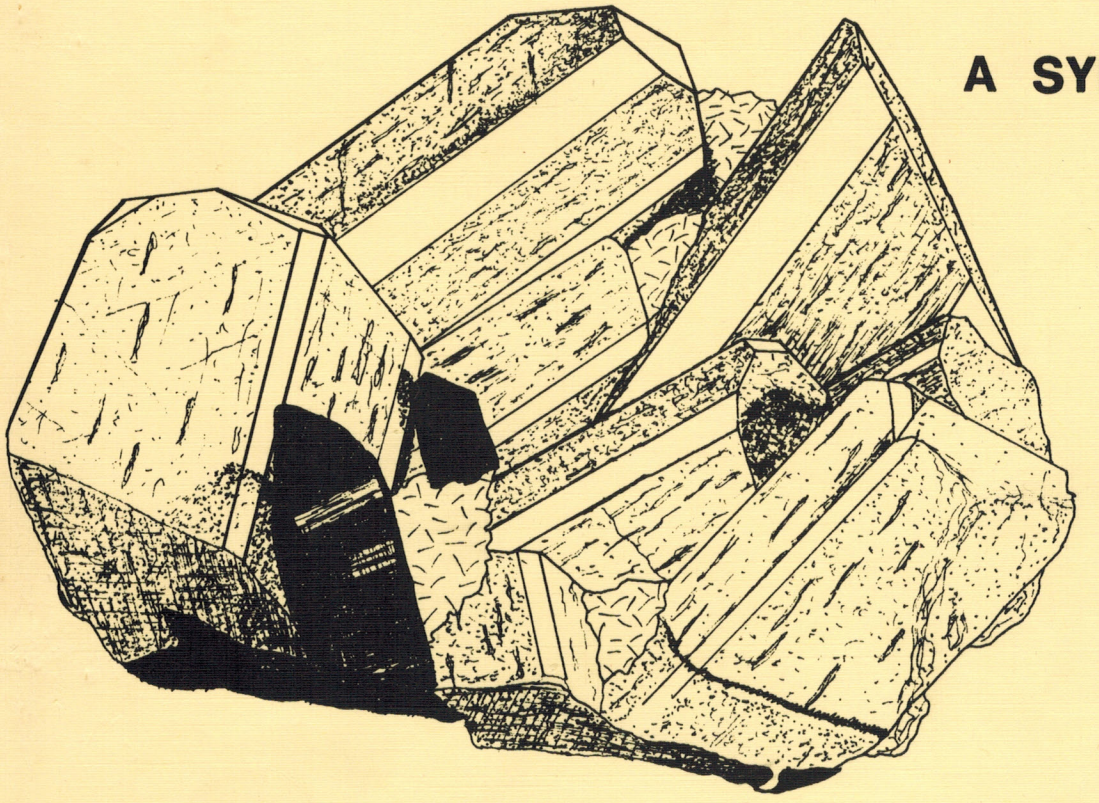
RECENT ACTIVITIES AT ROCKY MOUNTAIN MINERAL LOCALITIES

A SYMPOSIUM



Sponsored by:

FRIENDS OF MINERALOGY

COLORADO CHAPTER

SEPTEMBER 15, 1985

Held in conjunction with
DENVER COUNCIL OF GEM AND MINERAL SOCIETIES
18th Annual Gem and Mineral Show
Denver Merchandise Mart
Denver, Colorado

