Abstracts

New Mexico Mineral Symposium

Attention—An abstract published in *New Mexico Geology*, v. 13, no. 2 (May 1991), p. 41, "Minerals of the Cuchillo Negro district, Sierra County, New Mexico," by Ramon S. DeMark, discussed mineral collecting in the district. Mr. Greg Richards, an agent for the owner of the Vindicator mine in that district, advises that mineral collecting at the Vindicator mine is strictly prohibited without specific approval of the owner. For further information, contact Mr. Greg Richards, P.O. Box 5575, Hobbs, NM 88241.

The Twelfth Annual New Mexico Mineral Symposium was held November 9–10, 1991, at New Mexico Institute of Mining and Technology, Socorro. Following are abstracts from talks given at the symposium that concern New Mexico. The numbers in parentheses refer to locations on the map.

NEW MEXICO PSEUDOMORPHS—AN INTRODUCTION, by *Marc L. Wilson*, New Mexico Bureau of Mines and Mineral Resources, Socorro, NM 87801

The term pseudomorph, literally meaning false shape, refers to a mineral that exhibits the external form of a different mineral species. There is some disagreement about what actually constitutes pseudomorphism in minerals, so for the sake of simplicity, the definitions of Edward S. Dana will be followed in this presentation. Dana (1907) described three classes of pseudomorphism with six subdivisions: 1) pseudomorphism by substitution; 2) pseudomorphism by deposition; 2a) pseudomorphism by incrustation; 2b) pseudomorphism by infiltration; 3) pseudomorphism by alteration; 3a) paramorphism; 3b) with loss of ingredients; 3c) with gain of ingredients; 3d) with exchange of ingredients. Pseudomorphism by substitution involves the gradual replacement of original material by an unrelated mineral without chemical reaction between the two. Petrified wood is a common example of this class of pseudomorph. New Mexico examples include opal or the agate variety of quartz after wood from various localities, chalcocite after wood from Sandoval County, and carnotite after wood from the Grants district, Cibola and Valencia Counties. Pseudomorphs by incrustation form when one mineral coats another with or without the removal of that other. Quartz very commonly forms crusts on, or casts of, other mineral species and New Mexico examples include pseudomorphs of fluorite, barite, and galena from the Hansonburg district, Socorro County, and quartz and fluorite after calcite from the Cuchillo Negro district, Sierra County. Other examples include pseudomorphs of limonite-aurichalcite-calcite after calcite from the Magdalena district, Socorro County; turgite coatings on quartz from the Lordsburg district, Hidalgo County; and pyrite after sphalerite from the Hansonburg district, Socorro County. Pseudomorphs by infiltration form when a cavity made by the removal of a mineral is filled by another mineral. This type of pseudomorphism is more important in paleontology than in mineralogy, and examples such as quartz or pyrite *pseudomorphs* of brachiopods, pelecypods, trilobites, etc., abound in New Mexico. A mineralogical example would be sylvite pseudomorphs of langbeinite from the potash deposits in Eddy County. Paramorphism results when a mineral undergoes a change in internal structure without a change in chemical composition. Perhaps the best known example is the phase inversion of argentite (cubic) to acanthite (monoclinic) at temperatures below 177°C. New Mexico examples include calcite (hexagonal) after aragonite (orthorhombic) from numerous localities and pyrolusite (tetragonal) after ramsdellite (orthorhombic) from Lake Valley, Sierra County. New Mexico examples of pseudomorphism by alteration with loss of ingredients include copper (Cu) after cuprite (Cu_2O) from Santa Rita, Grant County and malachite ($Cu_2(CO_3)(OH)_2$) after azurite ($Cu_3(CO_3)_2(OH)_2$) from the Magdalena and Hansonburg districts in Socorro County, the Lordsburg district in Hidalgo County, and the Organ district in Doã Ana County. A New Mexico example of pseudomorphism by alteration with addition of ingredients *is cuprite* (Cu_2O) after copper (Cu) from the Santa Rita district in Grant County. Pseudomorphism by alteration with exchange of ingredients is probably the most important type of pseudomorphism because most specimens commonly observed belong to this category. New Mexico examples abound and include rose muscovite after microcline from the Harding mine, Taos County; cerussite and anglesite after galena from many localities; malachite and/or limonite after chalcopyrite from the Orogrande district, Otero County and from the Hansonburg district, Socorro County; linarite, brochantite, cerussite, anglesite, and/or wulfenite after galena from the Hansonburg district; malachite and cerussite after linarite, also from the Hansonburg district; rosasite and/or malachite after cuprite from the Magdalena district, Socorro County; ramsdellite after groutite from Lake Valley, Sierra County; hematite and/or chalcocite after pyrite from Santa Rita, Grant County; and limonite after pyrite from numerous localities. Often, pseudomorphs exhibit characteristics of more than one of these classes presented. Chrysocolla may pseudomorph any copper-bearing species by alteration and incrust adjacent minerals as well. Specimens of groutite from Lake Valley, Sierra County, are pseudomorphed first to ramsdellite by alteration and then to pyrolusite by paramorphism. Finally, azurite from the Rose mine, Grant County, has been pseudomorphed by a combination of copper and calcite. The copper forms microscopic arborescent crystal groupings that are partly to completely altered to cuprite. The cuprite is often further altered to malachite. They are thus copper, cuprite, and calcite, cuprite and calcite, cuprite and malachite, or malachite pseudomorphs of azurite. Classification is further complicated because the pseudomorphing materials filled azurite molds in the surrounding clays giving them aspects of both alteration and infiltration pseudomorphs.

