



CONTACT INFORMATION

Mining Records Curator
Arizona Geological Survey
1520 West Adams St.
Phoenix, AZ 85007
602-771-1601
<http://www.azgs.az.gov>
inquiries@azgs.az.gov

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07/15/91

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES FILE DATA

PRIMARY NAME: BIG SANDY FORMATION

ALTERNATE NAMES:

ZEE WEST

MOHAVE COUNTY MILS NUMBER: 464A

LOCATION: TOWNSHIP 16 N RANGE 13 W SECTION 25 QUARTER NE
LATITUDE: N 34DEG 42MIN 11SEC LONGITUDE: W 113DEG 33MIN 53SEC
TOPO MAP NAME: WIKIEUP - 7.5 MIN

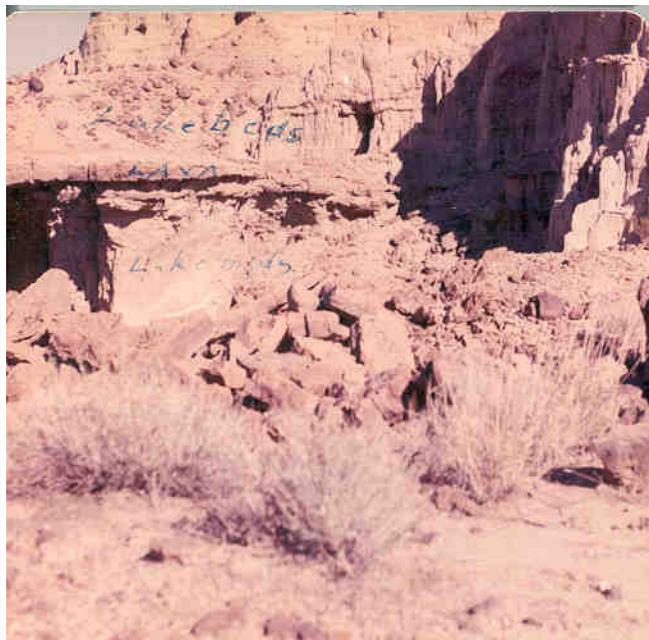
CURRENT STATUS: OTHER

COMMODITY:

STONE SANDSTONE DM
STONE LIMESTONE DM
ZEOLITES
FELDSPAR
SILICON SANDSTONE
CLAY BENTONITE
SAND & GRAVEL

BIBLIOGRAPHY:

SHEPARD, R. "ZEOLITES & ASSOC. AUTH. SILICATE
MIN. IN TUFF ROCKS BIG SNDS FORM. MOH. CTY
AZ" USGS PP 830, 1973
SHEPARD, R., USGS BULL 1354-C
SHEPARD, R. "MIN. & WTR RES. OF AZ" AZBM BULL
180, P. 465, 1969
ADMMR BIG SANDY FORMATION FILE







July 19, 1976

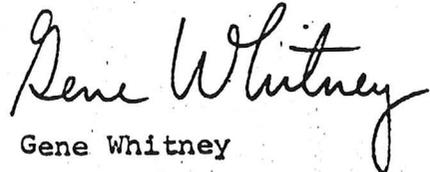
Michael Price
General Delivery
Kingman, Arizona 86401

Dear Mr. Price:

You inquired whether or not illite could be differentiated from mudstones and/or siltstones, using only the physical properties as criteria. In reply I must say that illite is a clay mineral and has fairly well-defined physical properties. However it rarely occurs in pure deposits but is usually associated with other clay minerals and non-clay minerals, and measuring the physical properties of mixtures is rather misleading. You can't really define the mineralogical composition of such a mixture using only the physical properties. Mudstones and siltstones are rock types and generally consist of some clay mixed with silt or sand. The coarser particle size of the siltstone would give it very different physical properties. In short, I don't think you'll have much luck unless the deposit is actually pure illite.

Although I don't know the specifics of the deposits that you are studying, I would guess that the predominant clay minerals in lake beds in arid areas (like Arizona) would be smectite (montmorillonite) or possibly sepiolite. Certainly illite could be present but it generally does not constitute the major mineral in such lake deposits. If you would like me to analyze your clay material with an x-ray diffractometer, you could send me one small sample (10 grams would be plenty) and I would be happy to run it for you and send you the results. X-ray diffraction is the most useful and widely used technique for analyzing clays.

I would be interested to hear what you finally decide about the lake deposits. I hope I have been of some service to you.


Gene Whitney

Zeolite '76
An International Conference
on the
Occurrence, Properties, and Utilization
of
Natural Zeolites

Tucson, Arizona, June 6 to June 14, 1976

From Program and Abstracts:

- "Solar Energy Applications of Natural Zeolites", D.I.Tchernev
Lincoln Laboratory, Massachusetts Institute of Technology,
Lexington, Massachusetts 02173
- "Properties of Natural Zeolites", D.E.W.Vaughan, Davison Chemical Division,
W.R.Grace & Company, 7379 Route 32, Columbia, Maryland 21044
- "Geological Occurrences of Zeolites", R.L.Hay, Department of Geology
and Geophysics, University of California, Berkeley, California 94720
- "The Use of Zeolitic Mudstone in Hog Raising at Ikawa-Machi, Akita
Prefecture, Japan, Sakuro Honda and Mitsue Koizumi, Research Institute of
Underground Resources Mining College, Akita University, Akita, Japan,
and Institute of Scientific and Industrial Research, Osaka University,
Osaka, Japan
- "Occurrence of Zeolites in Marine Environments", Azuma Iijima, Geological
Institute, University of Tokyo, Tokyo, Japan
- "Zeolite Zones in Geothermal Areas in Iceland", Hrefna Kristmannsdottir
and Jens Tomasson, Orkunstofnun, National Energy, Department of Natural
Heat, Laugavegur 116, Reykjavik, Iceland
- "Commercial Utilization of Natural Zeolite for Methane Recovery from
Sanitary Landfills", R.T.Mandeville, Reserve Synthetic Fuels, Inc.,
Newport Beach, California 92661
- "Natural Zeolites-A New Industrial Mineral Commodity", Frederick A.Mump-
ton, Department of the Earth Sciences, State University College,
Brockport, New York 14420
- "Use of Natural Zeolites for Encapsulation and Storage of Gas",
R.A.Munson, U.S.Bureau of Mines, Washington, D.C. 20241
- "Natural Zeolites: Novel Uses and Regeneration in Wastewater Treatment",
C.O.Murphy, O.Hrycyk, and W.T.Gleason, O'Brien & Gere Engineers, Inc.,
1304 Buckley Road, Syracuse, New York 13201
- "Occurrences and Uses of Zeolites in Italy", Riccardo Sersale, Istituto
di Chimica Applicata, Universita di Napoli, Naples, Italy
- "Cleansing Action of Natural Zeolites in Detergents", H.G.Smolka and
M.J.Schwuger, Henkel & Cie, GmbH, Düsseldorf, Germany
- "Zeolites in Saline Alkaline-Lake Deposits", R.C.Surdam and R.A.Sheppard,
Department of Geology, University of Wyoming, Laramie, Wyoming 82071
and U.S.Geological Survey, Federal Center, Denver, Colorado 80225