RECENT ACTIVITIES AT ROCKY MOUNTAIN MINERAL LOCALITIES

A SYMPOSIUM

PROGRAM

1:05	INTRODUCTION	Jim McGlasson
1:15	WHATS "NEW" IN COLORADO MINING AND ASSOCIATED MINERAL SPECIMEN PRODUCTION	Keith Williams
2:00	MINERALOGY AND PARAGENESIS OF 'POCKET CLAYS' AND ASSOCIATED MINERALS IN COMPLEX GRANITIC PEGMATITES, SAN DIEGO COUNTY, CALIFORNIA	Eugene E. Foord Harry C. Starkey Joseph E. Taggart
2:30	RECENT MINING ACTIVITIES IN THE COLORADO SAN JUANS	Barbara L. Muntyan
3:00	LITHIUM PEGMATITES OF THE SOUTHERN ROCKY MOUNTAINS WITH SPECIAL EMPHASIS ON THOSE IN COLORADO	Mark I. Jacobson
3:30	THE MINERALS OF THE POINT OF ROCKS PHONOLITE SILL, COLFAX COUNTY, NEW MEXICO	Peter J. Modreski Paul F. Hlava Ramon S. DeMark

WHATS "NEW" IN COLORADO MINING AND ASSOCIATED MINERAL SPECIMEN PRODUCTION

September 1984 to September 1985

Keith Williams

P.O. Box 1599
Idaho Springs, CO 80452

Despite continued economic setbacks within the hardrock mining industry and extreme limited ore production, numerous areas within the state have continued to generate excellent mineral specimens. Several of the mining operations that have produced specimens for the past 20 to 30 years have most recently shut down. Reopening seems to be based solely on economics and recoverability of high-grade ore along with increased precious metal prices.

The following listing and descriptions of operations and associated specimen production is in no way complete. This grouping is intended to mention those localities most familier to all and only briefly include weekend collecting finds by fellow mineral collectors.

Three major gold-silver mining properties were officially closed this past fiscal year. Included are 1) In March all remaining residents of company owned homes in Gilman were evicted. A few miners remain in the area of Gilman, including Redcliff and Minturn. Consequently, on a sporadic rate some pyrite is being

collected from the Eagle Mine. 2)Also in March, Standard Metals closed the Sunnyside Mine in Silverton. Most recently, as of August 30th an apparent sale of the mine to Echo Bay Inc. of Edmonton, Alberta has been anounced. High-grading of gold from the mine is said to have cost Standard Metals nearly $2 million per year of operation. One local high-grader was imprisoned last summer when caught with nearly 30 ounces of high-graded gold. It will be interesting to see if Echo Bay Inc. can stop the looting. Since the March shut down several lots of gold have been made available for sale. To my knowledge the best specimens remain in the Silverton area. 3) During the first week of February, 96 employees were laid off from the Bulldog Mine in Creede. Eighteen miners remain, doing a minimum of mining and maintainence work. Prior to the shut down a magnificent vug nearly 6 feet high by several feet wide generated about 50 quality barite crystal groups. Individual crystals to 8 inches, some showing double terminations, were found on matrix plates of to 24 inches across and weighing as much as 75 pounds. Unfortunately most of the specimens are quite large. All the good quality, small cabinet specimens were recently purchased; however, several large plates remain in Creede.

Continued work in the Equity Mine area some 6 miles north of Creede has apparently paid off. Underground mine development started last summer, included core drilling and drifting. On August 15th it was announced that a major ore body was encountered - details are obviously being kept quiet. Several discus-

sions with local miners on the property, indicate that the rock looks good; and that the direction of mining is towards the old Amethyst and OH Veins of the Commodore mines. As yet, there have been no significant specimens to come on the market.

LEADVILLE DISTRICT:

Work is continuing at Asarco's Blackcloud Mine on a somewhat slow production schedule. Early last October a few barites, some showing an excellent diamond pattern zoning, were found with associated galena and native gold. Approximately 25 specimens were available from two sources. These barites were collected from the 5-1 stope of the old Irene section of the Blackcloud Mine. Several barite crystals were 1.5 inches across on matrix with 1/4 inch galena cubes and micro crystallized gold. Additionally, dolomites, barites from the 30-3 stope, pyrites, and unusual twisted siderites have been coming out at a sporadic rate.

