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Meteor Crater of Northern Arizona where a long time ago a visitor from outer space dropped in leaving this crater some 3/4 mile in diameter and 170 feet below the surface of the plain.

Ektachrome by R. M. Fronske
From Wright flight plane



place
stamp
here

address

MIRRO-KROME ® CARD BY H. S. CROCKER CO., INC., OKLAHOMA CITY, OKLA.

63.0172

January 25, 1965

Mr. Kefton H. Teague
 Chief Division Geologist
 Industrial Minerals Division
 International Minerals & Chemical
 Corporation
 Old Orchard Road
 Skokie, Illinois

Dear Mr. Teague:

Thank you for your letter of January 11, 1965 re the December meeting with your Mr. Steen in connection with sources of silica for your Kingman plant.

The deposit of silica sand I particularly had in mind was that occurring on the southwest flank of Meteor Crater near Winslow, Arizona. This was presented as a matter of information only since the Barringer Crater Company, owner of the crater since the turn of the century, decided in 1957 to withdraw the silica from Commercial exploitation. Previous to that time there had been one or two abortive attempts by lessees of small stature to market the material. An estimated 1.5 million tons is available by open pitting.

The thought occurs that should the chemical and sieve analysis below be of interest, a large company such as yours might cause the Barringer people to change this present "hands off" policy. I hasten to add that such a change is strictly conjectural since I have not been in contact with the company since 1957.

SiO ₂	99.53 %
Fe ₂ O ₃	0.080
Al ₂ O ₃	0.63
Non-volatile	1.47
Held on 16 mesh	0.1 %
Thru 16 mesh on 20 mesh	0.2
" 20 mesh " 30 mesh	0.3
" 30 mesh " 60 mesh	43.0
" 60 mesh " 120 mesh	45.0
" 120 mesh " Pan mesh	11.4

Should the need arise I will be happy to cooperate further.

Sincerely,

Wm. H. Crutchfield, Jr.



INTERNATIONAL MINERALS & CHEMICAL CORPORATION

January 11, 1964

Mr. Wm. H. Crutchfield, Jr.
The Atchison, Topeka & Santa Fe
Railway Company - Coast Lines
121 East Sixth St.
Los Angeles, California 90014

A. T. & S. F. RY.
RECEIVED

JAN 12 1965

MINING DEPARTMENT,
LOS ANGELES, CALIF.

Dear Mr. Crutchfield:

Back in December Choo Steen brought to my attention a talk which he had with you regarding our silica position at the Kingman Plant, and mentioned that you apparently had found a substantial deposit of feldspatic sand in eastern Arizona.

Frankly I question whether or not we are interested in this deposit, mainly because the market which can be served by this area of the southwest is rather limited and we have substantial reserves of block feldspar at our Kingman, Arizona deposit. I would suspect that it would have to compete with the beach sands produced in California and probably would be at a competitive disadvantage.

Should you have samples of the crude material available, I would like to receive about a one to two pound sample of the sand so that we could have petrographic studies, chemical studies and perhaps even preliminary separation studies made on this material. If you do not have samples of the material available, please do not make a special trip to collect same but secure it when you are in the area sometime at a future date.

We thank you for having brought this occurrence to Mr. Steen's attention.

Sincerely yours,

Kefton H. Teague
Chief Division Geologist
Industrial Minerals Division

KHT/jt

Los Angeles, May 28, 1964

63.0172

FILE MEMORANDUM

It was reported by Dr. Shoemaker, U.S.G.S,
Lunar Studies, Flagstaff, at a A.I.M.E. meeting in
Los Angeles, May 15, that the meteor crater at Winslow
is of Mid-Wisconsin Age. It is estimated that 50 feet
of erosion has occurred since that period.

This was stated in connection with the fact
that since there is no atmosphere on the moon, the craters
have suffered no such erosion.

Wm. H. Crutchfield, Jr.

10,000 - 15,000 yrs b.p.

Los Angeles, October 25, 1957

63.0172

Mr. G. W. Cox:

Please refer to your 218 of October 8th concerning the Meteor Crater near Winslow. The following is a copy of Mr. Barringer's reply to my letter of October 15th, regarding the purchase of the silica sand deposit and also the "public trust."

"Thanks for yours of October 15.

"The answer to the question in your second paragraph is "no." My brothers and I are under an injunction from my late Father not to sell property, because of his faith that the meteorite which made the hole can be mined and recovered at a considerable profit.

"The 'public trust' part of it refers only to the surface mining of silica, which we have ceased owing to the danger (in the opinion of some people) of defacing the property. We have every intention of proceeding with mining the meteorite at any time that we can raise the money to do it.

"If you have people interested in this mining proposal, on a long-term lease basis, we would be very much interested in talking to you."

W. H. Crutchfield, Jr. ✓

cc-Mr. J. G. Fry

THE BARRINGER CRATER COMPANY

OWNER AND DEVELOPER OF THE METEOR CRATER OF ARIZONA

D. MOREAU BARRINGER, *President*
2015 Three Penn Center, Philadelphia 2, Pa.

RICHARD W. BARRINGER, *Secretary-Treasurer*
Radnor, Pennsylvania

63.0172

21 October 1957

Mr. W. H. Crutchfield, Jr.
The Atchison, Topeka & Santa Fe Railway Co.
121 East 6th Street
Los Angeles 14, California

Dear Mr. Crutchfield:

Thanks for yours of October 15.

The answer to the question in your second paragraph is "no." My brothers and I are under an injunction from my late Father not to sell property, because of his faith that the meteorite which made the hole can be mined and recovered at a considerable profit.

The "public trust" part of it refers only to the surface mining of silica, which we have ceased owing to the danger (in the opinion of some people) of defacing the property. We have every intention of proceeding with mining the meteorite at any time that we can raise the money to do it.

If you have people interested in this mining proposal, on a long-term lease basis, we would be very much interested in talking to you.

Yours very truly,


D. Moreau Barringer
President

DMB:cmd

October 15, 1957

Mr. D. Moreau Barringer, President
The Barringer Crater Company
2015 Three Penn Center
Philadelphia 2, Pennsylvania

Dear Mr. Barringer:

Thank you for your letter of September 11th, outlining the policy of The Barringer Crater Company regarding the mining of silica sand.

With reference to the above, if I was successful in finding someone interest in purchasing the deposit, and also taking on the "public trust", would your company agree to sell?

Sincerely,

W. H. Crutchfield, Jr. ✓
Mining Engineer

bcc-Mr. G. W. Cox
Mr. J. G. Fry

bps - Mr. Cox:

I must admit that I missed Mr. Barringer's veiled alternative in his letter to me of September 11th. Mr. Barringer's answer to the above will be of interest, and I will advise you upon receipt.

W. H. C.

- MEMORANDUM -

63.0172

Chicago, October 8, 1957

218

Mr. Crutchfield:

Refer, please, to your report of October 1, file 98.0000.

Perhaps it occurred to you but if not, I thought I would mention the fact that the letter you quoted from Mr. D. Moreau Barringer, President of Barringer Crater Company, Philadelphia, contains an alternative even though it is somewhat veiled.

That alternative would be that they would sell the deposit provided they received a substantial price for it. Since you have been handling with them, I would appreciate your asking them pointedly if you were successful in finding someone interested in purchasing the deposit -- and also taking on the "public trust", would they agree to sell?

G. W. Cox
S

cc - Mr. Fry

THE BARRINGER CRATER COMPANY

OWNER AND DEVELOPER OF THE METEOR CRATER OF ARIZONA

D. MOREAU BARRINGER, *President*
2015 Three Penn Center, Philadelphia 2, Pa.

RICHARD W. BARRINGER, *Secretary-Treasurer*
Radnor, Pennsylvania

63.0172

11 September 1957

Mr. W. H. Crutchfield, Jr., Mining Engineer
Atchison, Topeka & Santa Fe Railway Company
121 East Sixth Street
Los Angeles 14, California

Dear Mr. Crutchfield:

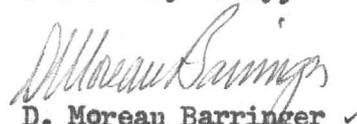
Thanks for your letter of September 4. Thanks also for forwarding the inquiry from your San Francisco people about the possibility of utilizing 10,000 tons a year of silica sand from the Meteor Crater.

I regret to tell you, however, that since my letter of April 10, 1953, to which you refer, we have adopted a policy for The Barringer Crater Company, that we will not grant any leases for the mining of silica sand.

We have been subjected to a certain amount of criticism for "defacing" this natural wonder for commercial purposes, and owing to our feeling that the ownership of the Crater is something of a public trust, we are perhaps overly sensitive. Whether we agree with the criticism or not (of course we don't) we do have to pay some heed to it and that is the reason for the adoption of this policy.

If the policy is ever changed in the future I will, of course, let the Santa Fe Railway know, first of all.

Yours very truly,


D. Moreau Barringer ✓
President

DMB:cmd

September 4, 1957

Mr. D. Moreau Barringer
Barringer Crater Company
1526 Chestnut Street
Philadelphia 2, Pennsylvania

Dear Mr. Barringer:

You may recall that in the past we have had correspondence concerning your silica deposit located about 6 miles south of our siding at Sunshine, Arizona. The purpose of this letter is to inform you that I have been in contact with a local mining consultant, acting on behalf of a reputable San Francisco group interested in financing a silicon metal project on the west coast. I have discussed the merits of your deposit with said consultant and he has expressed definite interest therein. Since he is now in the process of making a survey for his San Francisco clients, an item of importance is, of course, the cost of the raw materials.

I note in your letter to me of April 10, 1953, that you stated you would be glad to discuss a lease on a royalty basis providing for a reasonable minimum monthly royalty. Would you care to state this in more exact terms, basing your statement on the possible use of 10,000 tons per year of silica sand? Such information would, of course, be a definite asset for the purpose of the survey now being made.

This project is definitely in the preliminary stage, but I think that your deposit may have a real potential viewed in the light of its being used as a source of raw material in the manufacture of silicon metal.

Very truly yours,

W. H. Crutchfield, Jr. ✓
Mining Engineer

September 4, 1957

Mr. L. Kenneth Wilson
American Smelting and Refining Company
405 Montgomery Street
San Francisco 4, California

Dear Ken:

A question was posed to me today concerning whether or not the National Metallurgical Corporation, of which your Company owns 50%, is producing silicon metal. As you will recall in the latter part of 1955 and early 1956, we had some correspondence concerning location in this area of masses of silica for possible use at the Springfield plant. Therefore, since you are actually my only direct contact with that organization, I am taking the liberty of putting such question to you directly, to clear up my ignorance of the matter.

I haven't seen you since hearing your fine talk before the Prospector's Institute in Los Angeles. No doubt you have been busy, as usual. I hope that we will run into each other at the Mining Congress at Salt Lake.

With kindest personal regards, I am

Sincerely,

W. H. Crutchfield, Jr. ✓
Mining Engineer

Los Angeles, September 4, 1957

63.0172

MEMO TO FILE:

A Mr. A. M. Schinn, mining consultant telephoned this morning, requesting information on the silica sand deposit at Sunshine, Arizona.

Mr. Schinn is representing a Mr. Ball Holsinger, Jr., of the Atkinson and Associates, 235 Montgomery Street, San Francisco, in a search for a silica deposit suitable for use in making silicon metal. This San Francisco group is very interested in establishing an electro-thermic plant to make such metal on the west coast.

~~A rather crude method known as~~ The Cornelius method of electro-thermic melting is ^{planned} to be used.

Electricity required for such a plant would be in the order of 12 million kwh per year. This amount of electricity would produce 4,000 tons of metal from 10,000 tons of raw sand.

The Cornelius method is now being used for glass making by Corning, according to Mr. Schinn. To date, however, silicon metal is being made from massive quartz ranging in size from 3/4" to 2". The Cornelius method, according to Mr. Schinn, is readily adaptable to making silicon metal from silica sand thus affecting a savings in cost of raw material alone.

A present country-wide market survey indicates that today, 16,000 tons of silicon metal is being manufactured, using coarse silica feed.

