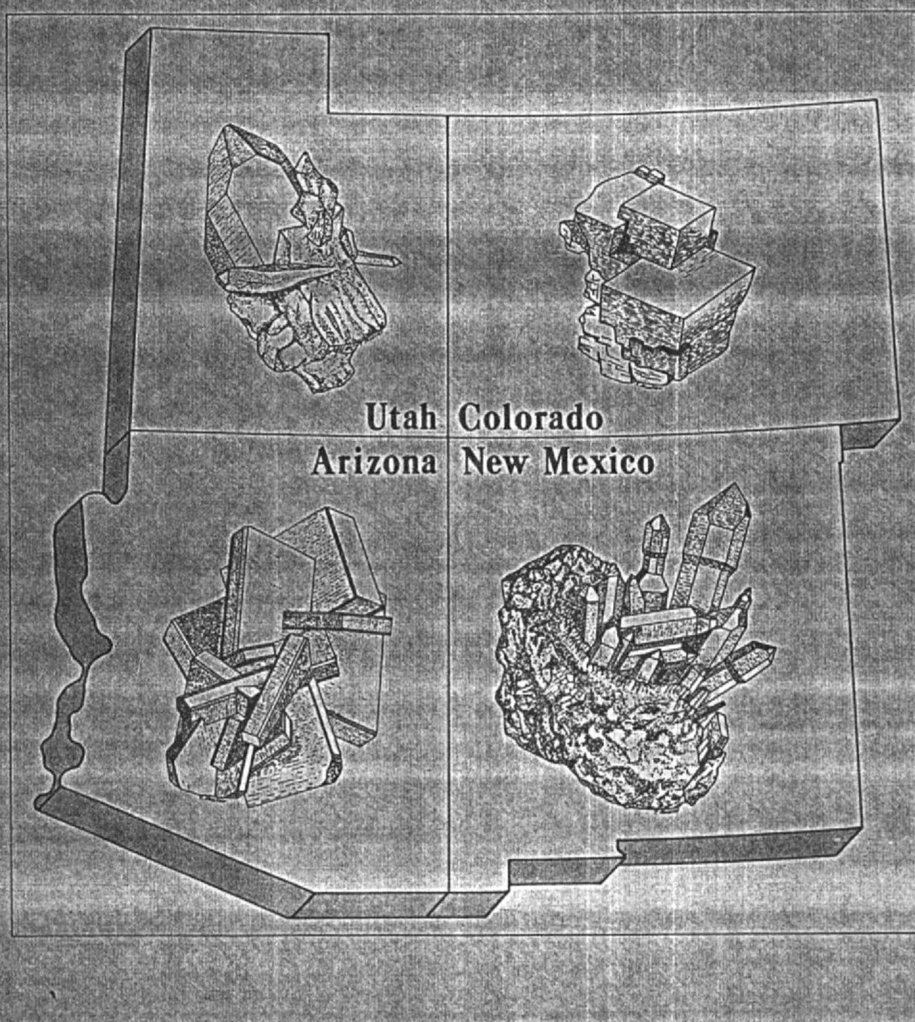
5th annual

NEW MEXICO MINERAL SYMPOSIUM

November 10 & 11, 1984



NMIMT Campus, Socorro, New Mexico

Welcome to

THE FIFTH ANNUAL

NEW MEXICO MINERAL SYMPOSIUM

November 10 and 11, 1984

Weir Hall, Room 120
New Mexico Institute of Mining and Technology
Socorro, New Mexico

sponsored by
New Mexico Bureau of Mines and Mineral Resources
New Mexico Tech Mineralogical Society
Albuquerque Gem and Mineral Club
New Mexico Museum of Natural History
University of New Mexico, Department of Geology

The purpose of the New Mexico Mineral Symposium is to bring together for an exchange of ideas both professionals and amateurs interested in mineralogy. The sponsors hope that the Fifth New Mexico Mineral Symposium will give both groups a forum to present their cumulative knowledge of mineral occurrences in the state. In addition to the formal papers, informal discussions among mineralogists, geologists, and hobbyists should benefit all.

Cover--MINERALS OF THE FOUR-CORNERS STATES. Scepter quartz from Kingston, New Mexico; rhodochrosite from Silverton, Colorado; topaz from the Thomas Mountains, Utah; and barite from Superior, Arizona represent the four-corners states in the cover design by Teresa Muggler.