Reference

Dana, E. S., 1907, A text-book of mineralogy with an expanded treatise on crystallography and physical mineralogy: John Wiley & Sons, New York, pp. 144, 252–253.

RECENT DEVELOPMENTS AT THE MEX–TEX, by *Tom Massis*, 9313 Lagrima de Oro NE, Albuquerque, NM 87111 (1)

The 1990 New Mexico Mineral Symposium reported minerals of the Mex–Tex group, Bingham, New Mexico (Massis, 1990). This is a report on recent developments at the Mex–Tex. During early February 1991, a major collapse at the main or upper workings covered and buried the most productive mineral-collecting area of the Mex–Tex group. The collapse occurred when nobody was present. It is felt that the increased aircraft activity over the area released a sonic boom nearby that started the collapse. This event, the collapse, was not expected. A 60–70-ft section subsided, collapsed, and covered nearly all the familiar underground collecting sites. The only underground section remaining is the extreme backside, located in the southeast section of the mine. This section is still unstable with evidence of recent falls from the ceiling that continue to drop in various-sized sections. The outside surface above these workings is still observed to be settling, eight months after the initial collapse. The collapse has significantly reduced the quantity of fine mineral specimens being collected. The 15–20-ft overburden now covering this area is essentially void of mineralization. Only one mineralized, specimen-producing zone has been found at the surface. This mineralized zone produced a small suite of fine fluorite, barite, and galena specimens. The forms and colors are new for the Mex–Tex group. At least four new fluorite crystal forms were found, highly modified cubic or octahedral forms. The colors are dark purple to gray blue with individual crystals exceeding three inches. A number of the fluorite specimens collected are museum quality. Barite specimens though small, less than two inches on a side, were free formed with no terminations, clear to light yellow, and many times quite "gemmy." Some modified cubic galena specimens, new forms for the Mex–Tex group, were also collected. Though specimen production and collecting has diminished tremendously, small pockets throughout the Mex–Tex group continue to be found. Hard work moving significant quantities of overburden is now required to open pockets. This year, 1991 (including the latter part of 1990), the Mex–Tex group has produced significant finds that include fine light-green hexoctahedral and modified cubic fluorites, typical light-blue to clear hexoctahedral fluorites, showy murdochite on quartz, numerous combinations of spangolite, brochantite, and linarite with other unidentified colored minerals, a suite of creedite, small linarite crystals in association with fluorite and galena, and wulfenite crystals. Large plates of small quartz crystals, both smoky-tipped and amethystine, continue to be found. There are no plans to remove the 15 to 20 ft of overburden covering the main specimen-producing area. Small significant finds will continue to occur elsewhere but it appears specimen production will diminish from this area. Collecting at the Mex–Tex, especially the upper workings, is extremely dangerous and is discouraged for the foreseeable future.

Reference

Massis, T., 1990, Minerals of the Mex–Tex group, Bingham, New Mexico: New Mexico Institute of Mining and Technology, 11th New Mexico Mineral Symposium, Proceedings, p. 12–13; New Mexico Geology, 1991, v. 13, no. 2, p. 40.

THE AMAZING SUNSHINE # TUNNEL, BLANCHARD MINE, BINGHAM, NEW MEXICO, by *Ramon S. DeMark*, 6509 Dodd Place NE, Albuquerque, NM 87110, and *Paul F. Hlava*, Div. 1822, Sandia National Laboratories, Albuquerque, NM 87185 (2)