Ion-exchange Minerals

- 1976, Feb. 25, Annual AIME Meeting, Las Vegas, Nev. Industrial Minerals Session, by Robert D. Thomson, USEM, Chief, Eastern Field Operation Center, Pittsburgh, Pa. "Mining and Land Use". AIME Preprint 76-H-113
- 1976, June 6 to 14; An International Conference on the Occurrence, Properties, and Utilization of Natural Zeolites. Program and Abstracts page 71,, by D.E.W. Vaughn, Davison Chemical Division of W.R. Grace & Company
- 1976, February; "The Nevada Barite Industry Today" by K.E. Laughery, Baroid Petroleum Services Division NL Industries, Inc.
- 1974, Sept. 22-25; Preprint 74-H-336, AIME (SME) Fall Meeting, Acapulco, Mex. by Ted H. Eyde, Senior Geologist, The Superior Oil Company, Tucson, Arizona***note page 3
- 1973, Feb. 25 to March 1; AIME Annual Meeting, Chicago, Ill. Preprint 73-H-36 Synthetic Zeolites: Properties and Applications, by Dr. Donald W.B., Senior Research Fellow Materials Systems Division Union Carbide Corp., Terrytown, N.Y.
- 1972, Nov. "The Mineral Position of the United States, 1975-2000. Proceedings of a Symposium Sponsored by the Society of Economic Geologists, at Minneapolis, Minnesota. The Univ. of Wisconsin Press
- MINING CONGRESS JOURNAL, "Is Our Account Overdrawn"
- 1972, International Atomic Energy Agency, Vienna; Technical Report Series No. 136, "Use of Local Minerals in the Treatment of Radioactive Waste"
- 1972, Univ. Nevada, Bulletin 79, "Erionite and Other Associated Zeolites in Nevada", by Keith G. Papke, Geologist Univ. Nevada, Nevada Bureau of Mines
- 1965, SME Fall Meeting, Rocky Mt., Minerals Conference, Phoenix, Arizona, by Wallace W. Key (contributing author to "Industrial Minerals and Rocks" and with US Dept. Interior Bur. Mines, San Francisco, Cal. Preprint No. 65H322
- 1964, SME Fall Meeting--VII IMPC New York City, Sept. 20-25; "Role of Industrial Minerals in the United States Economy"; Preprint 64H317
- 1966, PREPRINT No. 66H322
- 1964, PREPRINT No. 64H308
(A.J. Regis, Research Engr. Norton Co., Research & Devel.)
L.B. Sands and A.J. Regis, Preprint No. 67-H-321 & 67-H-317
- Personal communication with L.B. Sands. Professor Dept. of Chemical Engrng., Worcester Polytechnic Institute, Worcester, Mass. December, 1967
- 1973, December, "Water-Resources Appraisal of the Big Sandy Area"; Arizona Water Commission Bulletin 6; Prepared by the Geological Survey US Department of the Interior

Personal Reports, not published; 1963-1964, 1968-1969, 1971-1972

USGS LETTER, Nov. 1961; R.H. Olsen letter, July, 1962, etc.

AZ Bur. Mines Bull. 180 (1969) "Mineral and Water Resources of Arizona"

Economic Possibilities of the Zee-West Claims

A) Water

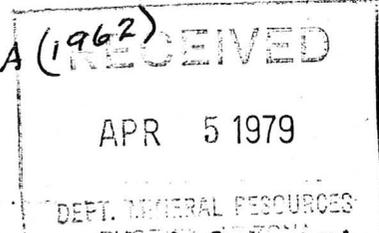
- 1) Ion exchange material: decolorizing oil, soil conditioner, fertilizer carrier, kitty-litter, decrease odors in feed pens, etc.
- 2) Lake beds have not been drilled in this locality to check for minerals related to saline lakes; water wells like at Bitter Creek may have had the water analyzed; but I don't have any good records of analysis, of water from and/or around the Wikieup area. A rumor I heard that the water south of my claims (Bitter Creek) could not be used for domestic consumption.
- 3) Marl and/or fresh-water limestone; local use in agriculture, etc. undetermined quantity on claims
- 4) Interbedded lava in the Pliocene lakebeds; an estimate that there are about 100,000 tons of weathered out slabs laying on the surface that could be used for building, rip-rap, etc.,? aplite as source of feldspar?
- 5) Lightweight aggregate potential; no work has been done on the bloating properties of the various beds. Lithium or uranium content in lower beds can only be determined by drilling ??
- 6) Geothermal potentials have not been checked.
- 7) Water potential very good; I believe the area where my claims are situated is an estuary related to this ancient lake
- 8) Sand and gravel, crushed rock, as by products
- 9) Various ion exchange materials as scavengers in treatment of radioactive wastes produced by atomic plants etc. International Atomic Energy, Vienna, 1972, Technical Report No. 136, "Use of Local Minerals in the Treatment of Radioactive Waste", is a good report and brings out more than what I could write. Also the AIME, Preprint No. 74-11-336, by Ted H. Eyde (Superior Oil Co., Sr. Geol.) has some good facts. Eyde has put out a variety of papers and to me he makes sense on various topics related to mineral exploration; I've never met him
 Wikieup
 If the illite bed is comparable to the Illinois illite which is marketed under the name of "Na Clay" and/or "Grundite", there is no reason it would not do a similar job. "Grundite" has been used as an additive in drilling muds, etc. This is not a very thick deposit (from what I have read) so eventually it will be exhausted. Years ago it was fairly well mined out; perhaps in recent years additional bodies of this type of clay (illite) may have been found; I don't know as I haven't kept up with this. Oak Ridge uses illite as a scavenger of radioactive Ce from the atomic wastes, etc.
- 10) Zeolite (analcite) on the claims is remarkably pure, the grains are coated with glauconite. Analcite is an isometric mineral with rather wide pore channel ways, which may account for the dehydration phenomenon and for the ease by which silver and other metals may be substituted for the sodium atoms. Used to scavenge Cu, etc., from waste water. I tried to get some companies to give it a try, with no results. This is new to most, & a new idea
- 11) Stabilized adobe brick; this not checked for amount of material
- 12) Other misc., uses as moulds for casting jewelery, foundry work, abrasive, fertilizer carrier (Western soils are notoriously deficient in Zn, the zeolite would give off the plant nutriment slowly); California has areas of hard-pan type soils the cleanups from feed pens may have enough additives so the material could be reused ?? I haven't done anything on this, as I haven't had the time or the capital to check various potentials. Some of this may be a repeat of what you already have in the letters.