Raw materials required for silicon metal, besides silica sand, are lime, manganese oxide and charcoal. The cost to manufacture, per ton, is \$100, however, the silicon metal sells for 20 cents per pound in car-load lots. The profit therefore per ton could amount from \$250 to \$300.

The Sunshine deposit, upto the present time, has only been looked at from the standpoint of making glass. The geographic location has been one of the chief disadvantages to its use for this purpose. In the light of silicon metal, however, its economic potential is considerably heightened, in my opinion.

Telephone RI 7-9073
RI 7-4030

W. H. C. ✓

RIVERA - good industrial site for this project.

3/7/55

File 63.0172

Mr. Crutchfield:

Message from Mr. McPake - On silica sand from Sunshine, Arizona; We have some rights which we intend to cancel, and upon cancellation there will be a 4 or 5-cent higher rate. In other words - when we cancel the rates from Sunshine, the shipper will have to pay a rate from Chambers, which will be 4 or 5-cents higher.

Mr. McPake will probably not be in tomorrow, but please call, and if he is not in call Mr Talmadge.

Reason

Memorandum

Los Angeles - May 4, 1954

63.0172

Mr. G. W. Cox:

I appreciate your April 23rd forwarding of Pittsburgh Plate Glass Company's recent chemical and screen analysis made of the silica sand from Sunshine, Arizona. Detailed and reliable information such as this is always a valuable addition to this Department's files.

W. H. Crutchfield, Jr.
Mining Engineer.

WHC-w

Memorandum

Los Angeles - May 4, 1954

63.0172

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W. H. Crutchfield, Jr.
Mining Engineer.

WHC-w

Mr. Crutchfield:

3/7/55
File 63.0172

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Mr. McPake will probably not be in tomorrow, but please call, and if he is not in call Mr Talmadge.

Reason

63.0172

Chicago, April 23, 1954

Mr. Crutchfield:

Referring to your mineral report April 19, file 98.0000, particularly that part relating to the silica sand deposit at Sunshine, Arizona:

Attached for your information is copy of letter dated April 6, 1954, from Pittsburgh Plate Glass Company, setting forth their analysis of a sample of sand from this deposit.

G. W. Cox

cc: Mr. Rydin - With enc.
Mr. Blair "

63.017v

ASSISTANT TO PRESIDENT

PITTSBURGH PLATE GLASS COMPANY

17v



R. M. BOYD, GENERAL TRAFFIC MANAGER
H. B. REAVES, JR., ASSISTANT TRAFFIC MANAGER
J. G. OWSTON, DIVISIONAL TRAFFIC MANAGER

GENERAL OFFICES
ONE GATEWAY CENTER, PITTSBURGH 22, PA.

April 6, 1954

Mr. G. W. Cox
Assistant to the President
Industrial Development
Atchison, Topeka & Santa Fe Railway
Chicago 4, Illinois

Dear Mr. Cox:

The sample of sand from Sunshine, Arizona which you submitted has been analyzed by our laboratory. This analysis indicates that while the sand is not of as good a quality as many other sands we procure for our present operations, it could be used for glass making.

For your information there is listed below, the chemical and sieve analyses of the Sunshine, Arizona sand compared with that of Mapleton, Pa. which is one of our present sources:

<u>Sand Source</u>	<u>Sunshine, Ariz.</u>	<u>Mapleton, Pa.</u>
Analysis Number	C-12643	
SiO ₂	99.53 %	99.60-99.85 %
Fe ₂ O ₃	0.080	0.018-0.031
Al ₂ O ₃	0.63	0.12 -0.25
Non-volatile	1.47	0.15 -0.40
Held on 16 mesh	0.1 %	None
Thru 16 mesh on 20 mesh	0.2	0.1 %
" 20 " " 30 "	0.3	0.4
" 30 " " 60 "	43.0	67.0
" 60 " " 120 "	45.0	31.1
" 120 " " Pan	11.4	1.4
	<u>100.0 %</u>	<u>100.0 %</u>

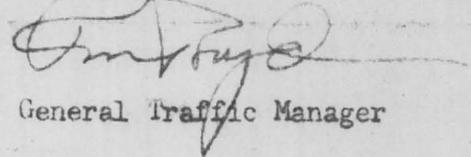
The laboratory comments as follows:

"Most batch sands are subjected to a washing process before shipment from the quarry to the glass factory. The alumina content is lowered by this treatment, and some of the iron encrusted sand grains are removed by flotation. No information was received, however, as to whether or not the sample from the Sunshine deposit had been so treated.

Glass was made from parallel plate glass batches one of which contained sand from the Sunshine deposit and the other contained Pennsylvania sand, Mapleton Quarry. By comparison, the glass made from the Sunshine deposit sand had a more pronounced green color. Radiant energy transmittance measurements on this glass indicated the color to be due entirely to iron oxide, and revealed the presence of no other coloring impurity."

Our conclusion is that the sand could be used for glass making although some difficulty and a slight compromise in glass quality might be encountered.

Sincerely,



General Traffic Manager

RMB:ie

April 6, 1954

Mr. Robert L. McCarrell, Jr
 Fort Pitt Coal & Coke Co.
 Washington Union Trust Bldg
 Washington, Pa.

Dear Mr. McCarrell:

This is to acknowledge your letter of April 2nd relating to our Mr. T. O. Evans' suggestion that you contact this department regarding further detailed information on the high grade silica sand deposit located near Winslow, Arizona.

The Meteor Crater silica deposit is 7 miles (by road) south of the Santa Fe siding at Sunshine, Arizona. The length of outcrop is approximately 2000 feet, and the width 500 feet. Minimum thickness exposed is 25 feet. Tonnage estimate is 1,500,000 net tons.

Analyses are as follows:

Chemical Analysis

Silica (SiO_2)	98.68%
Alumina (Al_2O_3)	0.83
Ferric Oxide (Fe_2O_3)	0.03
	<u>99.54</u>

Screen Analysis

<u>Mesh Size</u>	<u>%</u>
+ 28	None
- 28 + 48	15.9
- 48 + 65	39.4
- 65 + 80	22.7
- 80 +100	9.5
-100 +150	7.2
-150 +200	2.6
-200	<u>2.7</u>
	100.0

To my knowledge, this deposit is presently open for leasing. Mr. D. Moreau Barringer, Barringer Crater Company, 1526 Chestnut Street, Philadelphia 2, Pa., is President of this company.

Please feel free to call on this department at any time for further aid or information relating to this deposit.

Thanking you for your interest, I am,

Yours Sincerely,

W. H. Crutchfield, Jr.
Mining Engineer.

cc- Mr. T. O. Evans, Chief Mining Engineer System,
Prewitt, New Mexico.

bcc- Mr. R. S. Hirsch, Freight Traffic Manager - IA
Mr. K. M. Fogg, General Freight & Passenger Agent - Phoenix

WHC-w

FORT PITT COAL AND COKE CO.

WASHINGTON UNION TRUST BUILDING

WASHINGTON, PA.

63.0172

April 2, 1954

Mr. W. B. Crutchfield, Jr.,
Mining Engineer
A. T. & S. F. Railroad
121 East 6th Street
Los Angeles 14, California

Dear Mr. Crutchfield-

Recently I was discussing the Meteor Crater sanddeposit near Winslow, Arizona with your Mr. T. O. Evans. He suggested that I write you for further information.

If you would be kind enough to send us copies of chemical analyses, size consist and any other technical information you have on this sand, we would appreciate it greatly.

Very truly yours,

Robert L. McCall Jr.

RLMcCJr/nb

Los Angeles - February 12, 1954

63.0130

63.0172 ✓

Mr. R. S. Wirsch:

The following is in answer to your P-19-3513.1 of February 11th with copy of Mr. G. W. Cox's letter to Mr. Carlisle of Pittsburgh Plate Glass Company, Pittsburgh, Pa., attached.

The Meteor Crater silica deposit is located 7 miles by road south of the Santa Fe siding at Sunshine, Arizona. According to file report on this deposit, the length of outcrop is about 2000 feet and width 500 feet. The minimum thickness exposed is 25 feet. Tonnage estimate is 1,500,000 net tons.

Chemical and screen analysis of the material is as follows:

Chemical Analysis

Silica (SiO_2)	98.68%
Alumina (Al_2O_3)	0.83
Ferric Oxide (Fe_2O_3)	<u>0.03</u>
	99.54

Screen Analysis

Mesh Size	B %
+ 28	None
- 28+48	15.9
- 48+65	39.4
- 65+80	22.7
- 80+100	9.5
-100+150	7.2
-150+200	2.6
-200	<u>2.7</u>
	100.0

Mr. D. Moreau Barringer, Barringer Crater Company, 1526 Chestnut Street, Philadelphia 2, Pa., is President and one of the owners of this deposit.

Along our line in California exist two working deposits of silica sand that run about four-tenths of 1 per cent (0.4%) iron oxide as mined. One, located in Temescal Canyon on our Elsinore Branch about 8 miles south-east of Corona, is owned and operated by the Owens-Illinois Company. With minor exceptions, all production of silica sand is held for company use.

The second deposit, owned and operated by the Crystal Silica Company, 717 East 61st Street, Los Angeles, is located at Falda siding

on our Escondido Branch about 6 miles southeast of Oceanside. This company is presently in the process of enlarging and improving its existing washing plant so as to produce a glass sand suitable for use at least by glass container companies.

Material as mined, runs about three-tenths of 1 per cent iron oxide (0.3%). Existing washing facilities upgrade the same to an iron content of seven-hundredths of 1 per cent (0.07%). Proposed washing facilities will reduce this latter figure to at least four-hundredths of 1 percent (0.04%).

Chemical Analysis of the present washed sand is as follows:

Silica (SiO ₂)	92.52%
Alumina (Al ₂ O ₃)	4.74
Iron Oxide (Fe ₂ O ₃)	0.07
Lime (CaO)	0.06
Magnesia (MgO)	0.05
Sodium and potassium Oxides (R ₂ O)	2.42
Loss on ignition	0.08

Crystal Silica Company has recently acquired, by lease arrangement, an additional 150 acres of sand bearing land as future reserve. The area is being blocked out by drilling, and to date a sand horizon 45 feet in thickness has been partly outlined. Tonnage blocked out to date amounts to 2 million tons.

The additions and improvements to the present plant will not only upgrade the present product but will also increase the production from 75,000 tons yearly to somewhere between 175,000 and 195,000 tons. 100,000 tons of this production will be available to glass manufacturers.

An item that may be worth mentioning is that Mr. R. K. Harper, Director of Sales, has advised that his company has 55 acres available adjacent to their plant which could be used as a plant-site for a glass manufacturer.

During the course of my investigation into sources of silica sand I met a Mr. H. A. Blood, broker of silica sand in Los Angeles. He has requested that I accompany him on an examination of two supposedly existing undeveloped silica sand deposits located in Temescal Canyon in the vicinity of the Owens-Illinois Company despoit. This examination has failed to materialize as yet because of the breakdown in leasing negotiations, etc. between the owners and Mr. Blood. However, inquiry directed today revealed that this examination may develop within the next few weeks. I will keep you informed as to developments in this matter.

W. H. Crutchfield, Jr.
Mining Engineer.

cc- Mr. C. P. McPake

MEMO TO FILE

October 5, 1953

63.0172

Mr. Robert Jones today informed me by telephone that the Cudahy Company has approved his product and as soon as he is set up at Sunshine will obtain all their sand from him; this will amount to 600 tons per month. Acting upon the strength of this commitment, Mr. Jones is rapidly acquiring the machinery necessary to start operations at Sunshine.

W. H. Crutchfield, Jr.

WHC-w

63.0172

Los Angeles, August 26, 1953

L-19-2162

Mr. W. H. Crutchfield, Jr.: (Bldg.)

I notice in your reports of April 16th and August 14th that there is considerable mention made of the silica sand deposit at Sunshine, Arizona.

This morning, Mr. Earl Pomeroy of 407 E. 4th St., Mesa, Ariz., telephone Woodland 44295, came in to talk about possibilities of getting a track to this deposit. He advises the name of his company is the "Meteor Silica Corporation", an Arizona corporation, of which W. A. Moeur of Phoenix, Ariz. is President.