The Sunshine Mining Company began exploratory drilling, drifting, crosscutting, and raising in the vicinity of the Blanchard mine in November 1958. The Sunshine #1 was the first of six exploratory tunnels developed and it trends eastward. The tunnel dimensions are 12 × 12 × 405 ft long. No ore was marketed during this period. The tunnel was virtually unknown as a specimen producer until February 1978 when several flats of galena crystals coated with a lustrous, blue druze of linarite first reached the public at the Tucson Gem and Mineral Show. This was followed by an even more stunning find of world-class linarite crystals in late 1979. Many of these marvelous specimens were brought to the Tucson Gem and Mineral Show in February 1980 and were soon purchased (reputedly for many thousands of dollars) by eager collectors. Following the incredible 1979 linarite discovery, an effort to locate/recover additional linarite crystals was made by individuals under contract from Western General Resources, Inc. (the leaseholder at that time). This operation continued for several months but no large linarite crystals were found. The operation was closed down by OSHA. The Blanchard mine including the Sunshine #1 tunnel was claimed (located) by mineral collectors in April 1987, and in September of that year an amazing pocket was opened by the claim owners. The pocket was behind a large gypsum mass near the roof of a raise developed in the search for linarite crystals and had to be reached using a ladder. Initial entry into the pocket revealed large blue and purple cubes of fluorite up to 9 cm on an edge and water-clear selenite crystals in spear-shaped and prismatic habits. The largest selenite crystal was 44 cm long. The pocket dimensions were roughly 1–1.5 m wide by 0.8–1 m high by 5 m long. This pocket eventually yielded dozens of superb fluorite, selenite, and galena specimens. More recently, the new mineral species, scrutinyite (αPbO_2), was described by Taggart et al. (1988) based on specimens from the Sunshine #1 tunnel. Scrutinyite is a dimorph of plattnerite that occurs as very small (less than 0.1 mm) reddish-brown micaceous crystals. The following is a listing of some of the more noteworthy mineralogical events that have recently been recorded for the Sunshine #1 tunnel: 1) First positively identified location for caledonite at the Blanchard mine and largest crystal (7 mm). 2) First in situ occurrence of pyromorphite from the Blanchard mine. Colorless to slightly gray, transparent, hexagonal prisms were found. 3) Largest and brightest crystals of corkite known to occur at the Blanchard mine. 4) The finest occurrence of hydrozincite and the only known location for fluorescent green fluorite (short wave). 5) Only known occurrence of blue hemimorphite at the Blanchard mine. 6) One of only two significant sphalerite occurrences at the Blanchard mine and without doubt the producer of the finest specimens. 7) Largest known selenite crystals from the Blanchard mine. 8) Arguably, the producer of the finest fluorite specimens from the Blanchard mine. 9) Finest specimens of covellite replacing chalcopyrite. 10) Only known location at the Blanchard mine where corkite expitaxially overgrows jarosite. 11) Excellent anglesite crystals up to 6 mm, rarely found elsewhere at the Blanchard mine. 12) First reported occurrence of otavite from New Mexico.

TABLE—Confirmed minerals from Sunshine #1 Tunnel, Blanchard mine, Bingham, NM.

Sulphides	**Sulphates**
Chalcopyrite	Anglesite
Covellite	Barite
Galena	Brochantite
Pyrite	Caledonite
Sphalerite	Cyanotrichite
Oxides	Gypsum
Goethite	Jarosite
Murdochite	Linarite
Plattnerite	Spangolite
Scrutinyite	**Phosphates**
Carbonates	Corkite
Aurichalcite	Pyromorphite
Calcite	**Silicates**
Caledonite	Chrysocolla
Cerussite	Hemimorphite
Corkite	Quartz
Hydrozincite	
Malachite	
Otavite	
Rosasite	

Reference

Taggart, J. E., Jr., Foord, E. E., Rosenzweig, A., and Hanson, T., 1988, Scrutinyite, natural occurrences of αPbO_2 from Bingham, New Mexico, U.S.A., and Mapimi, Mexico; a new mineral: Canadian Mineralogist, v. 26, no. 4

TURQUOISE—IMITATION, ADULTERATION, OR NATURAL, by *Gary Werner*, P.O. Box 40286, Albuquerque, NM 87196

What turquoise is seems to be a matter of perception rather than fact. Turquoise to a geologist is a hydrous cupric aluminum phosphate, $CuAl_6(PO_4)_4(OH)_8{\cdot}5H_2O$, with additional trace constituents of iron and silica. Turquoise to a consumer is a traditional semiprecious stone, strong in color, that is hard enough to polish and not crumble, dense enough to not absorb skin oils when worn, and plentiful enough to be available at affordable prices. Unfortunately turquoise will never meet *all* of these criteria. Many forms of imitation and adulteration have been used to capitalize on an insatiable demand for this misunderstood gem. So, to an opportunist, turquoise is an abundant commercial material of acceptable blue color and natural-appearing matrix, capable of retaining these qualities for the few months needed for marketing. Price should be negligible and would increase only if an observable but unverifiable quantity of genuine turquoise is incorporated in the material. More valuable, in increasing order, are materials that will pass routine quantitative analysis, genuine stone temporarily doctored with oils and sealer, permanently doctored polymerizations and silications, and finally most expensive and least available, the unadulterated natural stone. In an attempt to protect the public from opportunists, while still allowing producers of altered or imitation stone to enter their legitimate place in the market, the New Mexico legislature passed the Indian Arts and Crafts Act of 1973, revised 1978 (sections 30-33-3 through 30-33-8). Though the lawmakers' understanding of the technical aspects of the problems might have been limited or even erroneous, their intent I believe was apparent. Subclass K reads:

> "unnatural turquoise" means any substance which is not natural turquoise, including: (1) "stabilized turquoise" which means turquoise which has been chemically hardened but not adulterated so as to change the color of the natural mineral; (2) "treated turquoise" which means turquoise which has been altered to produce a change in the coloration of the natural mineral; (3) "reconstituted turquoise" which means dust and turquoise particles which are mixed with plastic resins and are compressed into a solid form so as to resemble natural turquoise; and (4) "imitation turquoise" which means any compound or mineral which is manufactured or treated so as to closely approximate turquoise in appearance.