SAN JUAN DISTRICT:

Bullion King Mine - near Silverton:

This small isolated property has most recently generated some unusual long opaque quartz scepters. One local miner has collected about 50 specimens since last September. Included are plates 6 to 8 inches across with individual quartz scepters to 5 inches.

Campbird Mine:

Underground mine development continues in the east Campbird presently. The mill is running about 28,000 tons of dump rock from the Revenue Mine out of Yankee Boy Basin. Most of the milling should now be completed. Inspection of the dump rock indicated some rich zones of tetrahedrite with some small pyrite and galena crystals.

Tomboy Mine:

Sources inform me that a good lot of "significant" crystallized galena on matrix will be available later this fall. Individual crystals to 1/2 inch across have been found.

Bandora Mine:

In late September and October of last year T. Rosemeyer and R. Stoufer of Ouray, Colorado collected some most unusual specimens of cerussite and anatase on quartz. The cerussite crystals were as much as 1/8 inch across on matrix; the anatase crystals were micros but extremely sharp. Twenty to thirty good specimens were collected.

FRONT RANGE

Douglas Mountain:

Located near the county lines of Jefferson and Gilpin Counties near the intersections of North Clear Creek and Clear Creek off

Clear Creek Canyon a new road cut produced some very significant dark brown garnets. Most are floater-like crystals, some are in small groups showing complete trapezohedron forms. Approximatly three to four hundred specimens were collected by three different collectors.

Patch Mine:

A minimum of work continues at the Glory Hole Mine. Some good pyrites, galenas, quartzs, and sphalerites have continued to be collected by the local geologist on the property. No significant finds have been made as yet. In October and November access was made to the underground workings of the Karsen Vein production stope. By use of ropes, several good pyrites and chalcopyrites were collected.

Idaho Springs:

Moritz Mining continues gravel production at the west end of the Idaho Springs I-70 tunnel on the east edge of town. The recovery unit continues to collect 5 to 11 ounces/month of gold from the gravels of this small placer operation.

Gilson Gulch, Franklin Mine:

No new specimens have surfaced since the selenites and a few sphalerites with tetrahedrite were collected last October. An anouncement in April indicated a major ore body, specifics were not given, had been discovered. As yet, no ore has been produced and no new mineral specimens have surfaced.

STONEHAM, WELD COUNTY

Persistence and hard work paid off for Luke and Kathy Westervelt on the weekend of May 4 and 5th of this year. While collecting with the property owners permission, opened an enormous vug of excellent calcite-coated barite specimens. Mechanical removal of the calcite reveals gemmy, sharp, undamaged, blue-green, thick tabular crystals. Collecting on two additional weekends generated superb crystals of up to 3 inches on plates of up to 16 inches across. Although similar specimens have been recovered from this location over the past 40 years, these may well represent the finest matrix barites exhibiting the best color and luster. A most unusual and significant matrix find.

MINERALOGY AND PARAGENESIS OF 'POCKET CLAYS' AND ASSOCIATED MINERALS IN COMPLEX GRANITIC PEGMATITES, SAN DIEGO COUNTY, CALIFORNIA