SCHEDULE

Numbers in parentheses refer to geographic location on index map.

Saturday, November 10

8:00 Registration and coffee and donuts

9:10 Welcoming remarks

9:15 (1) Minerals of the Gold Hill mine, Tooele County, Utah – Les Cubit

9:45 (2) Minerals of Morenci, Arizona - Brian Huntsma

10:30 Coffee break

11:00 (3) Mineralogy of the El Cuervo Butte barite-fluorite-galena deposit, southern Santa Fe County, New Mexico - Robert M. North & Virginia T. McLemore

11:30 (4) Zinc mineralogy of the Hanover area, Grant County, New Mexico - Richard W. Graeme IV & Douglas L. Graeme

12:00 Lunch

1:30 (5) Minerals of the Alhambra mine, Grant County, New Mexico – Ramon S. DeMark

2:00 (6) Mineralization in the Quitman Mountains--Sierra Blanca complex, Trans-Pecos Texas - Jeremy R. D. Setter & John A. S. Adams

2:30 (7) Zeolite occurrences in Colorado and New Mexico - Peter J. Modreski

3:00 Coffee break

3:30 (8) Mineralogy of the Wind Mountain laccOlith, Otero County, New Mexico - Russell C. Boggs

4:00 (9) Black wulfenite from the Mina del Tiro, Cerrillos Hills, New Mexico - Robert R. Cobban

4:30 (10) Red beryls from the Wah-Wah Mountains, Utah - Eugene E. Foord & James E. Shigley

6:00 Sarsaparilla and suds: cocktail party in the Copper Room, Macey Center

7:00 Dinner in the Galena Room, Macey Center, with Special speaker, Dr. Laurence H. Lattman, President of New Mexico Institute of Mining and Technology

Sunday, November 11

9:00 (11) Geology and mineralogy of the La Plata mining district, San Juan Mountains, .Colorado - Vertrees McNeil Canby, Robert M. North & Phillip Fields

9:30 (12) Minerals of the Palm Park barite deposit, Hatch, New Mexico - Travis Cato, Jr.

10:00 Coffee break

10:30 (13) Geology and mineralogy of the Bear Mountains mining district, Socorro County, New Mexico - Robert M. North

11:00 (14) Point of Rocks mesa: new findings - Paul F. Hlava, Ramon S. DeMark & Peter J. Modreski

11:30 (15) The Alice glory hole, Clear Creek County, Colorado - Timothy A. Hanson and William B. Craft

12:00 Lunch

1:00-3:00 Silent auction sponsored by the New Mexico Tech Mineralogical Society

MINERALS OF THE GOLD HILL MINE
TOOELE COUNTY, UTAH

Les Cubit
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An overview of the Gold Hill, Utah, mining district and the mines located there leads into a comprehensive coverage of the Gold Hill mine itself. A brief history of this predominantly arsenic lode will be followed by the location of various minerals within the orebody and their formative relationships. Slides will show many of approximately seventy-five minerals identified at this location. Of particular interest to the collector will be locations of collectible specimens within the "glory hole."

MINERALS OF MORENCI, ARIZONA

Brian Huntsman
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The subject of this lecture is Morenci, Arizona, in general and its minerals in particular. Although a large suite of minerals has come from the Morenci mine, the copper minerals, similar to those from Bisbee, will be discussed. The historical and geographical aspects of the area will be covered. A slide show will accompany the lecture, and there will be time for questions near the conclusion.

MINERALOGY OF EL CUERVO BUTTE BARITE-FLUORITE-GALENA DEPOSIT SOUTHERN SANTA FE COUNTY, NEW MEXICO

Robert M. North and Virginia T. McLemore
New Mexico Bureau of Mines and Mineral Resources
Socorro, NM 87801

Barite-fluorite-galena veins occur along a fault zone in limestones, sandstones, and siltstones of the Permian Yeso Formation and sandstones of the Permian Glorieta Sandstone Member of the San Andres Formation at El Cuervo (Crow) Butte in southern Santa Fe County, New Mexico. The fault dips steeply to the west and trends northeast. Mineralization has been traced for almost three miles along the fault. Barite veins and pods up to 1 ft wide occur throughout the 3-5-ft-wide fault zone. Mineralized veins are common along fractures and bedding planes of Permian rocks adjacent to the fault. A second, unmineralized fault occurs to the west of the mineralized fault and separates the Glorieta Sandstone Member from shales of the Triassic Chinle Formation.