All terms in this discussion that appear in quotes refer to this legal description. In 1985, Bob North, Mineralogist for the New Mexico Bureau of Mines and Mineral Resources, and I collaborated to establish laboratory procedures for fractionating turquoise specimens in accordance with the Arts and Crafts Act. The logic we used in testing a specimen hinged on my theory that color and hardness depended on complete hydration, turquoise being a hydrated phosphate. The insufficiently hydrated forms of turquoise known as chalk are more abundant and less expensive than high-grade natural. Processes to regain hardness and color were what we needed to target when testing genuine turquoise for alteration. In practice, a piece of chalk will return to its fully hydrated color when saturated not only with water but also with oils, waxes, and most other polymers. Polymerization or color stabilizing (trade jargon coined, I believe, by the L. W. Hardy Company of Kingman, AZ) is a laboratory procedure incorporating clear catalyzed resins that harden and permanently seal turquoise in the rough. I believe this process is recognized as "(1) stabilized." A specimen containing organic compounds would definitely be unnatural but may lack the permanence and hardness of stabilization. For more insight, a carbon-hydrogen analysis was run on our fifteen samples and the results are presented at the end of this article. Several processes are identifiable by their carbon content. Fracture-sealed turquoise is unfortunately not addressed specifically by the Arts and Crafts Act. It is sold more often than not as natural but in reality is a poor man's stabilization of cut or finished stones. Unlike fracture-sealed vitreous gems, porous turquoise assumes the treatment generally and will gain rehydrated color levels. These in-shop formulations are usually adhesives or lacquers that harden once the carrier solvents evaporate. The compounds tend to be ultraviolet sensitive and degrade with time. Our carbon analysis of fracture-sealed stones indicates carbon content much less than stabilized samples and about twice that of oiled samples. In (2) "treated turquoise," fully hydrated color levels can be exceeded and slightly off-blue tints can be corrected with the use of dyes. These processes are usually used in conjunction with polymerization and are quite difficult to detect because of the fixing qualities of the polymer. Visual examination for indications of dissimilar concentrations, such as dye line and spots, and a good eye for unnatural shades have proven the most effective tests. Microscopic inspection of an oil infusion of a pulverized sample has netted conclusive results in some instances. In the case of a fairly new secret process, known as natural enhanced, dyes were not analyzed because the normally corresponding organic additives were absent. The sample was erroneously classed as natural. In discussions with the owner of the formula it was divulged that an electrical process on hard chalks was used. I then tried oxalic acid to bleach dye stuffs on the assumption that copper phosphate or a similar mineral tint was either being a) electrowinned into the crystalline lattice of the stone, or b) valence bonded to sodium silicate (silica occurs naturally in turquoise), which was being hardened by an electrical field rather than with electrolytes. The results were positive, a bleached spot at the acid contact, and conclusive, similar tests on natural and stabilized specimens were negative. Carbon content places ☞

Description slang/trade	Description common	Test: x-ray	Test: carbon	Test: other	Description legal
natural	unadulterated	clean	0–0.15%	negative to oxalic acid, visual exam for synthetics	natural
sealed natural	A. lacquered low grade B. lacquered and dyed	clean clean	0.45% 0.45%	visual exam for surface puddling or coarse undissolved pigments	stabilized treated
fracture sealed	polymerized fractures	clean	insufficient data for carbon, suspected 0.25–0.50%		stabilized
natural enhanced	mineral dying w/ or w/o silica or lacquer seal	clean	0–0.50%	positive to oxalic acid on unsealed stone	treated
color stabilized	catalyzed polymerization of chalk and low-grade turquoise	clean	2.5–20% High carbon values indicate complete penetration by complex organic compounds.		stabilized
silicated	hardened with glass, process seldom used without dye because of almost no color gain	clean	0–0.15%	no conclusive tests at this time	stabilized
color shot	dyed and polymerized usually epoxy type	clean	2.5–20%	visual exam for surface puddling, internal concentration lines and spots, epoxy craze lines	treated
waxed or oiled	paraffin-boiled low-grade hard turquoise	clean	0.27%	Extra deep colors may be seen along faults or fractures. Process is unstable, and oils will migrate into deeply discolored areas of concentration while leaving other areas almost colorless	treated?? no hardening as in stabilizing; color gain only motive
oil-base polishes	commonly used process of polishing with oil- or wax-based polishes; minimal color gain on medium grade or better	clean	0.15–0.22%	visuals comparable to paraffined, but less obvious	natural?? judicial determination needed
enhanced matrix	black dye applied in exterior textures to cover chalky matrix and create "Sea Foam" effect	clean	Dyed black matrix typically makes up 0.05% of the carbon values in any specimen.	visual determination	treated?? judicial determination needed
compressed block	compressed turquoise nuggets, bound by polymerization or without dye	clean	2.5–20%	visual determination	reconstructed
"recon" reconstructed or "block"	imitations spun off "German block" formulations containing aluminum hydroxide ($Al(OH)_3$) that have degraded to simply dyed plastics	contamination with $Al(OH)_3$ or no crystalline forms perceptible under x-ray; original German formula had no binders	Carbon may run well in excess of 20%. Some samples sustain combustion upon ignition		imitation
imitation	anything that looks like turquoise but is not	non-turquoise x-ray	carbon irrelevant		imitation
treated	A catch-all phrase that no longer indicates any particular process, an irrelevant term except for legal description.				