I advised him that matters of this kind would have to be handled in Phoenix and I suggested that I ask you to call on him together with a representative of Mr. Murray's office at the first opportunity and discuss his proposed program to see if anything can be worked out to take care of him and to reopen this operation.

L. J. LeRoy



cc: Mr. T. H. Murray - Phoenix

LJL:dz

63.0172

Los Angeles, California
August 5, 1953

File M-32-4445

Mr. T. H. Murray - Phoenix:

You will be interested in the attached copy of Mr. Crutchfield's letter of July 27, reporting on the possibilities of added traffic from Sunshine, Arizona.

Will suggest to Mr. Crutchfield to include you in future correspondence concerning the possibility of this silica sand moving from sunshine to California or other destinations.

R. S. Hirsch

CPMcP:ke



cc: Mr. W. H. Crutchfield (63.0178)
Mr. L. J. LeRoy
Files 295-9
295-18

0172

53 AUG 3 AM 10 0,

L.A. Aug. 3, 1953

63.0172

W.H.C.

PX WIRE

W. H. Crutchfield, Jr. - LA

Your letter July 28th file 63.0172. We will furnish covered
hoppers to handle silica flour from Sunshine to Los Angeles. Please
give us advance notice when will be needed. J-26.

Baker 0930A

63.0172

1953 JUL 31 PM 12 5z

L.A. July 31, 1953

1953 JUL 31 PM 1 00

W.H.C.

PX WIRE

W. H. Crutchfield Jr. - LA

Letter 28th, 63.0172. Following from Mahoney Quote Confirm that commodity is correctly described as silica flour. Who is shipper and consignee? End quote. Pls advise. J-324.

Baker 12P

Carl Frantz
Ext 396

July 31 - 3 PM.

Called Frantz and advised that the Sunshine development is only tentative as yet. Advised that Babbit & Cuddeback Companies will be consignees. Silica flour is correct description. This is covered in the tariff.

63.0172
W.H.C.

53 AUG 3 AM 10 0

L.A. Aug. 3, 1953

PX WIRE

W. H. Crutchfield, Jr. - LA

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L.A. July 31, 1953
1953 JUL 31 PM 1 00

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that commodity is correctly described as silica flour. Who is shipper
and consignee? End quote. Pls advise. J-324.

Baker 12P

Carl Frantz
Ext 396

July 31 - 3 PM.

Called Frantz and advised that the
Sunshine development is only tentative as yet.
Advised that Babbit & Cudahy companies will be
consignees. Silica flour is correct description.
This is covered on the tariff.

Memo

Los Angeles - July 27, 1953

~~63.0170~~
63.0172

Mr. R. S. Hirsch:

To keep you abreast of the latest developments concerning the silica sand deposit located at Sunshine, Arizona, I wish to bring the following to your attention:

Mr. Robert Jones of 508-B Huntington Avenue, Arcadia, telephoned July 27th and informed me that his plan to develop this property for silica flour use has progressed to the point where he has the financial backing of two cleanser companies in the Los Angeles area, namely, Gudahy and Babbit. The needs of these two companies will approximate 1100 tons per month.

A 10-year lease, with an additional 5-year option, is now under negotiation between the Barringer people, owners of the deposit, and Mr. Jones. Mr. Jones has agreed to royalty demands, and no hitch in negotiations is expected.

W. H. Crutchfield, Jr.

cc- Mr. L. J. LeRoy

WHC-w

6/18/53

Re. Ateka Crater. Silica deposit

Mr. Jones visited this property ^{June} 13 & 14th. He stated that he cannot use ~~the~~ machinery used by the Moens people there. Mr. Barringer, owner of deposit informed Mr. Jones that he now has the lease on Santa Fe land ~~and~~ formerly under lease to the Moens. Mr. Jones would rather lease adjoining land so as not to get embroiled in legal entanglements with the Moens & Barringer.

5000 tons of sand available without stripping ~~now~~.

Wants to know what property is available at Sunshine for leasing.

Santa Fe will not reduce rates from Sunshine due to ~~Kingman~~. Candidates Feldspar & Kingman.

New Equipment not available for 6 mos. Well cost \$60,000

Checked leasing arrangement with Barringer. - Barringer now has lease as of 7/5/53.

Jones
20-73214

4-15-53

Mr. Robert E. Jones

508 B HUNTINGTON

ARCADIA

Douglas 7-3214

(Sunshine)

Los Angeles - July 28, 1953

63.0172

Mr. F. A. Baker:

A Mr. Robert Jones of Arcadia is planning to produce silica flour from the silica sand deposit located at Sunshine, Arizona. He informed me that he has obtained the financial backing from two cleanser companies, namely, Babbit and Cudahy. These companies will, in combination, use approximately 1100 tons of silica flour per month in their Los Angeles plants.

Since the material will be shipped in bulk from Sunshine to Los Angeles, and since, as its name implies, it is of extreme fineness, it will be necessary to ship in covered hopper-bottom cars. Mr. Jones stated that initially he would require from 10 to 12 such cars per month, and inquired whether he could plan on this number being available to him when he starts operations within the next few months.

I would appreciate any advice that you might offer in regard to this matter.

W. H. Crutchfield, Jr
Mining Engineer.

WHC-w

Tubegram

Los Angeles - May 6, 1953

File 63.0172

Mr. L. J. LeRoy:

In reply to your tubegram of May 5, file J-19-2694-C, concerning availability of information on the silica sand deposit located at Sunshine, Arizona:

I wish to advise that on April 14th I referred this property to a party interested in producing silica flour for use by the cleanser, ceramic and paint industries. Negotiations for lease on this deposit are under way at this point. ~~time~~

The Ball Glass Company of Los Angeles had formerly used some of this sand but, according to Mr. D. Moreau Barringer, owner of the deposit, these people had to stop buying this sand "because its finely divided nature caused some of it to blow up the stack, and further contribute to the Los Angeles smog problem."

The bulk of the sand is too fine for use by the Glass Industry. The Cleanser Industry specified a silica sand of minus No. 325 mesh size; whereas, the Glass Industry specifies that only 5% of the silica sand should pass No. 140 mesh size. Therefore, with this fact in mind, I referred the deposit to a Mr. Robert Jones of Arcadia, California, whose prime need is a very fine grained, high purity silica sand.

W. H. Crutchfield, Jr.

Memorandum

Los Angeles - May 5, 1953

File-63.0.72

Called Mr. Robert Jones and was informed that he has not received any further word from Mr. Barringer since he submitted his proposal to produce silica flour from the Sunshine deposit.

Mr. Jones is leaving shortly for Sunshine for the purpose of making an inventory of the existing plant equipment now taken over by the Barringer Crater Company.

A cleanser concern might aid in the financing of the silica flour project, according to Mr. Jones.

W. H. Crutchfield, Jr

Memorandum

Los Angeles - May 5, 1953

File-63,072

Called Mr. Robert Jones and was informed that he has not received any further word from Mr. Barringer since he submitted his proposal to produce silica flour from the Sunshine deposit.

Mr. Jones is leaving shortly for Sunshine for the purpose of making an inventory of the existing plant equipment now taken over by the Barringer Crater Company.

A cleanser concern might aid in the financing of the silica flour project, according to Mr. Jones.

W. H. Crutchfield, Jr

Memorandum

Los Angeles - May 5, 1953

File-63.0.72

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W. H. Crutchfield, Jr

Memorandum

Los Angeles - May 5, 1953

File-63.0.72

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W. H. Crutchfield, Jr

1953 MAY 5 AM 10 42

Los Angeles, May 5, 1953

63.0172

J-19-2694-C

W.H.C.

T U B E G R A M

Mr. W. H. Crutchfield - Bldg. ✓

Referring to your memorandum of March 12th, File 63.0172, concerning request of Corning Glass Works, Corning, New York, for knowledge of a source of sand close to our rails:

In that memorandum you stated that you were in position to furnish fairly complete data on a deposit at Sunshine, Arizona but desired to obtain permission from the owners of the property before doing so.

Are you now in position to furnish the information desired?

L. J. LeRoy *LL*

AJB:dz

W. H. Crutchfield, Jr
Mining Engineer

April 20, 1953

File 63.0172

Mr. Robert E. Jones
508-B Huntington Ave
Arcadia, Calif

Dear Mr. Jones:

In answer to your question posed verbally April 15th as to whether the freight rate is the same from Sunshine, Arizona, to both Los Angeles and San Francisco, I wish to advise that our Traffic Department quotes the following:

Sunshine, Arizona-Los Angeles	22¢	+	15%	/	100#
" " -San Francisco	31¢	+	15%	/	100#

*5.6 } d.t.f
18 }
7 } 2.07*

This rate is based on a minimum of 50 tons. The rates above apply on either open or closed cars.

Hoping this information is sufficient for your purpose, at this time, I am,

Sincerely,

W. H. Crutchfield, Jr.
Mining Engineer.

WHC-w

M e m o

Los Angeles - April 14, 1953

File 63.0172

Upon receipt of Mr. D. Moreau Barringer's letter of April 10th, stating that his Sunshine silica sand deposit was open for leasing, I notified Mr. Harry S. Blood of the fact, and he in turn referred this information to Mr. Robert Jones of 508-B Huntington Ave., Arcadia, California.

Mr. Jones contacted me and told me he was grateful for this information, as he had been dealing with Mr. W. A. Moeur of Phoenix, Arizona, in an effort to obtain silica sand from this deposit for the purpose of making a silica flour product useful to the cleanser industry. Mr. Jones had been laboring under the impression that Mr. Moeur, former operator of the property, still held a valid lease at Sunshine.

Mr. Jones called on this office April 15th and told me that he had phoned Mr. D. Moreau Barringer, and Mr. Barringer told him to submit his ^a proposal.

W. H. Crutchfield, Jr.

M e m o

Los Angeles - April 14, 1953

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Mr. Jones called on this office April 15th and told me that he had phoned Mr. D. Moreau Barringer, and Mr. Barringer told him to submit his ^a proposal.

W. H. Crutchfield, Jr.

Barringer Crater Company

~~1528 Walnut Street, Philadelphia 2, Pa.~~

1526 Chestnut Street

D. Moreau Barringer

PRESIDENT

Richard W. D. Barringer

Radnor, Pa.

SECRETARY & TREASURER

✓ April 10, 1953

Mr. W. H. Crutchfield, Jr.,
Mining Engineer,
The Atchison, Topeka and Santa Fe Railway Company,
121 East Sixth Street,
Los Angeles 14, California.

Dear Mr. Crutchfield:

You are correctly informed to the effect that this Company owns a deposit of high quality silica sand, located about 6 miles south of your railroad siding at Sunshine, Arizona, some 25 miles west of Winslow. This deposit is idle at present, and can be leased on reasonable terms to anyone interested in the production of sand.

I know of no estimate of the tonnage at all, but I feel confident that clean sand in the amount of several hundred thousand tons can be readily obtained. The former lessee mined it by shovel operation to a depth of some 25 feet, but did little to block out reserves in advance of his mining.

The tonnage that could be produced daily will depend entirely upon the equipment, and could easily run up to several hundred tons or more.

The sand is of a very peculiar quality. I don't know its actual analysis, but I am told it runs in excess of 97% SiO₂, with the impurities mostly in the form of Al₂O₃ and CaCO₃. Fe is at an exceedingly low figure - less than .01%, as I remember - so that the sand is of an almost perfect whiteness.

It was formed by the pulverization and ejection of a large portion of the Coconino Sandstone when it was struck by the meteorite that made the Barringer Crater. Most of the original sand grains were cracked and shattered, so that the resulting sand is exceedingly fine. A considerable proportion will pass a 350 mesh screen, and practically all of it will pass a 200 mesh.

It has a small mixture, here and there, of boulders of Kaibab Limestone. Because of the tough nature of this limestone, the boulders are usually large and easily separated from the sand. In the part of the deposit which the previous lessee mined there were no boulders at all.

Owner and Developer of Barringer Meteorite Crater, Arizona

Mr. W. H. Crutchfield, Jr.