Barite is the dominant mineral, however, fluorite and argentiferous galena are common in pockets and zones within the veins. Other accessory minerals include calcite, quartz, sericite, potassium feldspar(?), and a trace of chrysocolla. The barite is typically white or pink and opaque, whereas fluorite is white, green, or purple and clear to translucent. Specimens of green fluorite fluoresce bluish-purple.

Samples from the deposit contain up to 87.77% $BaSO_4$- Additional samples contain up to 2.31% Pb, 0.01% Zn, 0.22 oz/ton Ag, and a trace of gold (less than 0.02 oz/ton). Analyses of white barite crystals yield 80-328 ppm Pb, 6-12 ppm Cu, 2-4 ppm Zn, <10 ppm Cr, 25-244 ppm Mg, 5 ppm Mn, 34-99 ppm K, 29 ppm Na, 19-23 ppm Y, 1.45-1.59% Sr, and 0.51-1.12% Ca.

The deposits at El Cuervo Butte are similar in emplacement, geology, mineralogy, and chemistry to sedimentary hydrothermal deposits and are analogous in part to Mississippi Valley-type deposits. Deposits that are probably of sedimentary hydrothermal origin are widespread within or near the Rio Grande rift. Examples may be found at Hansonburg, Palomas Gap, and Salinas Peak.

ZINC MINERALOGY OF THE HANOVER AREA
GRANT COUNTY, NEW MEXICO

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Grant County, historically, has been the most important producer of zinc in New Mexico. Within the county, the Hanover area of the Santa Rosa mining district has been the most significant zinc producer. Mining operations in Hanover began near the close of the last century and were suspended in the early 1970's. More than 500,000 tons of zinc were recovered from the 8,000,000 tons of ore that were mined during that period.

Although the primary mineralogy of the area is quite simple, an interesting assemblage of secondary minerals, most notably smithsonite, has been found. This surprisingly common carbonate occurs in several colors. The vivid yellow specimens are among the finest of their kind in the Western Hemisphere.

MINERALS OF THE ALHAMBRA MINE
GRANT COUNTY, NEW MEXICO

Ramon S. DeMark

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The Alhambra mine is located in the Blackhawk district, which lies in the Big Burro Mountains of western Grant County. The minerals of the Alhambra mine form an assemblage that is unique not only to New Mexico but to the United States as well. Initially located by the discovery of silver float in 1881, mining in the district ceased by 1893 due to a decrease in the price of silver. Since that time exploratory, developmental, and mining efforts have been sporadic with negligible silver production.

The Blackhawk district is within the Precambrian Burro Mountains batholith, which is composed primarily of granite with inclusions of gneiss, schist, and quartzite. Many stocks and dikes intrude the batholith. The primary ore-producing vein at the Alhambra mine cuts through quartz diorite gneiss near a large easterly trending monzonite porphyry dike.

The minerals to be discussed were found on the dumps of the Alhambra mine and in stockpiles produced during mining operations that were conducted during the autumn of 1979. Of particular interest at the Alhambra mine is the occurrence of nickel-skutterudite, because the Blackhawk district is the type location for this rare species. Additional species of interest include silver, acanthite, niccolite, erythrite, annabergite, "pitchblende" plus the more common sulfides, and a suite of interesting carbonate gangue minerals.

MINERALIZATION IN THE QUITMAN MOUNTAINS-SIERRA BLANCA COMPLEX TRANS-PECOS, TEXAS

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The Quitman Mountains-Sierra Blanca igneous complex (QMSB) consists of a diverse package approximately 200 km^2 of mid-Oligocene volcanic, granitic, and metamorphic lithologies, which are reasonably well exposed adjacent to Interstate 10.

This mineralization study is part of a detailed petrological and geochemical investigation of the QMSB complex, involving more than 250 whole-rock geochemical analyses and 270 electron microprobe analyses of selected mineral phases.