the natural-enhanced process lower than the fracture-sealed process but not notably higher than unaltered stones polished with wax- or oil-base polishes. These polishes are used extensively and impart a slight color gain on only the most absorbent pieces of natural turquoise. In contrast, saturating the stone with oils and waxes yields strong color gain but imparts neither hardness nor color permanence. "(3) Reconstituted turquoise" has evolved into two major types. The first is naturally occurring nuggets of chalk compressed and then bound by stabilizing polymers. The value of this material is based on availability of a genuine-turquoise base component. The second type is reconstructed powders. Even with the use of dyes, stabilized turquoise powder becomes an unappealing gray. A pure, white mineral filler, aluminum hydroxide ($Al(OH)_3$), must be used in substantial proportions before a dyeable mix is attained. This compounded substance will be passed as turquoise by most assay labs. The content of filler can be as much as 100% as in the case of the German imports sold as synthetic or genuine reconstructed. In our procedure x-ray diffraction was run first to quickly detect most imitations. If a sample contained aluminum hydroxide, it was classed as imitation and no more tests were run. "(4) Imitation" products frequently can be detected by visual examination, circumventing the need for further analysis. In the absence of readily available detection procedures, imitation has been lucrative and still spawns new formulations, as confirmed by Dr. Klein of the University of New Mexico. He had been sent a specimen of turquoise from Germany that had a beautiful lustrous deep Persian color and gemmy homogenous grain. On analysis, it was a carbon-calcium-nitrogen compound with minor amounts of phosphoric, titanium, and aluminum oxides. Back in 1985 our intent was to implement the enforcement of a much-needed law. Today my hopes are that the State will fund continuing research in an effort to discourage fraudulent marketing. Informed, educated consumers help this effort by becoming more aware of what is being sold.

FACETABLE STONES OF NEW MEXICO, by *Merrill O. Murphy*, 7304 Union St. NE, Albuquerque, NM 87109

[**Editor's note**: Mr. Murphy's text discussed more than 150 facetable stones, of which only 20 are printed here. The complete text may be obtained by purchasing the symposium volume from NMBMMR, Judy Vaiza, (505)835-5302.]

Glenn and Martha Vargas, in "Faceting for Amateurs," listed more than 100 natural gem materials suitable for faceting by amateurs. Their book was printed in 1969 and does not include a few minerals now considered facetable or then unknown. We will add a few to their list. An asterisk (*) preceding a listing indicates no mention in Vargas. Quite a large number of these minerals are found in New Mexico. Stuart A. Northrop's "Minerals of New Mexico" lists most of those and supplies general to specific locations. I refer you to this fine book for a back-cover jacketed map of New Mexico mining districts and to the many text listings of technical papers and reports of mineral discoveries. Many technical papers and letters are available for examination at the U.N.M. library and at libraries on campus at Socorro and Las Cruces. Though now out of print, Northrop's book should occupy a place on your own book shelves. As you will soon notice, I have added occasional bits of personal information and made some best guesses. I will appreciate comments and knowledgeable updates from readers. DISCLAIMER—I do not always know about the legal aspects of entry into the various locations to be mentioned. I take no responsibility for you if you trespass, get lost, or injure yourself while trying to follow my directions. I will, however, supply the most accurate information available to me. Be sure to check state highway numbers on the most recent official map; these numbers are changed periodically.

AMBER—N.M. probability very good. A possibility around any old coal dump. Has been reported from several locations such as: 1) the Gallup–Zuni coal basin near Ft. Wingate in McKinley County and San Mateo in Cibola County, 2) the Rio Puerco coal field in Sandoval and McKinley Counties, 3) the San Juan Basin mines in San Juan County. Many of these finds may be better classified as WHEELERITE.