Eugene E. Foord

U.S.Goelogical Survey
Box 25046, Federal Center, M.S. 905
Denver, CO 80225

Harry C. Starkey

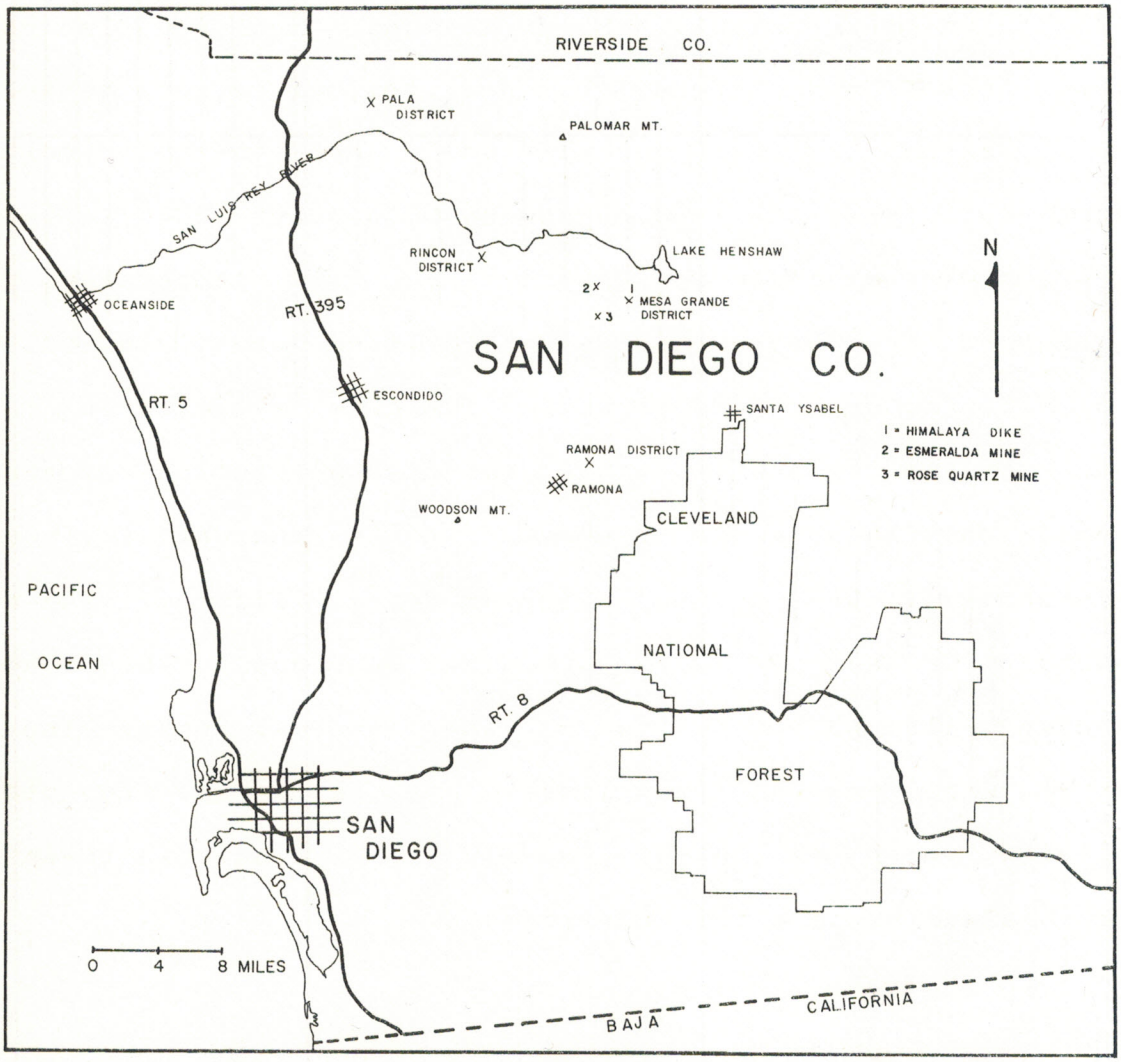
1636 South Yarrow Court
Lakewood, CO 80226