Mike Price

Mike Price
304 Del.
Kingman, AZ 86401

April 4, 1979

Mr. Glenn A. Miller
Department of Mineral Resources
Mineral Building, Fairgrounds
Phoenix, Arizona 85007



Dear Glenn:

Bulletin 182, (1970, AzBM), p.255, paragraph S 27, gives a brief description of the Catherine and Michaels, uranium claims. This is the locality I mentioned in our fragmentary conversation at the Rodeway, at times the direction to the workings are given as, -----Old Cornwall Ranch, and so on. This is northward of my claims near Wikieup, I'm in T16N, R13W, Secs.23, 24,25, 26; originally located as 18 lode claims for the industrial minerals. As you well know, at times the literature contains typographical misques, like paragraph S22, giving R16E(?), Mohave County; or the Democrat Mine is given as Sec.12, T19N, R15W in Bull.182, while the USGS, DEAN PEAK, quad., shows the Democrat as Sec.33, T20N, R15W. To put it mildly, unfortunately I am familiar a bit with the Democrat Mine, and the shipments that were made to the Vitre plant at SLC, Utah, but a person has to work with what one has.

Since about 1962 I have written several reports about the lake beds near Wikieup, and I am sure a number of them are floating around. As I have never been a "glamorous" report writer none of this was published. At that time my primary interest was in the zeolite (analcite) and the illite beds, as possible ion exchange material, catalyst carrier, etc. Even then I had the thought of initiating a low-cost, high-volume, type of an operation. I located the ground in 1962, several years before that type of ground was reclassified, and withdrawn from location. Although I've had this project shelved for a number of years, I have kept up the annual work. Since coming back to this locality, I staked 18 lode claims on a low-angle structure, near Kingman. Years ago I worked in this "Goldflat" area.

Several years ago, Rocky Mt. Energy, staked numerous claims near my claims,

Mike Price April 4, 1979 (cont.)

this is in T20N, R17W, they did a beautiful (and expensive) job of drilling throughout that area. In March, 1978, the USGS drilled a thermal hole in section 10, near the Lookout Spring turnoff. It pleased me as I had this already mapped as one of the structures. My assumption would be that they encountered water at shallow depth.

I'll zerox a few papers, and that will give you a better idea of what I have been trying to do. In a way these will be self explanatory, and they are just a piece of the stuff I've acquired through the years. No doubt you have a schedule to follow, and your time is limited to conversations. Perhaps you'll fall over someone who may become interested to prove and/or disprove a variety of ideas.

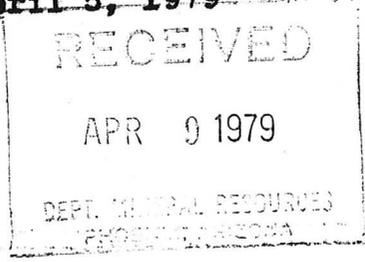
Best regards to all,


Mike Price

I found a bunch of old correspondence, some a bit contradictory, all depends what one wants to believe. Is there any available information about the USGS thermal hole; that is for public viewing. I'm assuming that sooner or later something will become available.

Mike Price
P.O. Box 1
Kingman, AZ 86401

April 5, 1979



Mr. Glenn A. Miller
Department of Mineral Resources
Mineral Building, Fairgrounds
Phoenix, Arizona 85007

Dear Glenn:

To be more specific about my question, if any information was available to the public, about the USGS hole drilled in section 10, T20, R17W. If that information is available, especially the results, then I am interested. If that is a problem for you, then just drop it; as the information will eventually surface. A couple of years ago I gave some information to the individual from the New Mexico School of Mines, about formerly drilled holes I knew of in Mohave County for their terrestrial-heat study. I got curious about the patterns, and that was the reason for the question; no problems.

Found several old letters which in part will explain my interest in the Wikieup area. Anyhow now you know that a piece of Mohave County is at Cal., Tech, in Pasadena. Several other letters, and an AA assay sheet on a sample from claim #1 or #8, there is not much difference in the analysis I've had of this stuff: it is high-grade material. I am a bit familiar with the Wind River formation, however I believe there is a metallurgical problem there. To the best of my knowledge this is one of the highest grade analcite deposits I have ever encountered. Last year at one place I found a minor amount of chrysoeolite in the zeolitized tuffs. I gave several pieces to "Mitch" Lynn at the Kingman BLM. That, and several other features, to me, are geological curiosities. Now I almost believe that assay sheet of 1967.

I could use an up to date sheet about the publications available at ADNR.

Dave left Marathon a long time ago, I doubt that I received all of the analysis.

Best regards,

Mike Price

State of Arizona
Bureau of Geology and Mineral Technology



Mineral Technology Branch
University of Arizona
Tucson, Arizona 85721
(602) 626-1943

July 11, 1979

Mr. Mike Price
General Delivery
Kingman, AZ 86401

Dear Mr. Price:

This letter will report results of examinations and tests on a sample of rock received with your letter dated July 2, 1979.

The material is a zeolite-bearing volcanic tuff, the zeolite being principally chabazite. The amorphous, dull-green colored mineral is glauconite, a hydrous iron magnesium silicate. As you suspected, there is a trace of chrysocolla, evidently a secondary hypogene deposit in thin layers along what appears to be tiny fractures. We estimate the total copper content of the sample to be less than 0.05 percent copper.