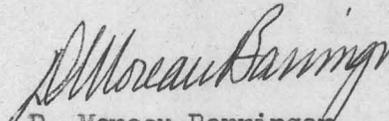
April 9, 1953

The previous lessee shipped mainly to two customers - The Ball Brothers glass plant in Los Angeles and the Phelps-Dodge Corporation copper smelter at Ajo, Arizona. The latter took only small and sporadic amounts. The former, I am told, had to stop buying this sand, because its finely divided nature caused some of it to blow up the stack, and further to contribute to the Los Angeles smog problem.

They were able to get sand of somewhat similar composition, but coarser texture, in Nevada. This latter information is only hearsay, and should be checked up.

We will be glad to discuss a lease, on a royalty basis, providing for a reasonable minimum monthly royalty, with any responsible parties you may refer to us.

Very truly yours,


D. Moreau Barringer

DMB:mcf

W.H. Crutchfield, Jr
Mining Engineer

April 1, 1953

File 63.0172

Barringer Crates Company
1528 Walnut Street
Philadelphia 2, Pennsylvania

Gentlemen:

The mining department has lately received inquiries regarding a source of high quality silica sand. As your organization has a deposit of this type, I would like to refer these people to you with your permission.

Since I have only recently become affiliated with this department, and have not as yet visited your property at Sunshine, Arizona, I would greatly appreciate receiving such information that you might care to release regarding daily tonnage, sizes of products, or any other data that would aid in bringing our files up to date.

Awaiting your reply, I am

Sincerely,

W. H. Crutchfield, Jr
Mining Engineer.

WHC-w

Los Angeles - March 12, 1953

File 63,0172

Mr. L. J. LeRoy - Building

In re your communication of March 10th, your file L-19-2694-C, received this date, concerning the request of the Corning Glass Works, Corning, New York, for knowledge of a source of sand close to our rails:

I wish to advise that after a study of our files on deposits of silica sand, the deposit at Sunshine, Arizona, is the only one of proven merit that could be used for the manufacture of their product. They will require a sized sand of high silica content with only traces of impurities, and this could be realized from the Sunshine property.

Mr. T. H. Murray, Phoenix, is well informed on this property, and I am taking the liberty of forwarding your communication to him so that he will be cognizant of this possible new development.

You might inform the Buffalo office that the Mining Department is in a position to furnish fairly complete data on this particular property. Before sending them this information, however, I will have to obtain permission from the owners of the property. This request will be sent to the owners today.

W. H. Crutchfield, Jr

cc- Mr. T. H. Murray
General Freight and Passenger Agent
Phoenix, Arizona

W. H. Crutchfield, Jr
Mining Engineer

March 12, 1953

File 63.0172

Mr. W. A. Moeur
310 Phoenix National Bank Bldg
Phoenix, Arizona

Dear Mr. Moeur:

I received a communication today from our Industrial Agent, L. J. Le Roy, stating that an eastern glass company is seeking knowledge of a sand deposit adjacent to Santa Fe lines. As your deposit has considerable merit, I would like to send them data that we have concerning it if you are so disposed.

Awaiting your reply, I am

Very truly yours,

W. H. Crutchfield, Jr
Mining Engineer.

WHC-w

Note 3/31/53 - Moeur no longer has lease on this deposit.

People to contact on this deposit are:

BARRINGER CRATER CO.

1528 WALNUT ST.

Philadelphia 2, Pennsylvania.

This information obtained by phone from Chief Clerk Henderson in Phoenix this date.

a local
mining engineer

File 63.0172

Meteor Crater Silica Deposit

10/7/52

G.W.V.

Mr. Larry Shinn telephoned re sample of silica from Meteor Crater.

He wants a 100 lb. sack for testing in the Laboratory of Mr. Harley A. Hill 1011 So. Figueroa St., Los Angeles. These tests will be for purpose of manufacturing Silicon.

Mr. J. H. Murray, Phoenix will contact owner, Mr. W. A. Moore, Phoenix to have this sample sent to L.A. perhaps it would be best to have it come to Chief Engineer and Mr. Shinn could have it taken to laboratory.

ABD.

File 63-0172

10/7/52

G.W.V.

Letter refers to the meters on the
Albera Deposit near Seward.
Mr. J.H. Murray, Chemist has
been handling contact at Denver
and Mr. Biddle Blomsted
request Wright Bates from
Mr. Murray who is entirely
familiar with this matter.
We should just supply him
with the information he
requests about prices.
A.B.

File 63-0172

10/3/52

G.W.V.

Mr. Larry Shinn has been
in communication with Joe. He
Albera sample from Seward. He
wishes this Dr. wants sample
to test it is Pilot plant. All
will be done Monday. How much
and when wanted.

If we get the samples sets
I send by results follow
up on when he is referred
to Denver?

A.B. samples must be obtained
through Mr. J.H. Murray at
Seward who has been testing
as contact with Denver.

October 7th, 1952
63-172

Mr. P. E. Bickel,
1546 West Willetta St.,
Phoenix, Arizona

Dear Sir:

Your letter to Mr. T. O. Evans, Mining Engineer, has been referred to me for reply. Mr. Evans is now devoting his entire time to the mining operations at Grants, New Mexico.

Upon review of your letter I note that you are making inquiry in regard to freight rates, etc., a subject upon which, I am sure, our Mr. T. H. Murray in Phoenix, can fully advise you. Therefore I am passing your letter to him for reply.

Yours truly,

(SIGNED) L. H. POWELL

Chief Engineer

cc - Mr. T. H. Murray
(With enclosure)

Vio

Los Angeles, Calif. Oct 9th, 1952

File 63-172

Mr. T. H. Murray

Your file 733-1 relates to sand deposit at the Meteor Crater at Sunshine, Arizona, referred to in my letter to you of June 13th last and yours of June 11th.

Mr. Larry Shinn, a local mining engineer is very much interested in securing a sample of this silica sand. If you could arrange with Mr. Moeur to forward to me a 100-pound sample, I will see that it is delivered to the laboratory of Mr. Harley A. Sill, 1011 South Figueroa Street, Los Angeles where tests will be run to determine if this material is suitable for manufacturing Silicon.

If you will arrange and advise me when sample goes forward, I will see that it is delivered to the proper party.

L. H. Powell

cc - Mr. T. O. Evens

Vio

September 16, 1952

Mr. P. E. Bickel
1546 West Willetta Street
Phoenix, Arizona

Dear Mr. Bickel:

In keeping with our conversation in Mr. Murray's office on September 4th I am supplying you with the following information concerning the specifications of the material acceptable to the Prepakt Concrete Company as a substitute for fly ash.

The material must be in a dry state, and 100% passing a 100-mesh sieve, and 90% passing a 300-mesh sieve.

If you believe your sand will fit these requirements may I suggest that you send a 100-lb sample to Mr. L. S. Wertz, President, Intrusion - Prepakt, Inc., Union Commerce Building, Cleveland 14, Ohio.

Yours very truly,

Mining Engineer

cc - Mr. T. H. Murray
Phoenix

TOE-c

63-172

Pending

Phoenix, July 14, 1952

M-733-1

Mr. T. O. Evans:

This is to remind you of your promise to contact Mr. P. E. Bickel of 1546 West Willetta Street, Phoenix, next time you are in Phoenix.

Mr. Bickel is a Mining Engineer and he is interested in developing the Meteor Crater silica deposit in connection with the Meteor Silica Company. Mr. Bickel's phone number in Phoenix is 8-0770.

T. H. Murray

THM:RJM

Will be in Phoenix Sept 4 - 4:00 pm
Called Mr. Malcolm re meeting Bickel 9/1/52
Give address of Prepared Cement Co - Cleveland

July 2nd, 1952

Mr. G. A. Connell
Director of Research and Development
Pacific Coast Borax Company
630 Shatto Place
Los Angeles 5, California

Dear Mr. Connell:

In keeping with your letter of June 20th, concerning 100 pound sample of Meteor Crater sand, having screen size of 30 mesh or finer, I have requested Mr. W. A. Moeur of Phoenix to supply you with this material.

Your letter arrived during my absence from the city, which will account for the delay in replying.

Yours truly,

Mining Engineer

TOE-c

July 2nd, 1952

Mr. W. A. Moeur
310 Phoenix National Bank Building
Phoenix, Arizona

Dear Mr. Moeur:

Attached is photostatic copy of a letter from Mr. G. A. Connell, Director of Research and Development, Pacific Coast Borax Company, Los Angeles.

As you will note in Mr. Connell's letter, he requests 100 pounds of your sand, of 30 mesh screen size and finer. Will you please arrange to supply him with this sample, forwarding it to the address shown on his letter?

In order that I may follow up on this item won't you please advise me when the sample has been shipped?

Yours truly,

Mining Engineer

Encl.

cc - Mr. T. H. Murray
General Freight & Passenger Agent
Phoenix, Arizona

TOE-c

63-172

Pacific Coast Borax Co.

DIVISION OF BORAX CONSOLIDATED, LIMITED

630 SHATTO PLACE • LOS ANGELES 5, CALIFORNIA
MAIL ADDRESS: P.O. BOX 9128, STATION "S," LOS ANGELES 5, CALIF.

June 20, 1952



MANUFACTURERS OF THE FAMOUS "20 MULE TEAM" PACKAGE PRODUCTS

Mr. Tom Evans
Mining Engineer
Santa Fe Railroad
121 East 6th Street
Los Angeles 14, California

Dear Mr. Evans:

We have finally heard from our glass friends who desired information on sands and they now advise that a material containing 0.04% iron will be acceptable.

If you feel that the deposit which we have discussed would be of this quality and of 30 mesh and finer, please have 100 pounds sent to my attention here in Los Angeles.

Yours very truly

By: *G. A. Connell*

G. A. Connell
Director of Research & Development

GAC:C

Los Angeles, June 13, 1952

File 63-172

Mr. T. H. Murray - Phoenix

Referring to your letter of June 11, file 733-1, which relates to the Meteor Crater sand deposit.

In telephone conversation with Mr. Harry Blood, he insists that he did write to the Meteor Silica Company, but will write to Mr. Moeur again, as we have suggested.

I have heard nothing further from Mr. G. A. Connell of Pacific Coast Borax Company, and I believe it will be a good plan if Mr. Moeur wrote him direct. Mr. Connell was out of the city when I telephoned his office yesterday.

T. O. Evans

TOE-c

Phoenix, June 11, 1952

W-733-1

Mr. T. O. Evans:

Your letter of May 26th, file 63-172 and further mine of June 6th.

I have, today, been able to contact Mr. Moeur and he advises that he has not received any letter from Mr. Harry Blood. He knows Mr. Blood and if he had gotten a letter from him he would have handled his request immediately. I gave him Mr. Blood's address and told him what was in the letter but it might be a good idea if Mr. Blood were to write again.

Mr. Moeur also asked if you had heard anything further from Mr. G. A. Connell and whether or not you would have any objection to him writing the Pacific Coast Borax Company direct.

Please advise.

T. H. Murray *THM*

RFH:hh

63-172

Phoenix, June 6, 1952

W-733-1

Mr. T. O. Evans:

Your letter of May 26th, file 63-172.

Since receipt of your letter, we have been endeavoring to contact Mr. Moeur. However, he was out of town on May 28th and 29th and has not been able to be in the office more than a few hours this week.

We have not been able to find him in as yet but when we can, we will try to get the information you desire.

T. H. Murray^h

RFH:h

Los Angeles, May 26, 1952

File 63-172

Mr. T. H. Murray - Phoenix

Attached is copy of a letter received from Mr. W. A. Moeur, concerning quotation on silica sand from Sunshine, Arizona.

I have personally delivered this information to Mr. G. A. Connell of the Pacific Coast Borax Company, who indicated that he would inform me of future developments.

Last Friday I had lunch with Harry Blood of the Harry E. Blood Company, 5028 Alhambra Avenue, Los Angeles 32, California, and he told me that he had written the Meteor Silica Corporation requesting 2 pound samples of their product, and his letter was not acknowledged, nor the samples received.

I am wondering if you can, in your nice manner, inquire of Mr. Moeur why this was overlooked.

T. O. Evans.

Encl.