ANHYDRITE—N.M. probability very good. Best chances are: 1) approximately one mile west of Cañoncito in Cibola County, many pea-size crystals in gypsum, 2) around drilled water wells in Eddy, Chavez, and Lea Counties, 3) around any gypsum deposit.

BERYL—N.M. probability excellent. Many New Mexico locations, mostly opaque to translucent ore grades. The best chances for faceting rough are: 1) the Ojo Caliente No. 1 and Petaca mining districts in Rio Arriba County. Rough runs from nearly colorless through shades of green, blue, yellow, and pink. A few small faceting bits have been cut. 2) The El Porvenir and Tecolote mining districts adjoining Young's Canyon, Burro Creek, and Gallinas Creek in San Miguel County—material is as described for Rio Arriba County. 3) The Harding mine in Taos County—generally colorless, greenish, or pale pink. A number of small stones have been cut. 4) *A reddish BERYL called BIXBITE (not to be confused with BIXBYITE found in the same area), a relatively new report! Rumors have circulated for several years about BIXBITE in the Taylor Creek mining district of Sierra and Catron Counties (the Gila Wilderness east of Beaverhead). Recent information specifies two locations in Sierra County, one a small prospect near the old BIXBYITE/TOPAZ diggings (center of S1/2 sec. 22, T10S R11W). The second location, less specific, is against Round Mountain just north of Diamond Creek and a few miles southeast of the first site. Stones found are small and are much lighter colored than the classic Utah BIXBITE.

CALCITE—N.M. probability certain. CALCITE has been reported from every county in New Mexico, but is not usually of facetable quality. Best chances are: 1) in concretions along the Rio Puerco and its tributaries in Bernalillo, Sandoval, and Valencia Counties, 2) the Organ mining district of Doña Ana County, 3) clear scalenohedron and prism crystals of transparent, colorless CALCITE in a small prospect 3/4 mile west of the intersection of I–25 and US–380 (just west of San Antonio in Socorro County). A great many crystals adhere to slabs of rock in the shallow prospect. The prospect is on the north side of the gulch just west of a low bluff.4) Harding mine and a large pit 1/2 mile northwest of the Harding mine in Taos County, 5) Cooke's Peak, Little Florida, and Tres Hermanas mining districts in Luna County.

*CHALCOPYRITE (also see PYRITE)—N.M. probability certain. Found at most copper mines and prospects. Not normally considered a faceting mineral but produces bright, interesting faceted tablets.

DOLOMITE—N.M. probability very good. Faceting-grade DOLOMITE of fine quality was once advertised from somewhere near Santa Rosa. Al Huebler of the New Mexico Faceters Guild recently cut a very fine stone from this material. Hint: research old Lapidary Journal ads and make local inquiries. Best chances are: 1) the Santa Rita area, 2) near Lake Arthur in Chaves County, 3) just south of Dunlap in De Baca County.

FELDSPAR—Numerous species as follows: ORTHOCLASE—(includes ADULARIA, CRYPTOPERTHITE, MICROPERTHITE, PERTHITE, SANIDINE, SODA-SANIDINE, and MOONSTONE)—N.M. probability certain for SANIDINE, SODA-SANIDINE, MOONSTONE and ADULARIA. Best chances are: 1) SANIDINE, SODA-SANIDINE and possibly ADULARIA occur in the Rabb Canyon MOONSTONE pegmatites. The SANIDINE and SODA-SANIDINE are water-clear (though often marred by partial cleavages and fractures) and show a vivid blue or silvery adularescence, probably the best in the world. The material thought to be ADULARIA is about 1/4 mile south of the main SANIDINE site. It is "sleepy" translucent and exhibits no adularescence. Rabb Canyon is in Grant County, roughly 10 miles northeast of Mimbres. 2). Small SANIDINES are found in the Jemez, Cochiti, and Bandelier areas of Sandoval County. Most are tiny, but a few to 1/4 inch have come from the Bandelier area. 3) The Albuquerque Volcanoes area and the Cerro Colorado south of I–40 in Bernalillo County produce a few pieces of doubtful value.

LABRADORITE—N.M. probability certain. Best chances are: 1) a light straw to good yellow transparent rough is found in the basalts of the Pueblo Park area of Catron County about 25 miles southwest of Reserve, the location extending into Arizona, 2) Loew (1875) reported clear LABRADORITE in the glassy andesites of San Antonio Mountain in Rio Arriba County. (This is probably the 11,651-ft mountain now called Chicoma Mountain. It is about 17 airline miles west of Española.) These are described as relatively large and vividly colored. The location, if it existed, is no longer known. 3) Loew also described LABRADORITE like 2) above, in a basalt plug 5 miles southwest of Cabezon Peak in Sandoval County. 4) V. C. Kelley, geologist at U.N.M., displayed a transparent, light-amber cleavage block with brightest blue labradorescence from the Jemez area, Sandoval County. [Dr. Kelley died in 1988.—Editor]