To a first approximation, mineralization types in the QMSB complex can be grouped on a spatial and temporal basis into three general categories:

1) skarn type. This represents the earliest mineralization in the complex, with capricious amounts of W-Mo, Pb-Zn-Ag, and Be-Sn-Fe-F-(±Ba±Bi±Cu±Nb±Se±Zr±REE). The mineralogy is predominantly an amphibolite facies garnet-magnetite skarn with minor hornfels. It consists of variable amounts of andradite, grossular, magnetite, calcite, epidote, quartz, diopside, wollastonite, vesuvianite, hematite, graphite, fluorite, pyrite, actinolite, tremolite, helvite, nontronite, phenakite, pyrophyllite, wavellite, adularia, chrysocolla, and scheelite. This type of mineralization formed from the ring-fracture intrusion of calc-alkalic to alkalic granitoid rocks with metaluminous phases ranging from diorites, quartz monzonites, syenites to pegniatites. The chemistry of these granitoid rocks together with the older co-magmatic volcanic rocks is suggestive of A-type magmatism (anhydrous, anorogenic, and somewhat alkaline). Crystallization-temperature estimates vary from 620°C to 780°C with $f(0)_2$ at -18. A rare-metal mineralization type is manifested in the pegmatite phase with anomalous amounts of Li-Nb-Ta-Zr-U-Th-Hf-REE. Crude metasomatic-zoning effects are apparent in the skarn as shown by progressive rare-metal and REE enrichment in some of the calcic endoskarns. At the southeastern limit of the complex there are zones of banded Be-Sn-Fe-F mineralization, which are analogous to Australian "wrigglite" skarns.

2) rhyolite-ongonite type. F-Be-U-Sn-(±Cs±Li±Sb±Ta±Tl) mineralization occurs with the high-silica rhyolites in the laccoliths of the Sierra Blanca Peaks. These rhyolites are akin to other mineralized ongonites and topaz rhyolites. The mineralization is mainly fluorite with minor occurrences of beryl and cassiterite and more rare occurrences of gearksutite, ralstonite, and thomsenolite.

3) hydrothermal-vein type. This is extensive throughout most of the QMSB complex and is the latest mineralizing episode. It is intimately associated with the closing stages of a resurgent caldera complex in the northern Quitman Mountains. Pb-Zn-Ag-(±Cu±U±Au?), Fe-Mo, F, and Ba veinings occur in a preferred east-northeast trend. These veins are also superimposed on the skarns resulting in a scanty, retrograded (to greenschist facies) zonation of actinolite, tremolite, calcite, quartz, sericite, and hematite.

Mineralization has been recorded in these veins showing variable and limited ore extent with minor amounts of pyrite, argentiferous galena, sphalerite, chalcopyrite, barite, molybdenite, magnetite, hematite, siderite, goethite, cerrusite, wulfenite, greenockite, torbernite, limonite, calamine, pyromorphite, psilomelane, and chrysocolla. Gangue minerals typically are quartz and calcite with more rare occurrences of tourmaline (schorl variety).

ZEOLITE OCCURRENCES IN COLORADO AND NEW MEXICO

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Well-crystallized zeolites are known from a number of localities in Colorado and New Mexico, mainly in aMyqdules in basaltic to andesitic lavas but also from several other types of geologic environments. Perhaps the best known occurrence, first described in 1882, is in the potassic basalt ("shoshonite") of North and South Table Mountains, Golden, Colo. (Wajdschmidt, 1939, Colo. Sch. Mines Quart., v. 39, 62 p.). Analcime, thomsonite, and chabazite are found here in abundance, plus lesser amounts of natrolite, mesolite, stilbite, scolecite, levyne, cowlesite, gonnardite, garronite, and offretite, and the associated non-zeolite mineral, apophyllite. Nearby, in Lakewood, Colo, an unusual occurrence of crystals of heulandite and stilbite within plant fossils was found in 1982 during housing excavations in the Denver Formation (Late Cretaceous to Paleocene). Here, volcanic-ash-bearing sandstone Contains fossil wood, seeds, twigs, and roots which have been partially or completely replaced by the zeolites (Modreski and others, 1983, Rocks and Minerals, v. 59, p. 18-28). Amygdules in basalt near Wolf Creek Pass in Mineral Co. and Archuleta Co, Colo. (Harmer, 1976, Mineral. Rec., v. 7, p. 272), contain sprays of mordenite, plus heulandite, analcime, natrolite, and the rare bariumzeolite, wellsite. The vesicles are lined with blue celadonite and dark-brown, crystallized balls of nontronite, an iron-bearing clay mineral.