TOE-c

METEOR SILICA CORPORATION

HEAD OFFICE
310 PHOENIX NATIONAL BANK BUILDING
PHOENIX, ARIZONA

PLANT LOCATED AT METEOR CRATER
P. O. ADDRESS, BOX 191
WINSLOW, ARIZONA

May 15, 1952

Mr. T. O. Evans
121 East Sixth St.
Los Angeles 14
California

Dear Mr. Evans:

Thank you for your letter of May 13 and in reply the price on this material is \$3.25 a ton F.O.B. Sunshine; that is for ~~the~~ material that is crushed and processed and loaded on the cars. The material is readily available for shipment and any quantity Mr. Connell might need can be furnished to him.

Very truly yours,

W. A. Moeur

W. A. MOEUR

WAM/w

Du. 7-5151

Telephoned him 5/21/52

May 13, 1952

Mr. W. A. Moeur
210 Phoenix National Bank Building
Phoenix, Arizona

Dear Mr. Moeur:

In recent conversation with Mr. G. A. Connell, Director of Research and Development for the Pacific Coast Borax Company, 630 Shatto Place, (mail address P.O.Box 9128, Station 'S') Los Angeles 5, California, I mentioned the quality of sand obtained from your Sunshine deposit, and later supplied him with an analysis of the same.

Today Mr. Connell asked if your sand is readily available, and if so, what is the price per ton f.o.b. Sunshine. The expected requirement would be 50 tons per day.

Won't you please supply me with this information that I may pass it along to Mr. Connell?

Yours very truly,

Mining Engineer

cc - Mr. T. H. Murray
Gen ~~Div.~~ Frt. & Pass. Agent
The A.T. & S.F. Ry. Co.
Phoenix, Arizona

63-172

Pacific Coast Borax Co.

DIVISION OF BORAX CONSOLIDATED, LIMITED

630 SHATTO PLACE • LOS ANGELES 5, CALIFORNIA
MAIL ADDRESS: P.O. BOX 9128, STATION "S," LOS ANGELES 5, CALIF.

May 9, 1952



Mr. T. O. Evans
Mining Department
AT&SF
121 East Sixth Street
Los Angeles, California

Your: 53-172

Dear Mr. Evans:

Thanks for your letter of April 30, 1952 which gives the Chemical & Screen analysis of sand deposits located near Sunshine, Arizona.

Is this sand readily available and if so what is the price f.o.b. Sunshine, per ton in carload quantities. The iron oxide content is higher than we desired, nevertheless your deposit is the purest found on the West Coast and we probably will have to be satisfied with it.

I am making some further inquiries through our friends, the people who would use the sand therefore will not ask for samples until we have heard from the interested parties. I believe that I told you the expected need would be 50 tons per day.

Yours very truly

By: *G. A. Connell*G. A. Connell
Director of Research & Development

GAC:C

April 30th, 1952

Mr. G. A. Connell
Pacific Coast Borax Company
510 West Sixth Street
Los Angeles, California

Dear Mr. Connell:

In keeping with your telephone request of yesterday I am supplying you with an analysis of a white sand occurrence located near Sunshine, Arizona. In addition I am supplying you with a screen analysis.

Silica (SiO_2)	98.68%
Alumina (Al_2O_3)	0.83
Ferric Oxide (Fe_2O_3)	<u>0.03</u>
SCREEN ANALYSIS	99.54
Plus 28	none
Minus 28 Plus 48	15.9
48 " 65	39.4
65 " 80	22.7
80 " 100	9.5
100 " 150	7.2
150 " 200	2.6
200	<u>2.7</u>
	100.00

This deposit is located 7 miles by road south of the Santa Fe siding and loading ramp at Sunshine, Arizona. The length of the outcrop is about 2000 feet, and the width 500 feet. The minimum thickness exposed is 25 feet. The tonnage for the area I have given you equals 1,500,000 tons.

You will note that the ferric oxide content is 0.01% higher than I mentioned over the telephone, but this was due to not having the file at hand.

If you should desire samples of this sand I shall be glad to arrange its delivery to you.

Yours very truly,

TOE-c

Mining Engineer

63-172

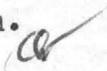
Los Angeles, July 6, 1950.

K-295-18

Mr. T. O. Evans:

Thank you for handling silica sand question with Messrs Kenny and Mendelsohn of B. T. Babbitt Co., your file 63-172, June 27.

I think it would be a good thing to carry on investigation of what the Santa Anna deposit may be; it may serve Babbitt's purpose, or not. If not, it may fit the needs of some other manufacturer.

R. S. Hirsch. 



Santa Anna, Texas. July 3, 1950.

Mr. T.O. Evans,
Mining Engineer,
A.T.&S.F.Rw. Co.,
Los Angeles, Calif.

Dear Sir:-

Yours 27th File 63-172.

I am sending you under separate cover sample of silica sand produced at this point. This sand mined by Santa Anna Silica Sand Co. Inc., Mr. H.L. Markland, President. Communications addressed to them at Santa Anna, Texas will reach them.

Yours truly,



Agent.

Santa Anna, Texas. July 3, 1950.

Mr. T.O. Evans,
Mining Engineer,
A.T.&S.F.R.W. Co.,
Los Angeles, Calif.

Dear Sir:-

Yours 27th File 63-172.

I am sending you under separate cover sample of silica sand produced at this point. This sand mined by Santa Anna Silica Sand Co. Inc., Mr. H.L. Markland, President. Communications addressed to them at Santa Anna, Texas will reach them.

Yours truly,



Agent.

June 27, 1950.

Mr. A. B. McClanahan,
A.T. & S.F. Agent,
Santa Anna, Texas.

Dear Sir:

I understand there is a glass sand deposit located near Santa Anna, and inasmuch as I have an inquiry for high grade silica sand I would appreciate it very much if you will send me approximately 1/4 of a pound by railroad mail. The concern interested is particularly anxious to obtain fine mesh size having a high silica and a low iron content.

Yours truly,

Mining Engineer.

TOE-c

Los Angeles, June 27th, 1950.
File 63-172.

Mr. R. S. Hirsch,
Freight Traffic Manager,
Los Angeles, California.

Dear Sir:

Conforming to your suggestion by telephone on June 22nd, I called on Mr. Kenny of the B.T. Babbitt Company concerning the possibility of supplying them with high grade white silica sand for use in the manufacture of their Babbo cleansing compound. Mr. Kenny referred me to Mr. Norman Mendelsohn, Vice President who is in charge of purchasing raw materials, and I met with him yesterday afternoon and supplied him with a sample of Meteor Crater silica.

The chemical analysis of the material I supplied him was satisfactory, but the color was about two shades off of being a pure white, and when water was added to it the shade darkened about 2 degrees more. Consequently the Meteor Crater material will not meet their requirements.

They are now purchasing about six cars monthly from a deposit located at Mill Creek, Oklahoma. Mill Creek is about one/half way between Tulsa and Dallas on the Frisco Lines. Ardmore, Oklahoma, on our lines is approximately 23 miles southwest of the deposit. The freight rate from Mill Creek to Los Angeles is \$9.00, which is approximately the same amount paid for the silica, and Mr. Mendelsohn is quite anxious to obtain comparable material closer to Los Angeles.

There is a large glass sand deposit located near our railroad at Santa Anna, Texas. This station is between Coleman and Brownwood. If you think well of the idea I can obtain a sample of the Santa Anna material and submit it to Mr. Mendelsohn.

The specifications covering the silica used by the Babbitt Company are so exacting as to silica content and color that it is practically impossible to obtain the material they require this side of Texas because geological conditions are not favorable for ~~the~~ ^{its} deposition in the far western states.

Specifications for Babbo
98% SiO₂ - pure white when wet
and remain white upon drying.

TOE-c

Yours truly,

Mining Engineer.

B.T. Babbitt Inc.

4726 Loma Vista Ave
Vernon, Calif

Tel. Ki. 7157

(Central Mfg District)

September 8th, 1949.

Mr. E. E. Pomeroy, General Manager,
P. O. Box 191,
Winslow, Arizona.

Dear Mr. Pomeroy:

Thank you for your letter of September 1st and for the sample of silica sand, which I later received.

I have submitted a part of this sample to Mr. Harry E. Blood of Harry E. Blood Silica Company, 5028 Alhambra Avenue, Los Angeles 32, California.

I have suggested to Mr. Blood that he communicate with you direct and no doubt you will hear from him reasonably soon.

Yours very truly,

Mining Engineer.

cc - Harry E. Blood Silica Company,
5028 Alhambra Avenue,
Los Angeles 32, California.

METEOR SILICA CORPORATION

63,0172

HEAD OFFICE
210 PHOENIX NATIONAL BANK BUILDING
PHOENIX, ARIZONA

PLANT LOCATED AT METEOR CRATER
P. O. ADDRESS, BOX 191
WINSLOW, ARIZONA

Sept 1, 1949

Mr T.O. Evans
Mining Engineer
A.T.S.F. Engineering Dept.
121 E. 6th St
Los Angeles, Calif

Dear Mr. Evans:

In regard to your letter of Aug 18, I have shipped you a sample of the material similar to that which we are now shipping to the glass trades.

There will be one difference between this sample and what we are shipping and that is in the moisture content--which is unavoidable in such a sample.

At the present time, Ball Brothers are requiring a moisture content between 2.0% and 2.4%, which is controlled in the processing. We are able to add any amount of moisture to suit the customer, but for reasons of weather, etc, we are not able to guarantee large volume shipments at less than 2.0% moisture content.

The sample furnished will contain less than 8.0% of minus 200 mesh material. There will be a trace only of iron, and only slightly more than a trace of alumina. For most practical purposes, the material can be considered 99.7% pure Silica.

Thanking you in advance for your cooperation, I am

Sincerely yours,

E. E. Pomeroy
E.E. Pomeroy
Gen. Mgr.

C.C.

*Harry E. Blood Silica Co
5028 Alhambra Ave
Los Angeles, 32, Calif*

Aug. 18, 1949.

File 63.0172

Meteor Silica Corporation,
Winslow, Arizona.

Gentlemen:

Will you please furnish me with a 10-lb. sample of your sand, similar in quality to that shipped to the Ball Brothers Glass Company in El Monte? There is a possibility that I may be able to interest a concern in its use.

Yours truly,

Mining Engineer.

Los Angeles, California
May 11, 1949

File - 63.0172

Mr. E. O. Hemenway - Albuquerque

This is in reply to your letter of May 9, concerning the sand operation at Meteor Crater, Arizona, your file reference 14212.

I am quite familiar with the operation and know many of the problems faced by the Meteor Silica Corporation. The first difficulty is one of ^{geographical} geological location with reference to marketing their material in the Los Angeles area in competition with sand produced at Overton, Nevada.

Sunshine, Arizona, the loading point on our railroad for this sand is 575 miles from Los Angeles and the present freight rate is \$3.85 per ton when open topped cars are used and \$4.30 per ton when shipped in closed cars. Overton, Nevada, is 396 miles from Los Angeles and that rate is \$2.60 and \$3.00 per ton depending upon the type of car used. These rates are subject to an additional 4% to cover the emergency increase. The Nunn Company, who ship the sand from Overton, receive \$3.50 per ton for the sand f.o.b. their plant. This makes the delivered cost to Los Angeles vary between \$6.25 and \$6.62 per ton depending upon the cars used in delivery.

Our traffic officers have informed me that our rate per ton mile is practically the same as the Union Pacific rate from Overton; and, if we were to agree to lower our rate to match the U.P. rate, that company would do the same thing. Consequently, the differential in the marketing price of the sand in this area would relatively remain the same as it is now.

I am grateful to you for your kind offer to visit this property with me. However, I have previously examined the deposit as well as the plant designed to dry and size the material. In addition, I have discussed the problem at some length with Mr. W. A. Moeur and his brother in Phoenix. It was my opinion then, and I have no reason to modify it now, that the division of the sand into various mesh sizes by air separation methods is not as satisfactory as it would be if water classification was employed. The large successful silica sand operators in the Ottawa District employ this method. Their sand, as you know, is the standard by which all other sands are compared. Water is obtainable at Meteor Crater in unlimited quantities by pumping from the old abandoned shaft located on the property.