FLUORITE—N.M. probability certain. FLUORITE has been found and mined in dozens of places in New Mexico. Best chances are: 1) in and around the Doc Long Recreation Area on NM–536 northwest of Cedar Crest in Bernalillo County, pale-green cleavages to 3/4 inch, 2) in almost all the many mining districts around Las Cruces and Organ in Doña Ana County. Most of this rough is colorless to pale green. An easy location is some prospects 1/2 mile east of Organ and a lesser distance north of US–70. 3) In almost all mining districts in the Silver City and Burro Mountains region of Grant County, 4) in the Cooke's Peak mining district of Luna County, a spectacular lime green and other colors in large pieces, 5) in numerous mining districts in the southern part of Sierra County. Of particular interest is that in the Grandview Canyon district east of the villages of Arrey and Derry. 6) In most of the mining districts of Socorro County, particularly the Hansonburg district southeast of Bingham where large cleavages of blue, green and purple rough are found. These are very fragile and difficult to facet. 7) The Zuni Mountains mining district of Valencia County, particularly the Mirabal mine near Diener and Bluewater, 8) At least 12 mines in the Gila Fluorite district a few miles more or less east of Gila in Grant County, very nice material in a number of colors.

GARNET—PYROPE—N.M. probability very good. Deep red. Best chances are: 1) in the Green Knobs/Red Lake area north of Window Rock in McKinley County. Many of these GARNETS are paler than normal PYROPES, some to light lavender, and may be RHODOLITE. 2) Red, raisin-size, appearing to be PYROPE, are found in a pink granite just north of I–25 and 2 or 3 miles southwest of Las Vegas in San Miguel County. Turn off I–25 onto NM–283 and go 1/2 mile or so.

*HALITE (common table salt)—N.M. probability very good. Best chance is in the Carlsbad potash mining district of Eddy County. An intense blue variety is very occasionally seen.

OBSIDIAN (Technically a rock, not a mineral)—N.M. probability certain. OBSIDIANS are found in many parts of New Mexico, particularly west of the Rio Grande. In most occurrences, the OBSIDIAN is subtransparent at best, but there are also a few sources of nearly transparent rough. Best chances are: 1) in the Jemez Mountains of Sandoval County at the Tent Rocks about four miles northwest of Cochiti Pueblo on National Forest Road 266. The tears are quite transparent but small, to 1/4 inch. 2) In the Jemez Mountains on the same road noted in 1), about 12 miles northwest of Cochiti Pueblo and about 3/4 mile north of the old Bear Canyon ranch site. More or less transparent tears to 1 1/2 inches can be found in the roadbed and in shallow diggings (for perlite) on the east side of the gulch. About 10% of these tears contain flow-oriented, glittering, blue, inclusions of unknown composition. Properly oriented and cut, these obsidians make spectacular gems. NOTE! We are investigating these inclusions. Under the microscope, they appear to be perfect hexagonal plates with strange, internal star-like markings. We are trying for microprobe examination to determine the nature of these inclusions.

PERIDOT—N.M. probability quite good. Best chances are: 1) in Kilbourne Hole and other similar features near Afton in Doña Ana County and near the Mexican border, small but good greens, 2) in McKinley County in the Red Lake, Green Knobs, Todilto Park, and Zilditloi Mountain areas, some good rough, 3) rumor has it that good finds are presently being made at a volcanic neck south of Engle in Sierra County, 4) an occasional find is possible in a number of other counties where large phenocrysts have been noted in volcanic rocks.

*PSILOMELANE—N.M. probability certain. The ore, PSILOMELANE, is almost always a combination of several oxides of manganese. A number of years ago, a highly silicious PSILOMELANE was imported from Mexico and cut into interesting, banded cabochons. The New Mexico PSILOMELANE has little silica and less banding. It can be faceted into bright, metallic tablets. The best location is the Luis Lopez mining district about 12 miles southwest of Socorro.

PYRITE and MARCASITE—N.M. probability certain. PYRITE or MARCASITE is found in almost every mining district in New Mexico. The two are chemically identical minerals with a differing crystal habit. MARCASITE tends to form in coal veins and other high-carbon rocks; PYRITE usually accompanies metallic ores. Either mineral may be faceted into glittering tablets. Beware of "PYRITE" of nearly silver color. It may be ARSENOPYRITE, which may be poisonous to work with or wear. One easy-to-reach source of PYRITE is some prospects north of US–70 and about 1/2 mile east of Organ in Doña Ana County.

