

Lab Report

Contact: [REDACTED]

Salesman: [REDACTED]

Subject: Separation evaluation of red iron oxide.

Test Date: [REDACTED]

Equipment Used: 1'x 3' Texas Shaker equipped with Tyler 8 & 20 mesh screens, V-135 Gravity Separator with 81C & 51C decks.

Procedure: 1) Received one 5 gallon bucket of minus 1/4". Due to wide size range of sample, sizing was necessary prior to separation.

2) Separated the -1/4", +8 mesh on V-135 with 81C deck. Three fractions were collected and identified as Heavies, Mids and Lights. Feed rate of 500 lbs./hr was achieved.

3) Separated the -8, +20 mesh on V-135 with 51C deck. Again, collected and identified three fractions. Same rate.

4) Performed Bulk Densities on all samples.

5) See attached for results.

Summary: Visually, the separation of +8 mesh material showed further sizing with little to none silica and oxide in the "Lights" fraction. Separation of the -8, +20 mesh material returned better results in terms of silica and oxide present in the "Lights" fraction. Further sizing of the -20 mesh material would be necessary before separation. No further testing was performed on the -20 mesh. Samples from separation have been retained and will be returned to [REDACTED]

Triple/S Dymanics

[REDACTED]

Lab Test Results

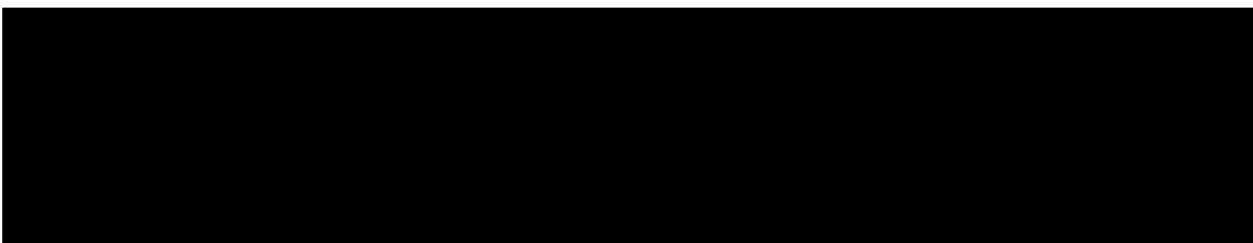
Screening Performance:

	<u>Wt.</u>	<u>%</u>
+8 mesh	31#	33.8
-8, +20 mesh	34.5#	37.7
-20 mesh	26#	28.4

Separation Performance:

	<u>Wt.</u>	<u>%</u>	<u>Bulk Density</u>
+ 8 Mesh			
Heavies	9.39#	31.6	149.1lbs. cu./ft.
Mids	10.22#	34.3	143.8
Lights	10.12#	34	133.8
-8, +20 Mesh			
Heavies	19.9#	60.6	140.5
Mids	9.86#	30.3	127
Lights	3.06#	9.3	115.7

Feed rate for both separation tests = 450lbs./hr



ROUTING STAMP		
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	FILE	[REDACTED]

[REDACTED]
 Triple/S Dynamics
 P.O. Box 151027
 Dallas, Texas 75315-1027

Dear [REDACTED],

It was a pleasure speaking with you on Thursday. [REDACTED] mines and manufactures red iron oxide for the various segments of the pigment industry.

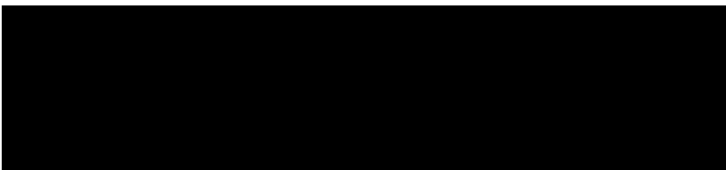
We are in the beginning phase on an R&D program to determine the method in which we will raise our iron content from 90% to as much as 96-98% iron reported as Fe₂O₃. The ore will typically have 3-5% silica and another 1-2% calcium oxide, it is this material that we would like to remove.