May 11, 1949

Mr. Moeur informed me that they had expended \$75,000 erecting their plant and were obliged to expend additional amounts to keep the plant in operation because of the excessive wear produced by the abrasive action of the sand on their equipment.

It is my understanding that the present shipments from the Meteor Crater deposit are consigned to the Ball Brothers Glass Company at El Monte, California, where it is used in the manufacture of container glass. This company purchases the Arizona sand because they prefer a dried sand as opposed to the wet sand from Overton. However, I question if they will continue to purchase the Meteor Crater sand when the Overton people install a drier as I am informed they are planning to do.

What I have written may sound rather pessimistic concerning the outlook for the Meteor Silica Corporation, but it is a presentation of the facts as they exist. If a glass plant were located in Phoenix, or Albuquerque, the geological location of the deposit would obviously be favorable, but for this deposit to compete with the Overton sand in this area appears to be an insurmountable problem.

We have attempted to interest the Harry S. Blood Silica Company to purchase some of this sand for use in the foundry trade, but we were not successful because the shape and structure of the grains prevent its use as a foundry sand. We attempted to do this because of the high prices prevailing for material used in the foundries.

An analysis of this sand follows:

Silica	98.60%
Alumina	0.83%
Ferris oxide	0.03%

T. O. Evans

c.c. Mr. R. G. Rydin
Mr. T. H. Murray

TOE/rm

Los Angeles, California
May 16, 1949

File - 63.0172

Mr. R. S. Hirsch - Los Angeles

Complying with the request of Mr. C. P. McPage, we are furnishing you with six copies of our letter to Mr. Hemenway of May 11, concerning the Meteor Crater sand operation near Sunshine, Arizona.

T. O. Evans

TOE/rm

encl

Los Angeles, California
May 16, 1949

File - 63.0172

Mr. R. S. Hirsch - Los Angeles

Complying with the request of Mr. C. P. McPage, we are furnishing you with six copies of our letter to Mr. Hemenway of May 11, concerning the Meteor Crater sand operation near Sunshine, Arizona.

T. O. Evans

TOE/rm

encl

63.0172

Albuquerque, May 9, 1949
File 14212

Mr. T. O. Evans,
Mining Engineer,
Los Angeles, California.

Dear Sir:

When in Phoenix on May 2, I had some discussion with a representative of the Meteor Silica Corporation, the outfit that is removing silica sand from Meteor Crater and trucking it to our Sunshine station for loading. Your industrial minerals book notes this deposit on page 70, but I do not find any recent report or notice of production in our file.

It appears that these people are making some progress in the development of this property in that they built an industrial track for loading at our Sunshine station and at the present time are shipping about 20 or 25 cars a month of this silica sand to the coast. I haven't been to either of the installations, that is, the one at the Crater or the one at Sunshine, but understand that neither one of these installations is very extensive. It is my further understanding that the quality and character of this sand is highly suitable for glass making and it would appear that if we have not analyzed samples of this material, we should do so and be in a position to assist in the development of this possible industry, and if this office can be of any help in making a trip to this location, will be very glad if you will advise.

Mr. W. A. Moeur, who is an attorney in Phoenix, is President of this corporation, and Mr. C. W. (Shorty) Davis, who is one of the old stockmen of Arizona, is one of the Directors, and I got from conversation with these gentlemen that they were having some difficulty in the matter of freight rates, as well as securing the necessary type of equipment in which to ship the material. This material has to be shipped in closed cars and the shipments to the coast are now being made in box cars. These people tell me that they can get quite a little more business from a Denver concern if they can ship the material in covered "hoppers,"

Mr. T. O. Evans -2-

but I advised them that this type of equipment is very short and doubted if we could help them out at the present moment. There appears to be a unlimited amount of this material, and if it is of satisfactory character, there might be a good chance of developing considerable freight traffic from this project.

Very truly yours,

A handwritten signature in cursive script, appearing to read "E. D. Hickey". The signature is written in dark ink and is positioned to the right of the typed closing "Very truly yours,".

Hc

cc - Mr. R. G. Rydin.

63.0172

GEORGE M. COLVOCOSESSES
MINING AND METALLURGICAL ENGINEER
1102 LUHRS TOWER
PHOENIX, ARIZONA

March 3, 1948

Mr. T. O. Evans, Mining Engineer
The Atchison, Topeka and Santa Fe Railway Co.
121 East Sixth Street
Los Angeles 14, California

RE: Meteor Crater Sand

Dear Mr. Evans:

Many thanks for your courteous letters of February 21 and February 27, your file No. 63-0172.

I certainly thank you for having taken up the freight rate on the Crater Sand with Mr. Goin of your company and note that he would doubtless be favorably disposed toward our request except for the fact that he has joined in the application for the recent increase in freight rates and might find it inconsistent to favor any decrease at the present time.

However, it is my understanding that ^{at} the time that the railroad officials made their last request for a 20% general increase, certain raw materials were specifically excluded at their request including volcanic cinder and some other non-metallic minerals.

It seems to me that the situation in respect to the Crater Sand is very similar to that of the volcanic cinder except that it is not being used for balast along the railway lines, and the present operation involving the mining and milling of the sand at Meteor Crater was quite definitely based upon a freight rate of \$3.40 to Los Angeles. I understand that the Meteor Silica Corporation, who are carrying on this work, made no protest when the rate was raised to \$3.70, but the last increase involving another 20% would seem to put them out of competition with sand from Nevada and elsewhere and I sincerely trust that Mr. Goin and other officials of your company will continue to give this matter careful consideration since operations at Meteor Crater appear to be at a standstill and it may not be possible to resume activity unless some concession can be made in respect to the charges for transportation.

Personal regards and many thanks for your assistance.

Yours very truly,

G. M. Colvocoyses

GMC:IM

February 27, 1948

Mr. George M. Colvocoresses
1102 Luhrs Tower
Phoenix, Arizona

Dear Mr. Colvocoresses:

Your letter of February 19, concerning consideration of lower freight rates on silica sand from Meteor Crater to the Los Angeles area was presented to Mr. G. L. Goin, Freight Traffic Manager, this morning.

It was apparent from my conversation with him that he has previously discussed this matter with Mr. W. C. Hendrie. It was evident to me that Mr. Goin is conversant with the entire matter and was somewhat sympathetic with your problem.

However, he is in a peculiar predicament because he has, along with other railroad officials, been instrumental in obtaining an interim general freight increase¹ and therefore, to be consistent, he cannot recommend a reduction² in any freight rate while the question of increases is pending before the Interstate Commerce Commission. As you know, the Commission has made no decision in the matter and, consequently, Mr. Goin does not know what the new rates will be until this issue is decided.

I realize that I have not been of much assistance to you, but possibly, we can again present the matter to Mr. Goin at a later date.

With kindest regards.

Yours truly,

Mining Engineer
Chief En

63.0172

GEORGE M. COLVOCORESSES
MINING AND METALLURGICAL ENGINEER
1102 LUHRS TOWER
PHOENIX, ARIZONA

February 19, 1948

Mr. T. O. Evans, Mining Engineer
Atchison, Topeka & Santa Fe Railway Co.
560 South Main Street
Los Angeles 13, California

RE: Meteor Crater

Dear Mr. Evans:

Since I know that you are very much interested in the development and operation of various mining projects along the line of the Santa Fe, I am taking the liberty of writing to you in respect to the situation at Meteor Crater which is owned by the Standard Iron Company of Philadelphia whom I represent locally.

The right to mine and treat silica sand from this property was granted two years ago to the Meteor Silica Corporation of Phoenix who have worked up quite a business with the glass manufacturers in Los Angeles, and during the past year shipped over 400,000 tons of crater sand to points on the coast in addition to which some 1,200 tons were shipped during this period to Clarkdale.

Naturally the sand which goes to the glass manufacturers must meet the competition with sand shipped in from other points, particularly the sand from Nevada, and the recent increases in railway freight rates have put the crater sand in a very disadvantageous position since the rate in round figures has been raised from \$3.40 to \$4.40 per ton whereas the Nevada sand rate was raised from \$2.15 to approximately \$3.00 per ton.

The Meteor Silica Corporation and Ball Bros. of Los Angeles to whom they have been shipping most of their sand have already taken some steps to request exemption from a portion of the last rate increase in order that shipments from Meteor Crater may be continued, and I sincerely trust that you will feel justified in giving this matter your personal attention and discussing same with other officials of the Santa Fe system.

I fully appreciate the position in which the railways have been placed by the increased wages and other costs which they are obliged to pay and under ordinary circumstances I should feel that the crater sand was not entitled to any such consideration, but as you are probably aware, there is an enormous deposit of this sand and there are excellent chances that the rate of shipments may be greatly increased in the future provided that the operators are able to meet the competition from other sources.

I am given to understand that Ball Bros. would be glad to take as much as 100 tons per day of this material and to double that quantity in the course of a few months time, and operations on such a scale would

give the Meteor Silica Corporation an opportunity to greatly reduce working costs and also the royalty which is paid to the Standard Iron Company under the terms of our contract.

May I respectfully request that you personally look into this situation and advise me if you believe there is any possibility of securing some concession since I understand that the present freight situation has forced the Meteor Silica Corporation to entirely suspend their shipments for the time being.

Personal regards.

Yours very truly,

S. M. Colocouris

GMC:IM

4-15-53

Mr. Robert E. Jones

508 B HUNTINGTON

ARCADIA

Douglas 7-3214

(Sunshine)

February 21, 1948

Mr. George M. Colvocoresses
Mining and Metallurgical Engineer
1102 Luhrs Tower
Phoenix, Arizona

Dear Mr. Colvocoresses:

Upon receipt of your letter of February 19, concerning increased rates on silica sand from Meteor Crater to the Los Angeles area, I attempted to reach Mr. G. L. Goin, our Freight Traffic Manager.

I was informed that Mr. Goin is out of the city and is not expected to return until next Tuesday. After I have talked with him I shall write to you again.

With all good wishes and kindest personal regards.

Yours truly,

Mining Engineer

63.0172



Mining World
Nov. 1947

Silica Sand
Sunshine, Arizona.

Los Angeles, Cal.
May 27th, 1927

File: 63.0172

Memorandum:

Mr. Harry Blood telephoned. He says that the foundries who have used the Sunshine sand for molding purposes claim that it won't stand up under heat. Under the microscope the grains have a peculiar roughness, as if they had been recently broken, and in some instances the fracture continues into the grain. When heat is applied the grains break, creating a lot of fines.

Mr. Blood does not believe that it can be used in foundry practice successfully, but he knows of no reason why it couldn't be used for glass making, if it can compete with the Nevada producers as to price.

T.O.E.

63.0172

MEMORANDUM

San Francisco, May 17, 1947

R-6-MS

Mr. Evans:

Thank you for sending me copy of your letter of May 13th to Mr. Murray, file 63.0172, regarding the silica deposit near Sunshine, Arizona.

I think it would be advisable for you to keep in touch with the Moeurs and see whether they are able to work out their problem. Evidently there are some very definite possibilities of traffic, and if the present operators cannot make a go of it, perhaps we can get others interested--I mean companies who have the know-how and adequate funds to support it. They could perhaps either join hands with the Moeurs or buy them out.

R. G. Rydin ✓

Los Angeles, California
May 13, 1947

Mr. T. H. Murray
General Freight and Passenger Agent
Phoenix

File - 63.0172

Dear Sir:

In keeping with your suggestion when I was in Phoenix on May 8, I visited Mr. W. B. Moeur and Sidney B. Moeur, who operate the Meteor Crater silica deposit near Sunshine, Arizona.

These people, as you know, have had considerable difficulty with the plant in effecting the separation of the various sizes of sand. They informed me that they have spent something over \$75,000 on the plant and from early in January until now only five carloads of silica have been shipped.

I volunteered to assist them in any way that I could to overcome their problem and my offer was kindly accepted. However, they believe that their difficulty will be solved when the changes in the plant design, which they are now making, are completed.

They are using a novel means of separating the sand grain sizes, which vary from 50 to 325 mesh in size, by means of an air current under vacuum. The process is entirely new and apparently the first of its kind in this country. The inventor is G. F. Sarvin, who resides at Clarkdale, Arizona.