Joseph E. Taggart

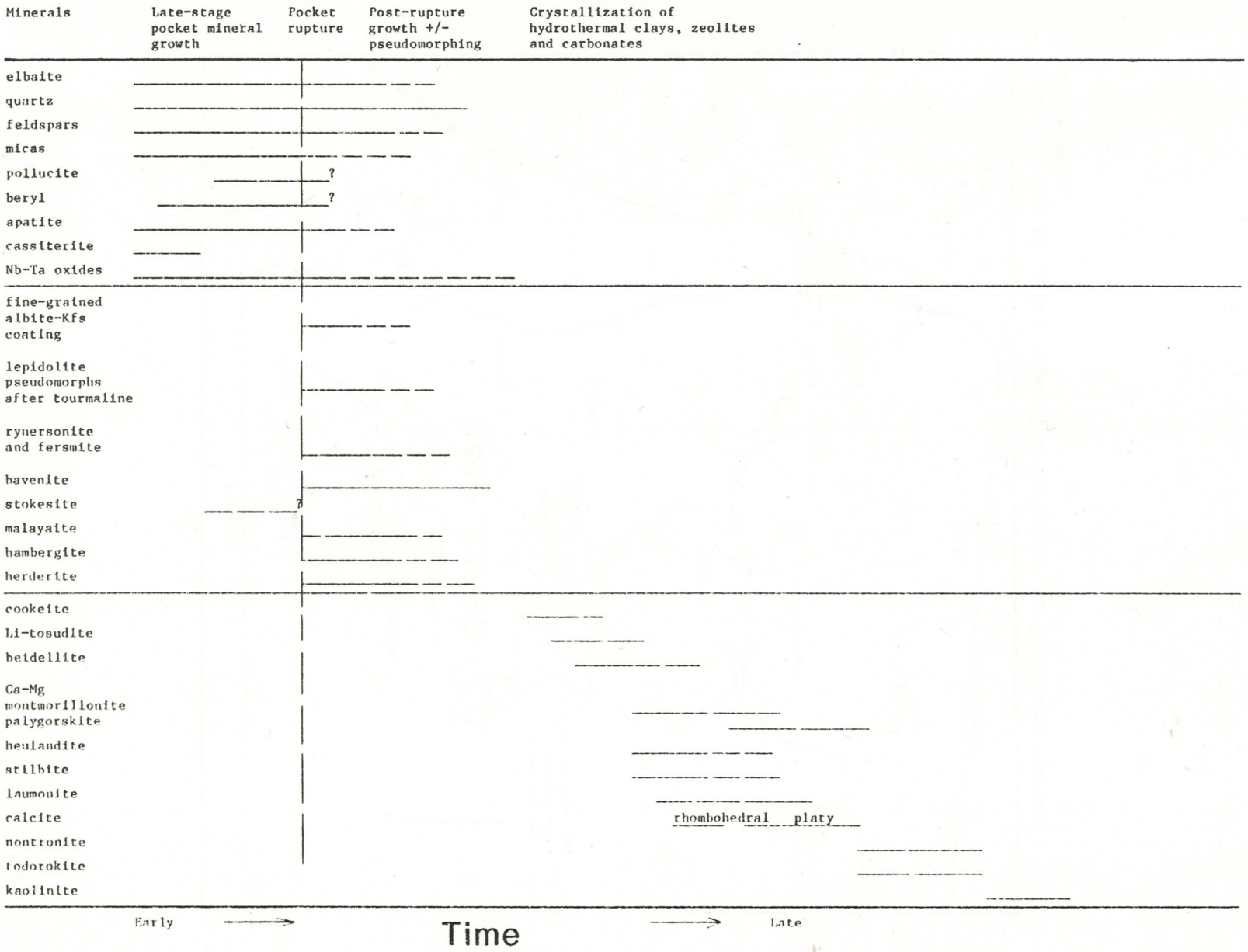
U.S.Geological Survey
Box 25046, Federal Center, M.S. 928
Denver, CO 80225