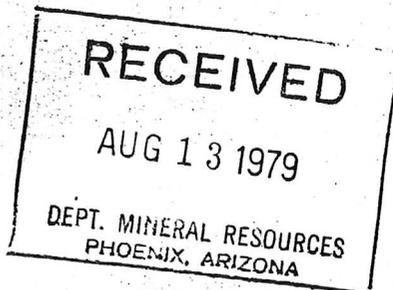
We cannot find any specific information relative to your particular area either in the Arizona Bureau files or in the Geology Department. We think the USGS information you mentioned is about as close as you can come. It is logical that some soluble copper could have traveled from nearby and dropped out as chrysocolla in the tuff.

Sorry we cannot be of more assistance. Good luck!

Sincerely,

Robert T. O'Haire
Associate Mineralogist

David D. Rabb
Mining Engineer



/bo

cc: W. H. Drescher

Mike Price
Ge Del.
Kingman, AZ 86401

August 8, 1979

Mr. Glenn Miller
Department of Mineral Resources
Mineral Building, Fairgrounds
Phoenix, Arizona 85007

Dear Mr. Miller:

The chabazite analysis is from a bed occurring on claim Zee-4, about 1200 feet, ~~N~~^{NE} of the section corner, and about 4000 feet westerly of where the type section of the Big Sandy formation was measured by the USGS. This particular zeolite seems to be of interest to some of the industrial minerals users. I will be back at Wikieup in a couple of days and will try to determine the extent of this particular bed if possible.

Yours truly,



Mike Price

Zeolite (Chabazite)



Secret

(Enclosed Pictures)

Mike Price
Phoenix, AZ 86401

*Mike Price
"My Claim"*

March 6, 1979

RECEIVED
MAR 8 1979
DEPT. MINERAL RESOURCES
PHOENIX, ARIZONA

*my estimate
about 300,000 tons
at or near the
surface*

Mr. Glenn Miller
Department of Mineral Resources
Mineral Building, Fairgrounds
Phoenix, Arizona 85007

Dear Mr. Miller:

The enclosed pictures will give a partial idea of the amount of slabs at or near the surface; the residual "statue" is about midway between Sheppard's type section of the Big Sandy formation and the section(s) corner. At the present time I do not believe that a big truck would be able to drive the approximately 1/2 mile to the slabs from the county road: one of the adjoining claims takes in the county road access; this is in T16N, R13W, the claims are in sections 23, 24, 25, 26. Because of adverse weather conditions I have not been to the claims since late 1978; even then I was using the county road off highway 93 (the entry is just south of the Big Sandy bridge; this road goes through my claims and was used by the big rigs when Cypress built the pipeline to Bagdad in 1976).

Several years ago I attempted to contact some of the feedpen operators about using the zeolite (analcite) and/or the zeolitized tuff in the pens to decrease odors, etc., similar to uses developed by the Japanese. However I did not accomplish anything as I was not in a position to take a truck-load of the material to Phoenix for checking; I offered the material for free just to find out what it would do. My estimate is that this deposit has about 500,000 tons of high-grade analcite (approx. 95% analcite); about 10,000 tons can be obtained easily from the surface. Although only about 2 miles eastward from Wikieup, this deposit is in an isolated locality and cannot be seen from the highway.

Below the analcite is a mudstone-like formation which was identified by the Marathon Oil Company as illite; the outcrop is about 10 feet thick and the footwall of the illite has not been determined. I have not done any

drilling on the property, which consists of 18 claims.

Zoult

Holy Moses Claim Gold

Near Kingman, in 1974, I located 18 claims on a low-angle structure that extends through a length of four claims. My claims cover the old Holy Moses mine and Lookout Spring. The Holy Moses is in the pre-Cambrian complex, and the low-angle structure is eastward, and at a higher elevation, from the old Holy Moses (now M-17). Since locating these claims I have stockpiled about 50 tons of gold ore, and I believe that the balance of the dumps will produce another 100 tons of ore by screening and/or sorting. The low-angle structure contains a small quartz vein that contains specimen rock. I obtained most of my ore from one of the dumps of the shallow workings in this structure. Good specimen rock was given to the local museum, and also some rock was sold to them. Perhaps some place like Rawhide may be interested in rock of this type for their gold panning. As in most gold bearing veins a variety of assays can be obtained, even from the same place; assays from one stockpile (about 30 tons) varied from $0.17_{oz} Au/T$ to $3.29_{oz} Au/T$; the coarse gold present in the ore makes it difficult to accurately sample this type of material; other samples assayed $0.44_{oz} Au/T$ & $0.10_{oz} Ag/T$ -- $1.11_{oz} Au/T$ & $13.30_{oz} Ag/T$; samples from the same spot in a remnant of a "bull" quartz vein assayed $0.09_{oz} Au/T$ & Tr Ag and $0.371_{oz} Au/T$; minus $1\frac{1}{2}$ " material from balance of one dump assayed $0.33_{oz} Au/T$ & Tr Ag. In the 1930s about 85 tons of ore were shipped ^{from the Holy Moses} to the Tom Reed mill; the mill assay was about $0.26_{oz} Au/T$. Other small shipments from nearby claims went $1.92_{oz} Au/T$ and $4.36_{oz} Au/T$. My estimate is that several thousand tons of gold bearing rock can be obtained from the outcrops, before any underground work is undertaken. There is also a minor amount of placer and/or float in this locality. At one time the old Holy Moses had a 3-stamp mill in operation, and the Lookout/Windy Point property had a 1-stamp mill. I hand mortared two batches of rock, first removing the pieces with visible gold before mortaring, and removing the coarse gold from the concentrates. The concentrates from 200 pounds of rock assayed $7.656_{oz} Au/T$ & $0.876_{oz} Ag/T$; the concentrates from 100 pounds of rock assayed

20.00_{oz} Au/T & 2.90_{oz} Ag, the rock was mortared to ~~about~~ 5410 mesh; the rejects assayed 0.35_{oz} Au/T

At least 700 feet of hand built road is not finished to the main stockpile; no dozing has been done to the old hand workings. There are indications of a reddish, gold bearing granitic intrusive which I have not been able to find by hand digging. No dozing has been done in the ancient channel to check the placer potential. To the south the low-angle structure is covered by volcanics, (near the south end of M-7); near the north end-line of M-7, a quartz vein 3-4½ feet wide cuts the complex (about N30W) and dips southward.