After reviewing the flow sheet and having previously studied the grain shapes of the Meteor Crater silica deposit, I am not too optimistic about results obtainable from the plant even after the modification. It seems to me that the conventional method of sizing, by water concentration as adopted by other silica sand producers, would be the most satisfactory. There is an ample supply of water obtainable from the old shaft on the property. Objections to this plan are that it would require a dryer to dry the sand before shipment. However, it is also necessary to have a dryer to dry the sand before it can be concentrated by the air separation method. I was informed that the Johns-Manville Company have promised to give them an order for 307,000 one hundred pound bags of 200 mesh silica sand if they can guarantee that the sizes will not be more than 15% above. The sand would be used in making transite.

I have requested Messrs Moeur to contact me if I can be of any assistance to them and they have agreed to do this. It is apparent to me that these gentlemen have had many problems that could have been avoided by engineering supervision.

Yours truly,

T. O. Evans
Mining Engineer

c.c. Mr. R. G. Rydin
Mr. G. L. Gale

Lab

11.45% thru 325
 15.5% over 325
 10.7% over 200
 72.35% over 100

Unknown 100 to 200

Bucket 100 + Foundry - glass + 20

Bucket 200 minus with 15% + Johns Manville 387000 kg only
Branite.

Bucket 300 - minus - ? Chromite

99% + Silicon

Trace Iron -

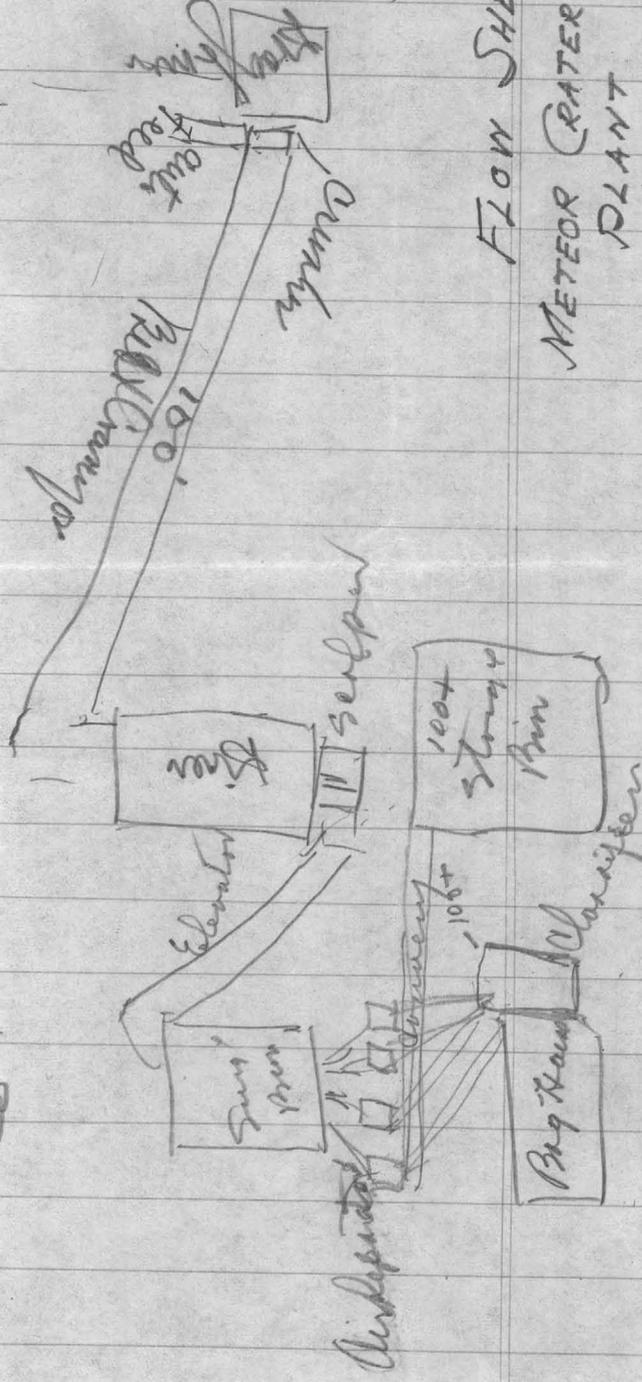
No refractory materials

No Clay

No washing

30 to 325 -
 Meak,
 30 to 100 - 8.7%

63.0172
File



FLOW SHEET

METEOR CRATER SILICA PLANT

Near Sunshine, Ariz

XXXXXXXXXX
XXXXXXXXXXXXXXXXXXXX

XXXXXXXXXXXXXXXXXXXX
XX
Zone 14
121 East Sixth Street

63.0172

3-11-47

Mr. Harry E. Blood,
112 West 9th Street,
Los Angeles, 15, California.

Dear Harry:

I am returning the letter addressed to you by Samuel J. Nunn bearing date of March 3rd, in which Mr. Nunn reports on the strength of Meteor Crater sand as compared to Ottawa sand, as determined by his tests.

The samples of this sand that I have examined are similar in all respects to those reported on by Mr. Nunn. I, too, have wondered how it will be possible to break down the silica cemented grains without cracking the individual grains during the reduction process.

I do not care to advance a theory as to the genesis of the cracks in the sand grains. The impactive force created by the meteor as it struck that area, as suggested in the National Geographic Magazine, is about as reasonable a hypothesis as any other I can think of.

Thank you very much for permitting me to review Mr. Nunn's letter.

Yours truly,

Mining Engineer.

Encl.

(C
O
P
Y)

THE NUNN COMPANY
404 - 405 Fay Building
Michigan 6029
Los Angeles, 13, California.

SILICA
SAND

March 3, 1947

Plant
Overton, Nevada

Mr. Harry E. Blood,
c/o Harry E. Blood Co.,
112 W. 9th Street
Los Angeles, 15, Calif.

Dear Mr. Blood:

In conformity with our discussion I have made three tests of the meteor sand for the purpose of determining its wearing quality.

In doing this I used a sample of Ottawa foundry sand, a sample of ours, and a sample of meteor, which was furnished you, and also a sample of meteor which was furnished through Mr. Lloyd Veitch. Your sample and the Veitch sample appeared to be identical, and in both cases I found a very considerable quantity of the grains had not been broken down to individual grains. I therefore rolled these samples on a rubber pad using a wooden rolling pin, and when they were reduced to individual grains I found 60 percent remaining on the plus 60 screen, so that as far as screen size is concerned a very desirable steel sand can be produced. I am assuming they can get rid of the fines in some way.

This sandstone is bound with a silica binder, and is not bound with clay as at our pit. This silica is impervious to water, and therefore this sand cannot be broken down by soaking or by water agitation, and some difficulty will probably be found in reducing it to individual grains. Indeed in handling this in large quantities it may be that some of the individual grains will be cracked during the reduction process.

I made three separate tests using Ottawa, Nunn and meteor under identical conditions. In two of these tests sand passing the 50 and retained on the 60 was used. In one of these tests sand passing the 60 and retained on the 70 was used. In each test the meteor sand had been rolled, and as the grain sizes were the same in each of the nine samples tested it is believed that the results should be dependable.

These tests were made to determine the strength of the individual grains, and the same methods were used with each sample in the three series.

Ottawa was found to have the best wearing quality, and was therefore given basis of 100% in each test, and on this basis the result as to meteor was as follows:

First	73%
Second	71%
Third	81 $\frac{1}{4}$ %

This averages 75 percent, and I believe it can be safely said that meteor has 75 percent of the strength in its grains as will be found in Ottawa.

Under the microscope at 100 diameters Ottawa individual grains are rounded and egg shaped, and show scratching as the result of wind blowing. Under the same conditions meteor shows a peculiar roughness, as if the sand had been recently broken, and it is my belief that in some cases these fractures continue into the grains, and that under heat they are likely to open up.

On the first test Nunn sand was about 1 percent better than Ottawa, and on each of the others it showed $77\frac{1}{2}$ percent of the toughness of Ottawa sand.

Several analyses have been made of these samples, and in all of them the ferric oxide ran from .04 to .03 percent. The alumina stood at or about 0.4 percent.

Freight on meteor is \$1.29 per ton higher when coming to Los Angeles and \$1.24 higher when coming to Oakland than the Nunn sand.

The National Geographic Society magazine for June 1928 has a very good article on this meteor, and in this article it is suggested that the cracks in this sand may have been produced by the exceedingly great pressure developed when the meteor struck.

My conclusion is that before assuming wearing quality for this sand the owners of this deposit would do well to make exhaustive tests as to this wearing quality. The Mulryan report suggests that no investigation has been made along this line.

The difficulty with the Tiffany sand was that the grains were bound with a silica binder and when pressure was exerted on the individual grains they went to dust. I made investigations of that sand before they started building, and determined for myself what the results would be.

Very truly yours,

(Sgd) Samuel N. Nunn.

SJN/rb

April 3, 1946

Mr. W. C. Hendrie,
405 Towne Ave.,
Los Angeles, Calif.

Sr 7789

Dear Sir:

Referring to our telephone conversation yesterday about silica sand, at your convenience would very much like the opportunity to go into this subject with you in detail. Will be very pleased to have you come to our office if agreeable to you, as we have quite a bit of data and samples of sands that are being produced in various parts of the country that will give you a pretty fair idea of what the trade requires.

Awaiting your call,

Yours very truly,

HARRY E. BLOOD COMPANY

By

HEB/1

*Sand meter water is
Ship from Winslow and
Santa Fe*

HENRY MULRYA

63.0172

724 South Spring Street
Los Angeles 14, California

June 6, 1946

This copy supplied
to us by Harry E. Wood
3/10/47
T.G.

Mr. W. C. Hendrie
405 Towne Avenue
Los Angeles, California.

Dear Mr. Hendrie:

Re: Silica Sandstone
Meteor Crater, Arizona

LOCATION:

A high purity, good grain size, silica sandstone, white in color, is located on the south rim of the Meteor Crater.

It is located 7 miles by road south of a spur, siding and loading ramp at Sunshine, Arizona, on the main line of the Santa Fe Railroad. The ramp is 1 mile north of U. S. Highway 66. The deposit is 6 miles south of the highway.

The road leading south to the crater commences at 13 miles west of Winslow and 40 miles east of Flagstaff, Arizona.

The road is partly improved and is maintained by Coconino County, and is suitable for truck hauling. The distance to Los Angeles from Sunshine by Santa Fe Railroad is 575 miles.

METEOR CRATER:

Meteor Crater, 4000 feet in diameter and 600 feet deep, is thought to have been formed long ago by the impact of a meteor. Whatever caused the crater is immaterial, but the effect has been to tilt the otherwise horizontal beds of sandstones to a dip of as much as 20° around the periphery of the crater. The slope of the hill is less than the 20° dip of the beds of sandstone.

SANDSTONE DEPOSIT:

The sandstone of economic value lies on the south slope of the crater.

The sandstone is pure white. Local areas of limey fine grained sandstone, iron stained concentrations and soft, fluffy minus 150 mesh silica are found, but are not numerous.

The usable sandstone consists of pure grains of rounded quartz generally free from mica, dark minerals or stains.

Its length of outcrop is 2000 feet, width 500 feet, and depth 25 feet at the crater rim and said to be 600 to 800 feet at the south edge. At this point a vertical shaft was sunk about 40 years ago in search of the meteor. It is supposed to be entirely in sandstone. An examination of the shaft dump indicates that this statement may be true. The dump is almost entirely pure white sandstone of good grain size.

TONNAGE:

The variable thickness does not permit an accurate estimate of tonnage.

The minimum thickness exposed is 25 feet. The tonnage for the area indicated for 25 feet of depth at 80% recovery of sand should be 1,500,000 tons. For each additional foot of depth below 25 feet at the same recovery should add 60,000 tons to the above. It can reasonably be assumed that a quarry face could be established at least 100 feet high at its upper side and that pure sandstone should occur at least 75 feet thick over this area which should yield 4,500,000 tons at 80% recovery. These are conservative figures and further prospecting no doubt would indicate a huge tonnage.

