerals, it seems unlikely that an effective physical method for beneficiating these ores can be developed. The extremely fine grinding required for liberating the minerals is too impractical and expensive for justifying further research using physical methods.

*J. V. Batty*

J. V. Batty

RECEIVED (A)  
U. S. BUREAU OF MINES

APR - 1958

SALT LAKE CITY, UTAH

*LHS*

# Miami Copper Company

*Incorporated under the Laws of Delaware,*

*Miami, Arizona,*

*B. R. Coit*

*Vice President and General Manager*

Geology Dept.  
January 4, 1960

Mr. Lincoln A. Stewart  
U.S. Bureau of Mines  
Box 4097  
Tucson, Arizona

Dear Mr. Stewart:

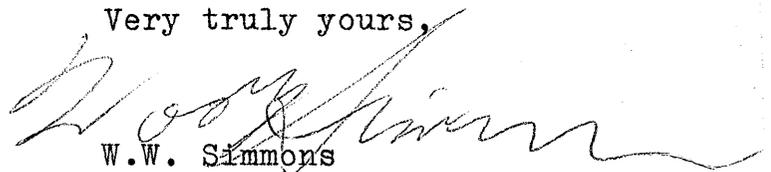
Messrs. Mel and Hardy Stockman visited this office today concerning two iron deposits near Gun Creek, Gila County, Arizona. They spoke of a vertical deposit 1000-2000 feet wide and plus 3 miles long. They were not sure of the mineralogy but said the material was non-magnetic.

They said the property had been examined by you and a Mr. Young of the USBM, Salt Lake City, office.

Any information you can give me on the property will be appreciated and of help to us.

Thank you for your kindness. Come to see us when you are in the district.

Very truly yours,



W.W. Simmons  
Chief Geologist

U. S. BUREAU OF MINES  
SOUTHWEST EXPERIMENT STATION  
JAN 6 - 1960  
TUCSON, ARIZONA

P. O. Box 4097  
Tucson, Arizona  
January 11, 1960

Mr. W. W. Simmons  
Chief Geologist  
Miami Copper Co.  
Miami, Arizona

Dear Woodie:

Replying to your inquiry of January 4, I did make a cursory examination of the Pig Iron group of claims near Gun Creek. Hardy Stockman, one of the owners, was with me. One of those violent summer showers occurred while we were in the canyon and for that reason I was unable to get into the box canyon which constitutes the lowest exposures, said to be somewhat better than higher up on the hillsides.

The deposit consists of an appreciable quantity of fine-grained muscovite, hematite, and ilmenite disseminated in impure quartzite. The mineralized zone appears to be at least 1,500 feet wide, exposed on both sides and in the bottom of the canyon. From where I went into the canyon I could see the outcrop for an estimated mile in each direction and I was told it extended farther in each direction.

On the way out (in the rain) I chipped pieces from ledges up the slope over a distance of 700 to 800 feet (a vertical range of about 500 feet). This 60-pound sample assayed 18.6 percent Fe, 3.82 percent  $TiO_2$ , and 57.1 percent  $SiO_2$ .

Gyp Toot previously had secured a jeep load of ore from an area across the canyon, about one-half mile northeast of the place where I took my sample. I selected representative pieces from the pile. These assayed 36.7 percent Fe.

cc: RWGeehan  
L A Stewart  
~~467-Iron~~ ✓ 552 - Iron  
DF

L A Stewart / rg

As you know, the reserves of low-grade iron ore in a deposit of this size could be tremendous. With a length of only 1 mile, a width of 1,500 feet, and assuming 12.5 cubic feet per ton, the calculated tonnage per foot of depth is over 600,000 tons.

Later, the Bureau sent Young from Salt Lake City to look at the deposit. I have not seen his report.

This part of the Tonto National Forest is unsurveyed, but by projection, the deposit appears to be in approximate sections 16, 17, 20, and 21, T. 8 N., R. 12 E.

Owners at the time of my visit were G. E. (Gyp) Toot, W. H. Stockman, and Leck Cline, all of Tonto Basin. More than a year ago, Gyp told me it was O.K. to pass out the above information to anyone interested in low-grade iron possibilities.

I have since heard that they discovered a second deposit in the same general area, but have no information about it. I hope the above information, although scanty, will be of some help to you.

Sincerely yours,

Lincoln A. Stewart  
Mining Engineer