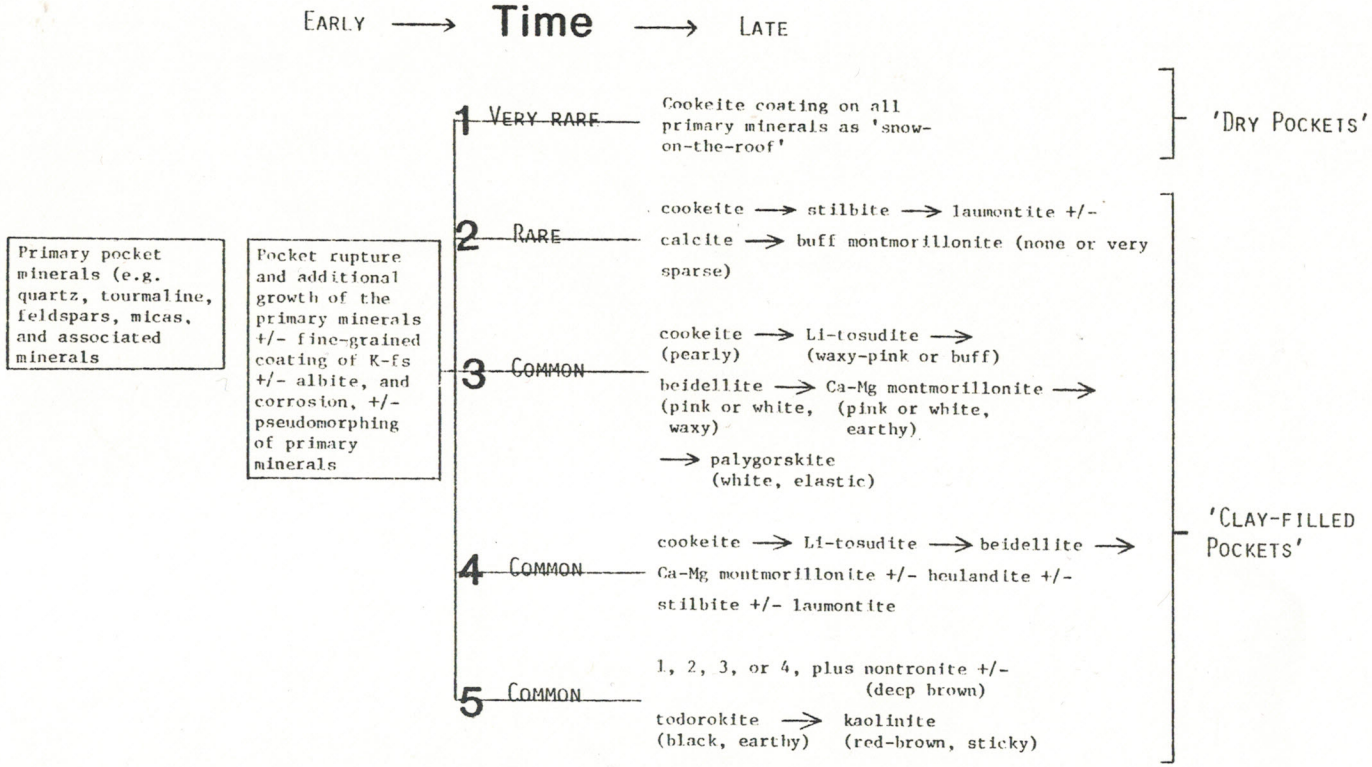
The Cretaceous gem- and specimen-bearing complex granitic pegmatite-aplite dikes and bodies emplaced into the Southern California batholith locally contain fractures and cavities (refered to as 'pockets'), which usually are filled with clay and other minerals. Within some pockets, the contained minerals have only thin coatings of cookeite or sericite. Other pockets contain pseudomorphs of lepidolite after elbaite, bavenite after beryl, clays and micas after spodumene and rynersonite plus fersmite after stibiotantalite. Most pockets contain fragmented primary minerals, which are enclosed in a matrix of Ca-Na zeolites; white, pink or red Mg-Ca (with or without Mn) clay minerals, and rare calcite. The most prevalent minerals are