To date the dumps from the low-angle workings have produced the best specimen rock; the structure is broken by a number of faults, and the higher grade ore occurs with pyrite, limonite after pyrite, etc., along the ragged edges within the structure associated with "bull" quartz, etc. At least 90% of the free gold is released when mortared to about 40 mesh; the balance of the fine gold is tied up in the limonite after pyrite concentrates; these are estimates from my mortaring and panning. The mortared rock releases a good string of gold and perhaps a place like R&H may be in the market for this type of material. My best specimen rock is only 6mm-7mm showings of free gold, the balance varies from speck to 1mm-3mm; I have found a few distorted isometric crystals and at times the limonite after pyrite has plates of gold over the limonite crystals; right now I only have about 7 or 8 flats on hand; part of my 1978 annual work has been cutting across an ancient channel by hand, where ¹⁹⁷⁹ the gold bearing material occurs as channels within the channel. I would like to get back to Wikieup to add to the 1978 work and would make a reasonable offer on the claims near Kingman. ¹⁹⁷⁹ The M-claims are in the McConnico district in T20N, R17W, Secs. 10, 11, 14, 23, near Holy (Lookout) Peak, which is a Haramide rhyolitic intrusive. In the stockpiles some of the better grade ore is a "dirty" looking type of vein matter. Thank you to John Jett for the bulletins.

Mike Price

M. J. Price
Gen. Del.
Kingman, Arizona 86401

20
May 21, 1976

" " mine file -

Mr. Vernon Dale
Mining Engineer
Department of Mineral Resources
Kingman, Arizona

Dear Vernon:

I appreciate your stopping and having that chat yesterday morning with me. At the present time I am spending considerable time at Wikieup on the claims I located in 1962. On March 18, 1976 I signed an agreement with a Thomas E. "Mat" Dillon on the M lode claims I located near Lookout Spring. Mr. Dillon had some good ideas and I had hopes that he would get a small operation going. At the present time my assumption is that he is having some financial problems, but who isn't. These types of prospects do have problems, especially when the mineralization will vary and samples cut from the same place at times will differ as much as three or four times.

Although the analcite-illite(?) - harmotome-etc., deposit I have at Wikieup does not have a direct bearing on what you are doing right now, I wonder if any lab work has been done to see if these types of materials could scavenge copper, silver, etc., from mill waste water; that is using the raw product (mine run). In 1965^{Nalco} did some checking on the analcite, (I had sent a sample to them in 1962, but other work prevented them from testing the material sooner). As they said in their letter, "The one material which did seem to offer some possibility was the analcite, but this unfortunately contained quite high iron and, therefore, would not be commercially acceptable". This was probably in part due to the thin film of glauconite that coats the analcite; I am not in any (or wasn't) to set up quality control.

Also Nalco said this, "As you may know from discussions with others, or from reading, the zeolite which is the ideal material for incorporation into catalyst is faujasite, again of low iron content. Consequently the desired material is that which approaches faujasite most closely. Mordenite

is reported to be good material, but we have failed to get satisfactory results with this product". So all in all this mineral is a very controversial thing. In 1973 I gave Glen Walker some information about the claims at Wikieup; later he did return the letter and the stuff I had written up about those claims. I've tried some of the analcite in a deg pen to decrease odors, etc., also Steve Van Nert (he works for Hanna Mining) took some to Tucson to try as kitty-litter; I haven't seen Steve for some time, however I am sure he is too busy with bigger projects to really make a close check to see what this stuff will do; I have been in about the same position. These are just thoughts (and at times I may get some "wild" ones), however I feel that things will focus on the use of local minerals in the treatment of radioactive waste, this ecology thing, etc. The analcite has a comparatively large open-spaces channels in it, which may account for the dehydration phenomenon and for the ease by which silver and other metals may be substituted for the sodium atoms. As many others I just do not have the time, or the knowledge, to actually find out what these types of materials can do.

Anyhow I still intend to hang on to the claims at Wikieup, and perhaps the today technology will come up with something. I wasn't going to finish this note till tomorrow so ignore the misquote on the date. I was going to go to Wikeup but decided not to, as it is getting a bit warm. I'll probably be there over the weekend. I wish you well with your project. I will go through some of my things here at Kingman (most of my things are in Phoenix) and see if I can come up with anything that may be of help in your study.

Best regards,



Mike Price

The reason I (?) the illite is that the Marathon Oil Co., identified the rock as that: then another organization said it was siltstone, and I really don't know what all that rock has. Marathon also was going to check some of the lake beds as a possible oil de-colorizer.

INTERNATIONAL COMPANY CORRESPONDENCE

TO Dave HallDATE 9-12-63

OFFICE _____

FROM Jack BrightOFFICE X-ray analysis of 1 Analcite(?) sample

OFFICE _____

(USE THIS LINE FOR FILE REFERENCE OR SUBJECT)

Proj. 120304

The sample contained Analcite, Calcite and Glauconite. The Calcite was present at about the 5% level, and as we have no Glauconite calibrations, its abundance can't be estimated easily. The Glauconite was not present at high concentration levels however.

Marathon Oil

Dear Mike:

(Difficult to read) 9-14-63

Mr. T. H. Eyde of the Union Carbide Nuclear Company, just now phoned me from Tucson 3 P. M. and said that he was going up to Mojave Co. and if I would tell him where the Zeolite was, he would go and have a look at it. He said that they were not interested in Analcite, but often there were other Zeolites in associated beds and there might be something else around there that they might be like. I asked him what minerals they were interested in and he said that he couldn't divulge that information. At first he said that they had made a study of the West and there were no Zeolites in Mojave County, but later said that if there were some deposits, they were probably on the Big Sandy.

I told him that it was a big country and that the beds were extensive; that we had about 16 claims located but it would be quite possible that we could show them our ground and they could locate around us and we would be holding the sack. I told him to write me a letter stating that anything they located in the area would become part of the group we held and then I would be glad to give him directions to get there or take him there. He said that he thought that Union Carbide was ethical enough that they wouldn't locate around us and leave us out. I said that I thought so too and said that it then should be easy for them to give us the letter that we requested. He said that he was going to talk to Bill Coulter soon and he would see what could be done. He also said that he would be in Phoenix next week and would see me and would like to see the samples that we took 7 miles south of Wikieup.