Although I have not used an air table before the difference in specific gravity should be great enough to separate the materials. We are also testing electrostatic separation as well.

Our lab has shipped a 5 gallon bucket of 1/4 inch minus raw ore for your initial test work. This should arrive the middle of next for your evaluation. We can assay the fractions and determine the direction of further testing at that point.

I will include a copy of spectrographic reports, tech data sheet on the finished product and a mineralogical report also. If you have any questions please don't hesitate to call.

Cordially,



OBJECTIVE : Screen assay analysis of ore to determine distribution of iron and silica.

SAMPLE I.D. : SR-041993
 FEED WEIGHT : 80.05 lb
 FEED SIZE : - 1 Inch

PROJECT No. : M413-03

PRODUCT	METALLURGICAL RESULTS										
	WEIGHT		ASSAYS (%)			CONTENT (%)			DISTRIBUTION (%)		
	(lb)	(%)	Fe	Calc. Fe ₂ O ₃	SiO ₂	Fe	Calc. Fe ₂ O ₃	SiO ₂	Fe	Calc. Fe ₂ O ₃	SiO ₂
+ 3/4"	0.55	0.69	58.70	83.94	8.67	0.403	0.577	0.060	0.7	0.7	1.1
- 3/4" + 1/2"	3.00	3.75	60.59	86.64	7.06	2.271	3.247	0.265	3.7	3.7	5.0
- 1/2" + 1/4"	9.25	11.56	61.48	87.92	5.46	7.104	10.159	0.631	11.5	11.5	12.0
- 1/4" + 10 m"	29.00	36.23	62.49	89.36	4.71	22.638	32.373	1.706	36.7	36.7	32.4
- 10 m	38.25	47.78	61.23	87.56	5.46	29.257	41.838	2.609	47.4	47.4	49.5
Calc. Head	80.05	100.00	61.67	88.19	5.27	61.674	88.194	5.270	100.0	100.0	100.0
Assay Head (Weighted Composite)			61.67	88.19	5.99						

REMARKS:

SiO₂ IS SPREAD EVENLY ACROSS THE SAMPLE

[REDACTED]

[REDACTED]

[REDACTED]

Dear [REDACTED]:

I have looked at the red and black hematite samples sent with your letter written on [REDACTED]. Probably I can not answer all of the questions that you put to me but I will do my best, referencing the four numbered paragraphs in your letter.

- (1) The black hematite material consists of specular hematite in the amount of about 45% and red hematite makes up the remainder of the Fe-oxide. The specular hematite crystals are typically arranged in sheaves or subparallel aggregates of platy crystals that range in size from 0.3 to 0.5mm most typically. Often there is no gangue associated with this hematite and there appears to be void space interstitial to the crystals. There is a second form of hematite which dominates the red hematite sample, in fact comprising over 99% of it, and this hematite is cryptocrystalline. Microscopic examination indicates that individual crystallites are far less than 1μ in size most typically but closely packed together in a confusing crystalline structure to produce large masses composed virtually of this sort of hematite. On occasion there are small (0.05mm or so) crystallites of specular hematite and sometimes larger crystals were found rimming nuggets of massive cryptocrystalline hematite. Your question, however, is about liberation size, and I do not feel competent to answer this. Though the crystal size of hematite has been described above, both the black and the red, often the material is in virtually pure masses and liberating these masses may be the proper size for grinding. I simply can not say and I would suggest that your testing can better answer liberation size than can microscopic prediction.
- (2) I have already referred to this obliquely in the paragraph above, that is the black hematite is about 45% crystalline material and 55% amorphous red material whereas the red hematite is over 99% amorphous red.
- (3) Microscopic study failed to reveal any gangue minerals other than quartz in either the red or black hematite.
- (4) Quartz is present in both black and red hematite and I would judge that about 30% of it is present as angular grains of perfectly equant shape and these grains average 40μ in size. The remainder of the silica is cryptocrystalline with grains seldom exceeding 1μ in size though very often there are clusters of such grains attached to one another. These crystallites are also highly angular or at least equant in shape.