stilbite, laumontite, cookeite, Li-tosudite, beidellite, Mg-Ca montmorillonite, palygorskite, and calcite. Sparse amounts of nontronite, heulandite, and todorokite have been identified. Pseudomorphous minerals were deposited under nearly-closed system conditions at temperatures similar to those that prevailed during pocket formation, whereas the zeolites, clays, and carbonates were deposited in open pockets under hydrothermal conditions (temperatures ranging from about 400°C to about 150°C) after the primary pocket minerals had crystallized. The temperature range is inferred from known mineral stabilities and fluid inclusion data. Paragenetic relationships indicate a decrease in the amount of Na relative to Ca as crystallization of zeolite minerals continued, and a decrease in Li and Al followed by enrichment of Ca, Mg and Si for layer silicates. The major amounts of Ca and Mg were probably provided by hydrothermal exchange with gabbro-norite or tonalite host rocks. The last mineral deposited in the pocketa is red-brown, iron-stained kaolinite, which is present locally and may indicate transition from an alkaline to acidic environment.



Location map of major pegmatite districts in San Diego County, California.


Minerals
Late-stage pocket mineral growth
Pocket rupture
Post-rupture growth +/- pseudomorphing
Crystallization of hydrothermal clays, zeolites and carbonates
elbaite
quartz
feldspars
micas
pollucite
beryl
apatite
cassiterite
Nb-Ta oxides
fine-grained albite-Kfs coating
lepidolite pseudomorphs after tourmaline
rynersonite and fersmite
bavenite
stokesite
malayaite
hambergite
herderite
cookeite
Li-tosudite
beidellite
Ca-Mg montmorillonite
palygorskite
heulandite
stilbite
laumonite
calcite
rhombohedral
platy
nontronite
todorokite
kaolinite
Early
Time
Late



Note- In any of the five assemblages, not all minerals listed may be developed. Herderite and/or hambergite may be present in all of them and pre-date deposition of cookeite.

RECENT MINING ACTIVITIES IN THE COLORADO SAN JUANS

Barbara L. Muntyan

6978 Wapiti Court
Boulder, CO. 80301

Introduction

Large-scale commercial mining has come to a virtual halt in the San Juan Mountains of Colorado in recent years. The Idarado Mine, the Camp Bird, the American Tunnel -- the great producers of the past -- have all closed, as have most of the smaller operations in the area.

Nevertheless, there has been a considerable amount of small-scale activity in the San Juans during the last five years, some for the specific purpose of recovering mineral specimens for the collectors' market. In fact, several mines in the San Juans have produced in quantity mineral specimens of high quality and aesthetics during the last several years.

This paper will review activities at four mines. Three are located in Ouray County: the Mountain Monarch, the Grizzley Bear, and the Senorita. The fourth mine, the Bandora, is located in San Juan County. In addition, we will briefly review other recent specimen retrieval in several smaller operations in these two counties.

The Mountain Monarch/Michael Breen Mines

Located about 2 miles east of State Highway 550, up Engineer Pass, the Mountain Monarch/Michael Breen complex is composed of more than a dozen claims, both patented and unpatented. The mines were begun in the 1890s and have shipped both silver

and lead ore intermittantly over the years. The two mines are controlled by the Standard Metals Corporation, operators of the American Tunnel near Silverton, and are maintained under concession by a group from Ouray.

About five years ago, some fine rhombs of rhodochrosite perched on clear quartz crystals began appearing on the market. These early specimens were labeled as coming from the "Mickey Breen Mine," the local nickname for the Michael Breen. It is highly likely, however, that these specimens (along with more recent production) has all come from the main adit of the Mountain Monarch Mine; all later material has been so labelled.

In the summer of 1982, Harvey Gordon and several others obtained a lease on the Mountain Monarch from individuals in Ouray who control the mine, for the specific purpose of recovering rhodochrosite specimens. Gordon's group, with the assistance of the Nordlander brothers of Ouray, worked the mine for several months and recovered several hundred rhodochrosites on drusy quartz matrix. Unfortunately, only one major vug containing a few larger pieces was encountered, and no further specimen collecting on a serious scale has taken place since 1982.