Kohler

Mostly right now I am awaiting replies from Companies with samples. The fellow that I talked with from Paddock Pool Co. is out and I have to start all over. This will acknowledge your letter of Sept. 8 which has no specific questions to answer. The copies of letters which you sent were not too good, but there will be days like that.

ke Price
565 Berk
Kingman, Arizona 86401

April 7, 1973

Mr. Glen Walker
Arizona Department of Mineral Resources
Mineral Building, Fairgrounds
Phoenix, Arizona 85007

Dear Glen:

The other day I did not show up in the morning after talking with you at the meeting because I decided to wait until I had received some more information from some individuals. One thing that I have found out since I've started to see what could be done with the zeolite claims is that there are only few people in the mining industry who actually know what can be done with the various minerals of that group. I am reestablishing my contacts with some of these people, and I am sure they will have some good comments on what the present day technology is accomplishing. In about two years' after locating the claims I found out that it would be a difficult project at that time, but decided to hold on to the claims and about all that I have done is do the annual work. I am interested in what you mentioned, that is the BLM vs Union Carbide about the status of their zeolite claims near Wilcox, and would like to get any available information that you may have about that issue as I located my claims as lode claims several years before the BLM was authorized to manage that type of land. The zeolite pieces that I have at Kingman were laying against a pile of copper bearing rock, and had been there for some time, so there is a possibility of contamination as the analcite has a structure with comparatively large open spaces and may have picked up some of the copper. About ten years ago I suggested to one copper producing company that there may be a possibility of this material scavenging additional copper from their final waste water and offered to bring to them enough material so that they could give it a try; I got the typical answer that they would contact me when time permitted them to try this out. Now that the pollution thing has really got going there may be something to that thought and the only way to find out would be try it whether it will or won't work. If I get any favorable comments from the people I have recontacted I will let you know, or I will see you in Kingman. I expect to be around here for some time and in my spare time will build up a small stockpile of clean zeolite at Kingman.

Best regards,



Mike Price

Letter returned by Glen
with various articles re: Zec-West claims



THE UNIVERSITY OF ARIZONA

TUCSON, ARIZONA 85721

ARIZONA BUREAU OF MINES

December 22, 1966

Michael A. Price
Rt. 3, Box 201
Tucson, Arizona 85706

Dear Mr. Price:

I sense that I should respond to the quantitative analysis that you record in your recent letter. I have no idea where the analysis was performed, but I fear that, as with so many incomplete analyses, it is misleading and very probably mineralogically inaccurate.

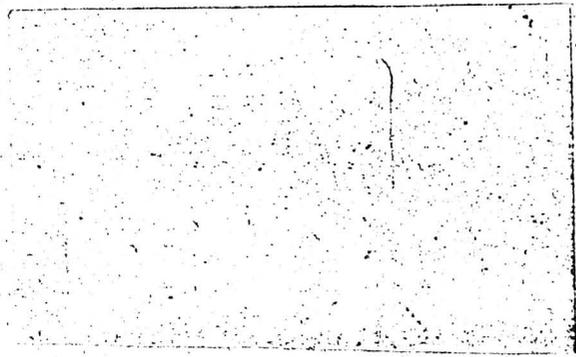
It is not difficult to characterize the sample as a siltstone and not a claystone. This can be done by feel (gritty), panning, and microscopic examination. These latter techniques add up to what I call a "cursory" examination. Such an examination leads to the conclusion that "clays" are not dominating or majority constituents. Furthermore, such minerals as quartz and muscovite mica are abundant--two constituents not quantitized in your report.

The identification of illite by X-ray technique is not readily made when muscovite mica is also present. It is suspicious that muscovite mica, so abundant in the sample, is not reported, but illite is!

In order to erase any lingering doubt, we have submitted the sample to heat treatment to check its response. The response, as it should be for a siltstone with only minor clay content, was negative.

*Siltstone Oil 50 2-2
No. 100 118*

Handwritten notes on the right margin, including 'Muscovite' and 'illite'.



HWP:csf

*Nalco***NALCO CHEMICAL
COMPANY**

4001 W. 71st STREET • CHICAGO 29, ILLINOIS • PORTSMOUTH 7-6677

October 29, 1965

Mr. Michael A. Price
~~P. O. Box 1065~~
Kingman, Arizona

Dear Mr. Price:

We have your letter of October 18 requesting status of samples of natural zeolite which you submitted to us.

There was finally an opportunity to do some work on a catalyst made with these zeolites and the results were neither very discouraging nor very promising. The one material which did seem to offer some possibility was the Analcite, but this unfortunately contained quite high iron and, therefore, would not be commercially acceptable.

As you may know from discussions with others, or from reading, the zeolite which is the ideal material for incorporation into catalyst is faujasite, again of low iron content. Consequently the desired material is that which approaches faujasite most closely. Mordenite is reported to be a good material, but we have failed to get satisfactory results with this product.

The above about summarizes our position and any information or comments that you have would be welcome.

Very truly yours,

R. C. Davidson

R. C. Davidson
Assistant Manager

rk.

Sample sent in 1962

EXTRACTS FROM CLAYS AND CLAY TECHNOLOGY

Pask, J. A. ⁴ and Turner, M. D., Bull. 169, 1955

p. 246 "Most promising as sources of lightweight aggregate are shales and clays containing illite⁴, beidellite-type members of the montmorillonite group, and vermiculite-chlorite. These minerals approximate the composition found by Riley (1951) to yield the melt of optimum viscosity. They almost always contain significant amounts of iron in their lattice and are typically admixed with varying amounts of limonite and hematite. Unlike members of the kaolin group they typically contain moderate proportions of alkali earths which serve as fluxes in the firing process. The potentialities for expansion and vesiculation of clays and shales of these mineralogic types have been demonstrated both in the laboratory and in commercial enterprise."

p. 275 "The only relatively pure deposit of an illite-type clay mined and sold for drilling mud use which has come to the writer's attention is the clay from Grundy County, Illinois, sold as grundite. Although this deposit is inactive at the present time, its properties have been described in a paper by R. E. Grim 1939. (A unique clay from the Goose Lake, Illinois area: Am. Ceramic Soc. Jour., v. 22, pp. 157-164.)"