In New Mexico, the most outstanding locality for well-crystallized zeolite minerals is probably in andesitic lavas along the East and Middle Forks of the Gila River; Catron Co. and Grant Co. (Haynes, 1983, N.M. Geology, v. 5, p. 841′-85). Zeolites found here include mesolite, chabazite, stilbite, 'heulandite, analcime, levyne, thomsonite (white, fibrous spheres), and gonnardite (white, compact spheres). Several zeolite species,. including natrolite, tetranatrolite, and analcime; occur as microcrystals in gas cavities of the phonolite sill at Point of Rocks, Colfax Co., N.M. (DeMark, 1984, Mineral. Rec, v. 15, p. 149-156), associated with other sodium-rich and silica-poor minerals.

Other zeolite occurrences in basaltic lava flows include heulandite and white, fibrous mordenite near La Madera, Rio Arriba Co, N.M., and phillipsite near Hunter Mesa, Colfax Co, N.M. In alkalic intrusives, analcime and thomsonite are reported from Wind Mountain, Otero Co, N.M., and natrolite, thomsonite, stilbite, and analcime from South Park, Park Co, Colo.
Natrolite and analcime are reported as alterations of nepheline in carbonatite at Iron Hill, Gunnison Co, Colo, Hlnd stilbite and analcime from altered nepheline in phonolite at Cripple

Creek, Colo. In skarn-type contact metamorphic deposits, stilbite, scolecite, chabazite, and laumontite, plus apophyllite and prehnite, occur at Italian Mountain, Gunnison Co, Colo, and laumontite occurs at the San Pedro mine, Santa Fe Co, N.M. Heulandite crystals and white, fibrous mordenite occur in breccia at the Rex/Smuggler mines, Hillsboro, N.M., and fine-grained leonhardite is abundant in hydrothermaily altered quartz monzonite of the Chalk Cliffs, Chaffee Co, Colo.

In addition to the coarsely crystallized zeolites that are best known to mineral collectors, much more widespread--and economically important--are zeolites that form by post-depositional recrystallization of tuffaceous sediments, particularly from alkaline-lake environments. These zeolites, including clinoptilolite, mordenite, analcime, chabazite, erionite, and phillipsite, are typically very fine-grained but occur in large tonnages that can sometimes be mined for industrial processes that make use of their molecular sieve, ion-exchange, or other properties. Post-depositional recrystallization is a common mode of occurrence for zeolites in Tertiary or Quaternary sedimentary basins in the western states, including Colorado and New Mexico. One prominent example is the Green River Formation (Eocene) of northwest Colorado and adjacent Wyoming and Utah, in which tuffs and oil shale contain abundant analcime, plus local clinoptilolite, mordenite, natrolite, and harMotome. Zeolite deposits in tuffs also include those near Buckhorn, Grant Co, N.M. and near Winston, Sierra Co, N.M.

MINERALOGY OF THE WIND MOUNTAIN LACCOLITH OTERO COUNTY, NEW MEXICO

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The Eocene Wind Mountain laccolith crops out over approximately 2 km^2 in southern Otero County, New Mexico. It is one of several small intrusions that were emplaced as discordant sheets, sills, and laccoliths into Permian and Cretaceous sediments of the Cornudas Mountains area. It consists of an analcime nepheline syenite. Miarolitic cavities in the laccolith contain a suite of uncommon minerals that is similar to the suite found at Mont St.-Hilaire, Quebec, Canada. Most notable is georgechaoite, $NaKZrSi_3O_9 \cdot 3H_2O$, a new mineral related to gaidonnayite, $Na_2ZrSi_3O_9 \cdot 3H_2O$. Georgechaoite occurs as white, twinned, orthorhombic crystals up to 1 mm in size. It is associated with microcline, acmite, nepheline, analcime, catapleiite, monazite, and a Mn-rich chlorite. Other minerals not found directly associated with georgechaoite include chabazite, eudialyte, calcite, thomsonite, and natrolite. It is likely that many other minerals will be found by collectors at Wind Mountain, as well as at some of the other intrusions in the Cornudas Mountains area.

The miarolitic cavities range in size from approximately 1 cm to 3 cm in diameter. The crystals in the cavities are usually small, seldom exceeding 5 mm (for minerals such as microcline, nepheline, and acmite) and commonly only I mm to 2 mm for the rarer minerals. The sequence of formation of the minerals in the cavities is as follows (earliest to latest): microcline, nepheline, analcime, acmite, chlorite, catapleiite, monazite, and georgechaoite. A brief description of some of the species follows.