QUARTZ—N.M. probability certain. Northrop names 70 varieties of QUARTZ found in New Mexico. Most of these varieties are cryptocrystalline, i.e., made up of interlocking, fibrous crystals, agates and jaspers are examples. Many cryptocrystalline QUARTZ stones can be faceted as interesting tablets, but in the interest of brevity, I shall mention only the more outstanding sources of transparent crystalline QUARTZ. Some good possibilities are: 1) in the Mogollon, Taylor Creek and Wilcox mining districts of Catron County (see Ferguson, 1927; Alfredo, 1951; Rocks and Minerals, 1952, v. 27, p. 35). Also in Catron County, "an area five miles wide by 30 miles long near Grass Lake in the southern San Augustin Plains, crystals, casts and banded agate," (news item, 1947). 2) "Pecos Diamonds" in GYPSUM beds for 100 miles along the Pecos River in Chaves, De Baca, and Eddy Counties, sharp, doubly terminated but seldom clear crystals. A particularly good locale is about five miles east of Ramon in De Baca County. 3) In Baldy, Cimarroncito, and Elizabethtown mining districts and widely scattered through the Cimarron Range in Colfax County. 4) Widespread in virtually all the mining districts of Doña Ana and Grant Counties. Particularly fine faceting rough (colorless, smoky, amethystine, and smoky-amethystine) is found at the SANIDINE MOONSTONE claims in Rabb Canyon, Grant County). 5) In virtually all the mining districts of Rio Arriba, San Miguel, Santa Fe, Sierra, and Taos Counties. AMETHYST has been noted in a number of counties as follows: 1) in the Mogollon mining district of Catron County, 2) at the Ben Nevis mine in the Organ mining district of Doña Ana County, 3) in the Chloride (abundant), Kingston, and Tierra Blanca mining districts of Sierra County, also recently reported from somewhere near Wall Lake in western Sierra County, 4) in the Council Rock, Ladron, San Jose, and San Lorenzo mining districts of Socorro County, also an interesting AMETHYST occurrence in a decayed FELDSPAR (clay) dike on the lower, southwest slopes of Ladron Peak, also in Socorro County. This one was once well known to university students at Socorro but has, apparently, passed from common knowledge. Crystals were clear, stubby, to 1 1/2 inches across. Only the tops were amethystine, never deep purple. Smoky QUARTZ of fine quality and considerable quantity has been taken, in the past few years, from a long, slender occurrence on the north slope of Sierra Blanca Peak southeast of Carrizozo and north of Ruidoso in Lincoln County. A heavy incrustation must be removed from these specimens. Many are of museum quality. The entire length of this site is, apparently, a National Wilderness or Primitive Area. Federal authorities have confiscated several "for sale" collections and threatened severe fines, claiming the crystals are a "national treasure." A considerable controversy still simmers over collecting in this area. As I understand, surface collecting for one's private collection is okay, but digging or collecting for sale is bad.

*SELENITE—N.M. probability certain. This mineral is evident in almost every county in New Mexico. It is the crystalline form of GYPSUM and might be found at any GYPSUM location. It is extremely soft, easily cleavable, and partially water soluble. It offers a real challenge to the competitive faceter.

SMITHSONITE—probability the best in the U.S. The translucent to nearly transparent variety called HERRERITE was found in at least two mining districts in New Mexico. Best chances are: 1) in the Stevenson–Bennett mine about a mile south of Organ and a small series of prospects about 1/2 mile east of Organ in Doña Ana County, 2) just south of the village of Magdalena in the old Kelly and Graphic mines, the Magdalena mining district of Socorro County. Vast tonnages of gem- and specimen-quality HERRERITE were shipped and milled as zinc ore. Neither mine can be entered at present, but occasional small finds are made on the dumps. Either mine may be open sporadically, but entry is extremely dangerous. Mining was done in fractured limestone, and the mines have been flooded for a long time.

SPHALERITE—N.M. probability certain. Northrop lists a large number of SPHALERITE locations in New Mexico. Unfortunately, most of our SPHALERITE is very dark to nearly opaque, and even the best pieces will yield only small stones. Best chances appear to be: 1) in the Modoc, Organ, and Rincon mining districts of Doña Ana County, 2) all of the many mining districts in the area around Silver City, Grant County, 3) all of the many mining districts around Hatchita and Lordsburg in Hidalgo County, 4) in the Cerrillos mining district of Santa Fe County, 5) all of the many mining districts of Sierra County. Of the above possibilities, I would select the old mines and prospects of the Cerrillos mining district a few miles nearly due north of the town of Cerrillos and just south of the ancient Indian turquoise pit. A second choice would be the old mines in the Hermosa mining district of Sierra County. Both locations seem to yield honey-colored SPHALERITE.

*TURQUOISE—N.M. probability very good. TURQUOISE is not, normally, considered a faceting material. It can, however, be faceted into interesting tablet forms as is done with several other opaque minerals. There are many New Mexico locations. Best chances are: 1) in the Burro Mountains, Eureka, Santa Rita, and White Signal mining districts of Grant County, 2) in the Orogrande mining district of Otero County, 3) in the Cerrillos mining district of Santa Fe County, 4) any copper mining area may, on occasion, produce turquoise. □