9-16-63
LITTLETON, COLORADO

Dear Mike,

The last sample of analite you sent does seem to be quite pure (I guess 90% or better analite). Our man picked up some glauconite - the other labs did not report this. (I got your letter this morning).

Do you want the copies of the U. of Arizona analyses, or can I keep them?

I will keep this last sample as an oil decolorizer.

Trip to New York City was great, but I am glad to be back.

Sincerely,
Brother Dave

MARATHON OIL COMPANY DENVER RESEARCH CENTER
FORMERLY THE OHIO OIL COMPANY

8-28-63
LITTLETON, COLORADO

Dear Mike:

I promoted you to president of Price Clay Minerals, Inc. so that the letters are official enough to have company pay the postage on the correspondence.

As you will see from the analysis report from our X-Ray lab-- very little analcite in any of the samples. I had been under the impression that samples 1 and 2, that you sent me long ago at Caltech, were supposed to be nearly pure analcite. It seems that the major constituent is illite in all the samples.

I have not requested elemental analyses yet, however, I think the amount of aluminum present as the oxide will be apparent to you from the % of the various minerals. I guess illite is roughly 25% Al_2O_3 isn't it?

I need to do more extensive tests to be certain the clays are really good oil decolorizers. As you can see from the copy of a note I sent to my supervisor, I am finding out whether the company really has a need for such. I want things to get more official from here on out so I won't be wasting my time only to find out later that they aren't really interested. I think probably they are interested.

Would you please send me some of the material that U. of Arizona said was high purity analcite? Also the X-Ray analysis if possible. I want to give our lab a standard for analcite determination-- also be sure there are no mistakes to date. I hope you are keeping these samples well mapped so we can maybe get an idea of trend throughout the lake bed-- might depend on former direction of stream flows and the like. I'm sure you know more about this than I do-- I just don't want to load up our lab with too many determinations. X-ray studies are apparently cheap and don't take much time, still, I want to make each sample mean something.

I hope these results help you out. Do you have some more critical samples that would help determine the scheme of things in the lake bed-- or do you think the distribution of minerals is too random to get a "map".

I will let you know how the oil decolorizing bit goes. If we need really large samples, maybe you could show Raymond where to get them and then he could send them on up.

I think I have hit a big one here at work. The economic evaluation of my isprene process (raw material for rubber) says we can get 25-30% rate of return on investment and still sell the stuff for half the current market price. Management here is quite excited. This would be the first process to come out of the research center if it works. I think my eight months here has made these guys believers in Caltech graduates! Luck of course, but I'm not letting them in on that little secret.

Sincerely,

Dave

INTRA-COMPANY CORRESPONDENCE

TO Joe Kelly DATE 8-28-63
OFFICE _____ FROM Dave Hall
OFFICE _____

(USE THIS LINE FOR FILE REFERENCE OR SUBJECT)

Here is a copy of the 3 X-Ray analyses of my "nepotic clays". I have other copies, so you may "file" this one when you are through with it. These are random samples from the huge lake bed, so apparently all the material in the lake bed could function as an oil decolorizer.

Ed's preliminary tests indicate the stuff should be good, but more should be done to prove this. Before having Ed spend any time on more thorough tests, I'd like to be certain something will come of this if the stuff is of value. Is there real interest in clay decolorization? If we get more samples, I think Marathon should start handling this more formally - ie have purchasing handle the correspondence or in some other way formalize the study.

In summary- this clay looks interesting as a possible oil decolorizer. Where do we go from here?

*Note accompanying X-Ray analysis sheet
sent to my boss.*

Marathon Oil

INTERNATIONAL COMPANY CORRESPONDENCE

TO Dave HallDATE 8-27-63

OFFICE _____

FROM Jack BrightAnalysis of 6 clays Proj. 120304

(USE THIS LINE FOR FILE REFERENCE OR SUBJECT)

OFFICE _____

	<u>#1</u>	<u>#2</u>	<u>17-20</u>	<u>18-19</u>	<u>N-2</u>	<u>Z-5</u>
Calcite	20%	5-10	3-5%	3%	15-20	5% -
Illite	50-55	50-60	35-40	50-55	55-60	60-65
Feldspar	30-40	15-20	x	15%	40%	10%
Analcite	x	x	x	x	x	x
Quartz	trace	5-10		25%	trace	10%
Riebeckite?	x	x	x	x	x	x
Chlorite	?		?	?	?	
Montmorillonite						10-20
Nepheline			x	x		
Ilmenite		trace?	?			

x - present, but no quantitative estimation made.

Due to the complexity of the mineralogic assemblage in these samples, precise identification of all constituents was quite difficult. Where possible, quantitative estimates were made, but for Nepheline, Analcite and Riebeckite, no calibration curves were available.

The Riebeckite identification is questionable. The substance so identified is pretty certain to be an amphibole and the pattern fits Riebeckite fairly well.

All 6 samples were basically the same. If samples 1 and 2 functioned well as oil decolorizers, then the other 4 might do well also - - at least so far as comparative mineralogy is concerned.

Patterns were run on the total sample ground to -200 mesh. Z-5 and 18-19 were sieved, and the -200 fraction compared with the -325 mesh fraction. The diffraction traces for both size fractions of both samples were virtually the same. Therefore, it was decided to run the remaining samples as received, -200 mesh.

Marathon Oil

MARATHON OIL COMPANY DENVER RESEARCH CENTER
FORMERLY THE OHIO OIL COMPANY

8-21-63
LITTLETON, COLORADO

Dear Mike:

Our analytical lab recommended that the analyses start out with an X-Ray study. They are redoing the first two samples that you sent me long ago, together with the four new ones. Could you send me a copy of the earlier X-Ray studies? I gave the first one to Caltech. Supposedly, the samples are now being displayed in their museum.

Our X-Ray lab will report % analcite or % illite, as the case may be. Results should be fairly quantitative-- they are doing a lot of that kind of work here now. After I get these results, I will get elemental analyses for aluminum, iron, calcium, potassium, silica and trace elements. Do you know whether there is a test for available alumina? Our lab was not familiar with one. We would simply analyze for aluminum and silica-- or did you perhaps mean % aluminum present as aluminum oxide (alumina) rather than as aluminum silicate? This is out of myfield too.