Analcime has formed in part from the alteration of nepheline and is commonly found as coatings of euhedral crystals replacing nepheline crystals.

Catapleiite is found as small (<1 mm), euhedral, orange to white, hexagonal, tabular crystals. They commonly form rosette-like groups and are perched on microcline or acmite.

Georgechaoite occurs as small (<1 mm), white, twinned, prismatic crystals. They are commonly found growing on either microcline or acmite.

Monazite occurs as small (<1 mm), yellow, prismatic crystals that are commonly perched on acmite.

Nepheline occurs as hexagonal prisms commonly altered, in part, to analcime.

Thomsonite is found as radiating balls of transparent prismatic crystals.

BLACK WULFENITE FROM THE MINA DEL TIRO
CERRILLOS HILLS, NEW MEXICO
Robert R. Cobban

Oxidized base metal veins 2 mi n. of Cerrillos

monzonitic stock intruding older stock & altering it

S. district
1. turquoise in S. district in argillic alteration in concentric zone around stock
2. Cu porphyry
3. base metal veins, NE trend, near vertical Zn Pb Ag wall rock silicate no carbonates

hemimorphite rice smithsonite auricalcite

SW of Hawkeye shaft

BLACK WULFENITE FROM THE MINA DEL TIRO, CERRILLOS HILLS

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The Cerrillos mining district includes perhaps the oldest underground mine in the United States. Mineralization in the southernmost mineralization center of the district is coincident with a mid-Tertiary monzonite with concentric alteration typical of copper porphyries of the southwestern U.S. The three following types of mineralization occur in this mineralization center:
a disseminated copper sulfide deposit lying near the monzonite, turquoise deposits present in argillically altered rock concentric about the monzonite, and late base-metal veins which cut the monzonite.

The Mina del Tiro and parallel veins contain a simple base-metal sulfide suite which has produced a great variety of minerals upon oxidation. Sulfides include sphalerite, galena, pyrite, chalcopyrite, and tetrahedrite. Oxidation products include hemimorphite, aurichalcite, cerussite, plattnerite, wulfenite,
and descloizite.

Particularly unusual are the black color of the wulfenite and common pseudomorphs of plattnerite after cerussite.

GEOLOGY AND MINERALOGY OF THE RED BERYL DEPOSITS IN THE WAH WAH MOUNTAINS BEAVER COUNTY, UTAH

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Although a number of papers have been published on the rare and distinctive red beryls from the Wall Wah Mountains, Utah, only partial geological and mineralogical data have been presented. Our studies have attempted to extend and refine the knowledge of the geology and mineralogy of the red beryl-bearing rhyolite at the Violet Claims and surrounding area in the Wah Wah Mountains.

The host rock varies from rhyolite to alkali rhyolite and contains, by weight, 3.53 to 4.15% K_20, 1.17 to 1.61% Na_2O, and approximately 0.3% F, but no detectable Cl. All the chemical data indicate that the rhyolite is very similar to other topaz-bearing rhyolites in the western USA. The red beryls occur principally along fractures that formed late in the cooling of the rhyolite. The fractures contain black manganese oxides and hydroxides and clay minerals, in addition to the beryls. Some crystals occur imbedded in the rhyolite, and these crystals frequently contain abundant inclusions of quartz and feldspar. The fractures typically are only a few millimeters wide at most and rapidly pinch and swell. The best crystals of beryl are enclosed within a white- to pink-colored mixture of smectite and kaolinite. Bixbyite often forms "seed" cores of the red beryls. The beryl crystals are distinctly color-zoned, and complete chemical data have been obtained for core and rim portions of several crystals. Crystals cut perpendicular to c show cores that are pale- to medium-orange and rims that are burgundy-violet red. "Hourglass" zoning is shown in crystals cut parallel to c. Many crystals show this type of color zonation, but others are all red. The red color of the rim portions of the beryls correlates directly with an increased content of Mn and Ti. Specific determinations for water yielded only approximately 0.2% total water (w/w); this demonstrates that the beryls are essentially anhydrous. Unit cell dimensions were measured for core and rim portions: core -- a 9.229(1)A, c 9.212(1)A; rim -- a 9.234(1)A; c 9.204(3)A. Refractive indices determined for core and rim portions were within the following ranges: = 1.567 to 1.568, w = 1.574. Few beryl crystals are completely free of inclusions of other minerals, but, when they are free of inclusions and also free of flaws, they are spectacular specimens and make excellent and striking gemstones. Most crystals of red beryl are several millimeters to 1 cm long and 1 to several millimeters wide. The largest fine crystal found to date is in excess.of 2 cm in length and more than 1 cm wide. Cut stones are generally a carat or less in weight, but larger stones occasionally have been faceted.