The 80% recovery figure is used to allow for waste such as the limey sandstones, iron concentrations, and loss in processing.

OVERBURDEN:

There is little or no overburden. Probably 2 feet of loose sand, brush and other foreign material would need to be removed.

DEVELOPMENT:

Two quarries have been opened over a period of 30 or 40 years.

The entire output was said to have been shipped to Clarkdale, Arizona for annual replacement of the reverberatory furnace lining.

The north quarry is 25 feet high, about 250 feet long, and 150 feet wide.

The south quarry which adjoins it is 10 feet high, 200 feet long and 100 feet wide.

The quarries were located where the maximum amount of loose sand and broken sandstone were available. The quarry faces show the deposit to be essentially a sandstone which at these places is greatly fractured by movement. Small iron stained portions were found in the north quarry. These quarries could be reopened at little expense for shovel or bulldozer--carry all loading.

CHEMICAL ANALYSES:

The possible use of this sand as a source of silica for flint glass and other uses led to testing for iron. Several analyses were made indicating a low iron content.

A sample representative of the main sandstone bed was submitted by the writer to Atkin & McRae for analysis:

Silica (SiO ₂)	98.68%
Alumina (Al ₂ O ₃)	0.83
Ferric Oxide (Fe ₂ O ₃)	80.03
SCREEN ANALYSIS	<u>99.54</u>
Plus 28	none
Minus 28 Plus 48	15.9
48 " 65	39.4
65 " 80	22.7
80 " 100	9.5
100 " 150	7.2
150 " 200	2.6
200	2.7
	<u>100.00</u>

The low iron content (0.03%) indicates a crude silica sandstone of exceptional purity. It is the highest quality crude sand for glass use that the writer has observed in the areas contiguous to Los Angeles and San Francisco.

The screen analysis shows a good grain size for the glass making industry. Few fines would require removal.

ECONOMICS - ADVANTAGES:

1. The low iron content and good grain size, plus the fact that the grains are easily released, makes it possible to process this sandstone by dry methods. Some improvement in quality might be expected in the removal of the minus 150 mesh grains.

Washing, scrubbing, and water classification are unnecessary.

2. The tonnage indicated is adequate to serve the glass industry on the Pacific Coast for a long period of time.
3. Mining and dry processing costs should be lower than those of present California and Nevada operators.
4. Dry sand would be shipped as against present 5% to 6% moisture sand.
5. The quality of the crude sand is better than any processed sand produced in Los Angeles or San Francisco areas, especially for use in flint glass production.
6. The sand would find ready acceptance in the foundry business where higher prices prevail.

ECONOMICS - DISADVANTAGE:

1. The distance from market is a decided drawback. The best competitive material is from Overton, Nevada, a distance of 401 miles to Los Angeles at a rate of \$2.15 per ton. The distance from Sunshine to Los Angeles is 575 miles. If a rate proportional to the distance were granted the freight per ton f.o.b. Los Angeles would be about \$3.08.

SALES PRICES OF SANDS:

1. Sales price of Nevada sand is \$3.42 f.o.b. Overton plus \$2.15 freight (plus 3% tax) for wet sand (5% moisture). This sand on a dry basis is \$5.816 per ton f.o.b. Los Angeles.
2. One producer and user in Los Angeles could pay \$5.00 per ton for dry sand f.o.b. Los Angeles.
3. Using a delivered price of \$5.816 per ton, if a freight rate of \$3.08 plus 3% tax or \$3.172 per ton could be obtained, a balance of \$2.6444 would be left to cover all operating costs, sales expense, and profit.

The royalty must be established on a low rate per ton and my thought is it should not exceed 10 cents per ton.

On a 10,000 ton per month production, a profit should be realized. All of the business could be taken away from the operator mentioned on equal price, but better quality.

4. Competing with the producer and user might be more difficult, but as he is faced with a major capital expenditure, a source of high quality sand at even higher cost per ton might make them customers instead of producers. Their capital expenditure would thus be saved.

RECOMMENDATIONS:

1. The royalty rate should be renegotiated to bring it to a reasonable basis, namely 10 cents per ton.
2. Negotiations with the Santa Fe Railroad should be pursued diligently to obtain a rate per ton not to exceed \$3.08 per ton. This rate is reasonable based on the proportionate distances of 401 and 575 miles and \$2.15 for the 401 mile distance.
3. Costs of plant for processing and mine equipment costs should be obtained as soon as possible to determine the capital necessary to commence operations.
4. Estimate costs of mining, hauling to railroad, and tons per hour of finished product. On a 5000 to 10,000 ton per month production the mining and hauling could be contracted for a definite amount per ton.

CONCLUSION:

The sand is remarkably pure and well suited for use in the flint glass industry. A reasonable royalty must be obtained. The freight rate negotiations should be carried on as soon as possible both to Los Angeles and San Francisco.

If reasonable royalties and reasonable freight rates can be established, this sand should find a ready market in the areas mentioned. It is not competitive in other regions.

Yours very truly,

(Signed) Henry Mulryan

HM:c

SiO₂ - 78.68

Al₂O₃ - 0.83

Fe₂O₃ - 0.03

K. J. Kirk

- 28 + ~~48~~ - 15.9

- 48 + 65 - 39.4

- 65 + 80 - 22.7

- 80 + 100 - 9.5

100 + 150 - 7.2

150 + 200 - 2.6

- 200 - 2.7

200 - 2.50 20% Car

Rate 3.50

700 575 miles

OVERHOI

112 WEST
TELEPHONE

SiO_2 -

78.68

Al_2O_3 -

0.83

Fe_2O_3 -

0.03

K.J. Kirk

TERMS

- 28 + ~~48~~ - 15.9

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150 + 200 - 2.6

• - 200 - 2.7

200 - 3.50 20% Car

Rate $\frac{3.50}{700}$

575 miles

Los Angeles, August 2nd, 1946
File 63.0172

Mr. R. G. Rydin,
Executive Representative of the President,
San Francisco, California.

Dear Sir:

The following is a reply to your memorandum of July 30th, appertaining to development of silica sand at Meteor Crater near Winslow, Arizona.

We investigated this occurrence about two years ago. Our examination based upon surface indications failed to disclose sufficient tonnage of mineable material to justify the expense of erecting a processing plant. We estimated the deposit to contain approximately 5,000 tons.

It is possible that the parties who propose to mine this sand may have developed larger reserves by diamond drilling or other means of exploration since our examination. We shall investigate this possibility within a week and inform you.

Yours truly,

cc - Mr. E. O. Hemenway

TOE-c

Los Angeles, August 5th, 1946
File 63.0172

Mr. R. G. Rydin,
Executive Representative of the President,
San Francisco, California.

Dear Sir:

This is to supplement my reply to your memorandum of July 30th, relating to development of silica sand at Meteor Crater near Winslow, Arizona.

Mr. W. A. Moeur of Phoenix, Arizona, with several associates has obtained a contract to mine the silica sand from the D. M. Barringer Estate of Philadelphia, Pennsylvania. Mr. George M. Colvocoresses, Mining Engineer, Luhrs Tower, Phoenix, Arizona, is the agent for the estate.

Mr. Colvocoresses informed me that he estimates the deposit to contain "several hundred thousand tons." This estimate is based upon deep exploration tests. He further stated that to mine a large tonnage from this deposit by open pit methods will depend upon their ability to retain the surrounding area from lateral movement. The superficial area covered by the deposit is small, necessitating a deep pit to obtain large tonnage.

Mr. Colvocoresses also stated that Mr. Moeur had been in communication with Santa Fe officers developing rates on shipments to Los Angeles and San Francisco. The success of the enterprise depends upon their ability to compete with prices on silica sand shipments from Overton, Nevada, on the Union Pacific.

Yours truly,

cc - Mr. E. O. Hemenway

Silica Sand
Sunshine, Arizona.

Los Angeles, March 23, 1946.
File 63,9172

Location:

This deposit is located on the southerly slope of Meteor Mountain. A good road leads south from U. S. Highway 66 (about opposite Meteor Crater Filling Station) around the base of the crater to a shaft where the road ends. The silica deposit is about 500 ft. east of this shaft. The total distance by road is about 7 miles.

Ownership:

The property is owned by the D. M. Barringer Estate. Mr. George M. Colvocoresses, Mining Engineer with offices in Luhrs Tower, Phoenix, Ariz., is the agent for the estate. (His office telephone is 34831).

Description of the Deposit:

The sand covers an area approximately 75 feet in width by about 200 feet in length. The depth is estimated to average 10 feet although drilling may prove a greater depth. The sand is very white and fine grained - some of it is as fine as flour. It appears to be a high grade silica sand although the recoverable tonnage is probably too small to justify the erection of a washing and sizing plant. An ample supply of water can be obtained from a shaft sunk to a depth of 760 feet approximately 500 feet west of the deposit. This shaft was abandoned when a heavy flow of water was encountered during sinking operations in an attempt to reach the buried meteorite.

Probable Tonnage:

We estimate that only about 5000 tons of this sand would be recoverable. The superficial area covered by the deposit is small and to get any great volume of tonnage would necessitate a deep pit.

T. O. Evans.

P.S.

The following data from Mr. Colvocoresses by telephone August 4, 1946:

He states that he estimates the deposit to contain several hundred thousand tons. This is based upon deep exploration tests. However, his basis of recoverable tonnage is dependent upon being able to retain the surface from lateral movement when depth is attained in the pit.

T.O.E.

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Sunshine, Arizona.

Los Angeles, March 23, 1946.
File 63.0172

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T.O.E.

C O P Y

MEMORANDUM

Chicago, July 24, 1946

Mr. Gurley:

You will be interested in the following copy of an article in the Winslow Mail of July 5th with respect to prospective silica sand at Meteor Crater near Winslow:

"SILICA SAND DEVELOPMENT STARTED AT METEOR CRATER"

Present Shipments Being Made
to California for Processing

"What could develop into a profitable industry to Winslow was made known this week when it was learned a small group of Phoenix men purchased on a royalty basis the silica sands in Meteor Crater near here.

"Preliminary work has developed the possibility of a very satisfactory market. Before processing the sands it is possible that considerable quantities may be sold to processing plants in Los Angeles. This, however, eliminates a considerable part of the profit and jobs that could be made available to Arizona by processing within the State and shipping the finished products to market.

"Exhaustive tests have been made showing there is adequate supply of high grade silica sands, enough to justify processing and shipping to available markets. The sands test very high, averaging 99.7 per cent silica with no refractory elements except a low content of iron averaging about 6.100ths of one per cent. Tests show that the simple washing process, one-half of the iron content can be removed, thus making the sand desirable for glass manufacturing and glazing.

"Samples have been furnished various types of foundries in the west and exhaustive tests have been run by the foundry chemists with satisfactory results. It appears these sands are as good or better than any now on the markets of the United States for all types of foundry casting, and excel other available sands for precision casting work.

"Samples are now in the hands of machinery concerns in two parts of the United States to determine the best and most practical method of classification for shipment. It is indicated that by proper classification, different grades of silica sands can be obtained covering the whole use of similar sands, from rough foundry work to dental laboratory use with a satisfactory range in prices for the various grades.

"This is, no doubt, one of the undeveloped products of Arizona which can be extensively used to advantage in California since the latter State imports practically all of its silica sand."

cc Mr. Grogan

G. H. Minchin

MEMORANDUM

San Francisco, July 30, 1946

Mr. Evans:

Attached for your information and file is copy of a memorandum written by Mr. G. H. Minchin, our Operating Vice-President, to Mr. Gurley, with respect to a prospective silica sand development at Meteor Crater near Winslow.

I am not sure whether this is something entirely new or whether you and Mr. Balling already had record of it for your brochure. If you have not checked into it, however, I think it might be well do so at your convenience. One of the questions which comes to mind that is not answered in the news item is the extent of the deposit. The statement is made that the sand is of a character desirable for glass manufacturing and glazing. If that is so and there is a large amount of it which can be gotten out at not too great a cost, perhaps we ought to be doing something about calling it to the attention of some of the larger glass manufacturing companies (if they do not already know about it).

R. G. Rydin ✓

Cc: Mr. Hemerway

Enc.