I had all the samples ground to 150-200 mesh and then material under 200 mesh is being used for X-ray studies-- they use material of 325 mesh for that. I tested samples land 2 as oil decolorizers. So far the tests look good-- have to determine long range stabilizing effects.

Looks as though I will be able to get you a lot of data on these samples. If it works out for oil decolorizing-- might be a good deal for Marathon too. Probably, I should patent the use for Marathon, if it looks good. This is only fair since they are going to be putting out a lot for analyses. Maybe the idea is not even patentable. It would not keep you from selling the material for any other use. This is all premature however-- we would have to do an economic evaluation and also do more experimental to prove the value of the method.

I will write you as soon as I get the data-- estimate is Sept. 5. I leave for a week at meeting in NYC. on Sept 7 and will return Sept. 14.

Tell Evie I will write her soon.

Sincerely,

Dave

Ford Motor Company

ENGINEERING AND RESEARCH STAFF

20000 ROTUNDA DRIVE
P. O. BOX 2053
DEARBORN, MICHIGAN

September 27, 1963

Mr. Michael A. Price
Box 1065
Kingman, Arizona

Dear Mr. Price:

Ford Motor Company is not a processor of zeolite and therefore we shall not be able to assist you in your evaluation of the mineral deposits you have mentioned. We can only suggest that you contact concerns that are currently active in this field.

We might mention that various catalytic minerals have been considered for the purification of exhaust gases. However, none have proved sufficiently practical to warrant adoption.

Should you later have a specific development in this or other areas applicable to our products, we would be pleased to review your data under our conditions governing disclosures of outside persons. Attached are two copies of our Confidential Disclosure Waiver outlining our conditions. One copy should accompany your material; the second copy is for your files.

Your inquiry in this matter is appreciated.

Very truly yours,

FORD MOTOR COMPANY


Joseph Crupi
New Devices
Vehicle Regulations Department

JC:pb
Enclosures
(2 waivers)

(For an auto muffler
exhaust emissions)



THE DOW CHEMICAL COMPANY

TEXAS DIVISION
FREEPORT TEXAS

September 25, 1962

Mr. Michael A. Price
Box 1007
Riverton, Wyoming

Dear Mr. Price:

We have completed our examination of the analcite samples which you sent to us last month. All three of the samples were quite similar chemically. In addition to the major constituents of Na, Al, and Si, all contained a percent or more of Ca, Fe, and K. A few tenths of a percent of Ti was present and traces of numerous elements were noted. Among these were Ba, Cu, Mg, Mn, Ni, Pb, Rb, Sr, and Zn. None were present in economic quantity. No lithium was detected.

*By zeolite
harmotome
with analcite*

Since we have no requirement for natural zeolites per se, we cannot express further interest in the deposit. We will keep your correspondence on file should a need arise at a later date.

A reference to the zeolites of Arizona appears in a 1949 publication of the University of Arizona. A copy is attached in case you have not seen it.

Thank you for sending the samples. I regret that we are unable to use the material.

Very truly yours,

C. M. Shigley
Director of Technical Research

md
attachment

Ref: A 150 at later date "Mineral & Water Resources of Arizona", (Ar. Bot. Bull)

OAK RIDGE NATIONAL LABORATORY

OPERATED BY

UNION CARBIDE NUCLEAR COMPANY



POST OFFICE BOX X
OAK RIDGE, TENNESSEE

Our file: General ✓

September 21, 1962

Mr. Michael A. Price
~~Box 1067~~
~~Riverton, Wyoming~~

Subject: SAMPLES OF ROCKS

Dear Mr. Price:

We have received the rock materials sent to us for use as possible scavengers of radioactive materials from radioactive waste.

We have evaluated a great number of naturally occurring minerals and if you have information concerning the type and composition of the mineral you sent to us it would aid in our evaluation. After we receive this information we can consider whether or not further evaluation should be made.

Your interest as expressed in supplying these materials is greatly appreciated. Please advise if we can be of further assistance.

Very truly yours,

F. N. Case, Superintendent
Isotopes Sales Department
Isotopes Development Center

FNC:dw

Samples sent Na Pers.

#1 Analcite

#2

Fine grained basolite?

(Amount mineral?) Identified as Illite by Marathe

#3

{Tuffaceous-?} kaolinite? (?)
Illite ← ID by Marathe

Illite

August 21, 1962
794 So. Mentor
Paradise

Dear Mike,

I just went to the geology curator of minerals & told him I had a sample of natural, high purity analcite and wondered if he would like it as a sample. He said "what is so special about analcite?" I said this was from a huge deposit & we were looking into commercial uses. I was sure I would get sly smiles & chuckles & I did. The man was very polite & got interested when I told him about the analytical results. He was interested when I told him where the sample was from & really got interested when I told him none of his samples looked like the one you sent. So I packed home & got the sample & went to him along with the copy of the X-ray report. Well, bet the poor man is still sitting there turning it over in his hands & mumbling to himself just as he was when I left him. He said he had never seen anything like it & wouldn't have believed it was analcite if I hadn't given him the analysis. I think I made a believer of him. I'll never chuckle again when someone offers him what appears to be a commonplace sample!

As soon as a Dr. Camb returns they may do more studies on the sample. They will send the results to you if they do. Certainly they are grateful for a very novel sample.

Sincerely,
Dave



THE UNIVERSITY OF ARIZONA
TUCSON

ARIZONA BUREAU OF MINES

July 16, 1962

Sample No. 48027

The sample submitted to the Arizona Bureau of Mines for examination is composed of analcite (hydrous sodium aluminosilicate) and a little calcite (calcium carbonate). X-ray diffraction of the material showed only these two minerals to be present. If any other mineral is present it is too poorly crystallized to be identified by microscopic or x-ray procedures.

Some iron, potassium, magnesium and a trace of nickel was detected. However, analcite has a structure with comparatively large open space, and it is believed these metals may be substituted for the sodium atoms.

I hope this information is of some help to you.

Sincerely,

Robert T. O'Haire
Robert T. O'Haire
Assistant Mineralogist

200-1.2

RTO/h

cc: Mr. Lee Hammons

*Transmitted to Mr. Lee Hammons, Mineralogist, Tucson, Arizona
Four bottles of 1/2" x 1/2" x 1/2" each
1 1/2" - 1/2" x 1/2" x 1/2"*