Semi-Quant Laser/Ablation ICP Mass Spec analysis.

Sample #	Sb ppm	Te ppm	Cs ppm	Ba ppm	La ppm	Ce ppm	Pr ppm	Nd ppm	Sm ppm	Eu ppm	Gd ppm	Tb ppm
A.M.BLACK	< 2	< 2	< 2	240	12	2010	4	25	< 2	< 2	< 2	< 2
BAYFERRO BLACK	7	< 2	< 2	12	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
SEDONA RED	< 2	< 2	< 2	12	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
S.W.YELLOW	< 2	< 2	< 2	60	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2

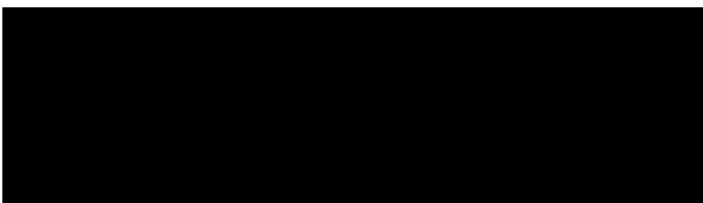
Semi-Quant Laser/Ablation ICP Mass Spec analysis.

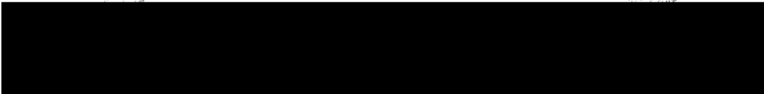
Sample #	Dy ppm	Ho ppm	Er ppm	Tm ppm	Yb ppm	Lu ppm	Hf ppm	Ta ppm	W ppm	Re ppm	Os ppm	Ir ppm
A.M.BLACK	< 2	< 2	< 2	< 2	< 2	< 2	< 2	10	< 2	< 2	< 2	< 2
BAYFERRO BLACK	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
SEDONA RED	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
S.W.YELLOW	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Semi-Quant Laser/Ablation ICP Mass Spec analysis.

Sample #	Pt ppm	Au ppm	Hg ppm	Tl ppm	Pb ppm	Bi ppm	Th ppm	U ppm
A.M.BLACK	< 2	< 2	< 2	< 2	50	< 2	< 2	< 2
BAYFERRO BLACK	< 2	< 2	< 2	< 2	2	< 2	< 2	< 2
SEDONA RED	< 2	< 2	< 2	< 2	9	< 2	< 2	< 2
S.W.YELLOW	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2


< = less than
 > = greater than
 ppm X 0.029 = oz/ton
 ppm X 0.0001 = %





Natural Red Iron Oxide

Tech Sheet No. RN1-10074

Product No: 
 Color Index #1317-60-8
 Natural Red Iron
 Oxide #110

TYPICAL PROPERTIES

Color	Red
Bulk Density lb./cu.ft.	55
Specific Gravity at 20 c°	4.9
Melt Point °C	Decomposes at 1538°
Mesh Size	.01 % Retained on 325 Mesh
Hegmen Grind	7+
Oil Absorption	22
Average Particle Size	1.5 Microns
Moisture Content	0.1 %
L. O. I.	.07 %
Soluble in Water	0.22 %
Ph	8.0

TYPICAL CONCENTRATION (BY WEIGHT) _____ %

Element	
Iron Oxide, Fe ₂ O ₃	89.5 - 91.0
Silicon Dioxide, SiO ₂	7.0
Calcium Oxide, CaO	0.13
Aluminum Oxide, Al ₂ O ₃	1.9
Titanium Dioxide, TiO ₂	0.38
Potassium Oxide, K ₂ O	0.28

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