The characteristic features of the red beryl result from its formation within a rhyolite host-rock under low pressure and high temperature conditions in a volcanic environment. A similar trace-element chemistry, for example, Mn, Ti, Mg, Pb, Zr, and others, of both the rhyolite and the red beryl substantiates their genetic relationship. Red beryls occur in "topaz-bearing" rhyolites, a class of silica-rich volcanic rocks that are distinguished by the presence of topaz and the high contents of F and other elements, including Nb, Be, Zr, Mn, Pb, Cs, Rb, Li, and Be. Topaz rhyolites are derived from magmas that originate in the lower portions of the earth's crust in an anorogenic environment. The low pressure, high temperature (about 800°C and less), and low water content of the magma, combined with its relatively high F content, favored release of a gas phase from the rhyolite. The gem-quality beryl then crystallized in cavities, along fractures, or within the rhyolite itself.

GEOLOGY AND MINERALOGY OF THE LA PLATA MINING DISTRICT SAN JUAN MOUNTAINS, COLORADO

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The rugged La Plata Mountains lie on the southwest end of the Colorado mineral belt, southwest of Silverton on the eastern edge of the Colorado Plateau. In 1873, about ten years after the discoveries at Silverton, placer prospectors found uneconomical gold deposits in the La Plata River. Several decades elapsed before the larger lode-gold deposits of the district were discovered, and important discoveries were made intermittently until the late 1930's.

Ore deposits in the district are hosted in Paleozoic and Mesozoic sediments and in diorite-monzonite porphyry sills and dikes of the La Plata laccolith. Gold has been the most important metal produced. The bulk of its production has come from telluride veins and limestone replacements along these veins. Minor production has come from a variety of other deposits: pyrite-base metal veins and replacements, garnet-magnetite skarns, and an interesting, mineralized, svenite stock that contains copper, silver, and minor amounts of platinum-group metals. The veins occupy small fractures related to the uplift of the laccolithic dome. Ore shoots are strikingly controlled by structural changes along strike and dip.

The igneous activity in the area is probably Laramide and, therefore, earlier than volcanic activity in the Silverton area. The ore deposits also are different from those around Silverton and may have formed with their host igneous rocks at greater depths and temperatures. This is supported by the facts that ore shoots are continuous at depth with no mineralogical change and that no wide, boiling-type, alteration haloes surround the deposits.

The authors will discuss the geology and mineralogy of the productive ore deposits and will present fluid-inclusion data on several ores of the district. The region will be discussed in its relation to other mineralized areas of similar structure throughout the West.

MINERALS OF THE PALM PARK BARITE DEPOSIT
HATCH, NEW MEXICO

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The Palm Park mine is located approximately 6 mi northeast of Hatch, New Mexico. It is located on the Upham quadrangle in sections 10, 11, 14, 15, T. 18 S., R. 3 W. The mine can be reached by taking the Hatch exit south from Interstate 25, immediately turning east across the Interstate, and following a dirt road north paralleling the Interstate. This road eventually turns east to end on the west side of the Caballo Mountains. A white zig-zag on the mountain side can be seen from the highway and marks the location of the mine. The claims were originally located in 1925 by J. P. Pinkerton of Hatch and are currently under lease to Barite of America at Deming, New Mexico; the claims are currently inactive.

The principal minerals are barite and fluorite. These occur as replacements and open-space filling in the Fusselman Dolomite. The local structure is a horst in the core of a northwest-trending antiform that plunges to the southeast. Mineral specimens of interest are: quartz with bright to dark red, yellow, orange, brown, and black phantoms; amethyst; barite crystals varying in size to 10 cm; and yellow to yellow-green fluorite crystals.

GEOLOGY AND MINERALOGY OF THE BEAR MOUNTAINS MINING DISTRICT SOCORRO COUNTY, NEW MEXICO

Robert M. North
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The Bear Mountains mining district is located in the Cibola National Forest, T. 4 N., R. 4 W., about 15 miles north of Magdalena. The prospects are located near the head of Cedar Springs Canyon.

The mineralization of the district is found along a fault that cuts La Jara Peak Basaltic Andesite and Hells Mesa Tuff. All prospects and shows of mineralization are located in places where the fault cuts La Jara Peak Basaltic Andesite. The mineralized portions of the fault strike roughly north-south and dip steeply to the east. Hematite alteration is pervasive along the fault. Epithermal copper-antimony mineralization is exposed by two open cuts. The exposed vein varies up to 1 ft wide.

Observed primary minerals include only pyrite, quartz, and calcite. Oxidized minerals include abundant chrysocolla, hematite, tripuhyite ($FeSb_2O_6$), stibiconite ($Sb^{+3}Sb_2^{+5}O(OH)$), and unidentified antimonate. The unidentified mineral has an x-ray diffraction pattern identical to ordonezite ($ZnSb_2O_6$), but it contains no zinc and has copper as a major constituent. The mineral is suspected to be the copper analog of ordonezite. Conichalcite was found in small amounts. Assays showed only as high as 0.75 oz/ton (25.7 ppm) silver and no gold.

The presence of relatively large amounts of antimony suggests that this deposit contained. stibnite and perhaps tetrahedrite as primary minerals. The resulting oxidized products make the mineralogy of this deposit unique in New Mexico.

POINT OF ROCKS MESA: NEW FINDINGS

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The minerals of Point of Rocks mesa in eastern Colfax County, New Mexico, were first discussed at the 3rd Annual New Mexico Mineral Symposium in Socorro in 1982. Updates were presented by DeMark at the 4th Annual New Mexico Mineral Symposium in 1983 and by Hlava, DeMark, and Modreski at the Friends of Mineralogy-Mineralogical Society of America-TucSon Gem and Mineral Society Joint Symposium in Tucson, Arizona, in February 1984. Work is continuing on the many unknowns we mentioned in those talks. The following list will summarize those minerals we have currently identified at Point of Rocks. (Tentative identifications are starred.)

SULFIDES
Galena
Pyrrhotite
Sphalerite
New, unnamed K,Fe-Sulfide

OXIDES
Magnetite
* Birriessite

HALIDES
Fluorite
Villiaumite

CARBONATES, SULFATES, ETC.
Barite
Carbonate-apatite
(Carbonate-fluorapatite)
* Brenkite
Pyrochlore
* Thorbastnaesite

COMMON SILICATES
Acmite
Analcime
Natrolite
Opal
Quartz
Albite
* Microcline
Nepheline
.Pectolite
Sodalite

EXOTIC SILICATES
Eudialyte
Lorenzenite
Neptunite
Polylithionite
Serandite var. Schizolite
* Tundrite
* Na,Zr-Silicate (Catapleiite?)
Kupletskite
Mangan-neptunite
Paranatrolite
* Rosenbuschite
Tetranatrolite
Vishnevite
Unknown Silicates: at least 6

THE ALICE GLORY HOLE

CLEAR CREEK COUNTY, COLORADO

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For many years the Alice glory hole has produced fine miniatures and cabinet specimens of pyrite and chalcopyrite, but, until recently, the spectacular occurrence of fine gold crystals had gone unnoticed.

The Alice glory hole is located in the front range of the Rocky Mountains, in the north-central part of Clear Creek County, approximately 30 miles west of Denver. It is situated in the Alice-Yankee Hill mining district at an elevation of 10,300 ft in sec. 3, T. 3 S., R. 74 W., as shown on the Empire, Colorado quadrangle. The mine can be reached easily by auto from Idaho Springs by traveling west on 1-70 for 2 1/2 mi to the Fall River exit, then north 8 1/2 mi to Alice, and then west 1/2 mi to the glory hole.

Minerals that occur as specimens of interest to collectors are barite, chalcopyrite, ferberite, gold, pyrite, quartz, siderite, and scheelite. These minerals have four intimate phases, three of which contain Cu, Pb, Bi, S and the fourth contains Ag, Cu, Pb, Bi, S. Minerals of lesser importance are bornite, biotite, chalcanthite, chalcocite, covellite, malachite, sphene, and iron oxides.

The Alice orebody has been developed by both open-pit and irregular underground workings. Most of the underground workings, especially those below the pit floor, are inaccessible because they are flooded and collapsed. The glory hole is accessible by climbing down from the eastern edge of the pit.
The glory hole is suffering decay; extreme caution should be used when entering it and while collecting there.