During the winter of 1983-84, a major snowslide severely damaged buildings and equipment on the property. Several major cave-ins also now block the main haulages in both the Monarch and the Breen. Thus it is unlikely that further specimen collection will take place unless major clean-up work is first undertaken.

MINERALS:

1) Major Species:

Rhodochrosite -- rhombs up to 2" on edge, baby pink to strawberry pink.

Quartz -- druses and individual prisms to 1.5" long, clear to slightly milky.

2) Minor Associations:

Chalcopyrite -- small, bright twinned crystals to ¼", sprinkled over both quartz and rhodochrosite on many specimens.

Galena -- small, simple cubes to about ½", often in association with sphalerite. On white crystalline quartz matrix.

Sphalerite -- small, lustrous black crystals to about ½" on edge, often with galena.

Fluorite -- very rare. Pale green cubo-octahedrons in association with small rhodochrosite rhombs,

Pyrite -- small bright cubes to ¼", rarely slightly larger. Uncommon.

Grizzley Bear Mine

The real Grizzley Bear Mine can only be reached by a difficult pack trail up Bear Creek Canyon south of Ouray. Several years ago, a group from Ouray decided to drive a tunnel from the south wall of the Amphitheatre east of Ouray through the mountain to intersect the ore body of the Grizzley. The theory was that this might become a paying mine if economic access was created. The tunnel was to be named the Zanett Tunnel and was to run a distance of 6,400ft; when money gave out and work stopped, the tunnel had been driven about 4,300 ft. and no ore had been encountered. All recent specimens have come from the Zannet Tunnel, and not from the Grizzley Bear Mine itself.

While the tunnel was being bored, several highly mineralized zones were cut which yielded many fine specimens. About 3,300ft. from the portal an area of intensely green chloritic quartz vugs was opened; these contained intergrown clusters of bright pink rhodochrosite rhombs sprinkled over the green quartz, making very striking specimens.

Further back in the tunnel, a large tube yielded plates of rhodochrosite rhombs to 2"+ on white drusy quartz. Some of the plates measured more than 14" across. Unfortunately, the tube

was in a watercourse, and many of the rhodochrosites were somewhat etched as a result.

Near the face of the tunnel was another series of vugs, one of which produced quartz clusters of stout habit, in association with light green fluorite cubo-octahedrons to 1". Minor pyrite and rhodochrosite were also associated. Several other vugs in this zone yielded large plates of white quartz crystals with minor sulfide associations. Also in the same area, a number of pyrite and quartz specimens, with pyrite crystals to ¼", are associated with minor hematite.

If work resumes on the Zanett Tunnel, it may be hoped that additional mineralized zones will be encountered and some more good quality specimens will be recovered.

MINERALS:

1) Major Species:

Rhodochrosite -- rhombs to 2"+ on edge, often etched. Smaller crystals are sharp, strawberry pink, often on chloritic quartz plates.

Quartz -- druses from pale to medium fern green; large single crystals to 2" are milky white and barrel-shaped; other quartz crystals are long, slender, clear prisms.

Fluorite -- Pale green, rough octahedrons formed from built-up cubes to 1" on edge, typically on milky quartz crystal plates.

2) Minor Associations:

Pyrite -- bright small cubes to ¼", with clear quartz.

Galena -- small crystals.

Sphalerite -- small, dark crystals.

Hematite -- forms needle inclusions in some quartz.

Calcite -- rare; forms brown scalenohedronal crystals to 2". Often a minor druse crusting fluorite crystals and rhodochrosites.

The Senorita Mine

The Senorita Mine overlooks Highway 550 from a hillside north of Ouray on the Cutler Creek road. It has been worked intermittantly since the turn of the century.

Very large, white, tabular barite crystals perched upright on clear quartz druses form distinctive specimens from this mine. A number of excellent specimens have been recovered during the last several years; some specimens had barite crystals to 2½" on edge, making them among the largest to come out of the San Juans.

In addition to barite, several specimens of small quartz pseudomorphs after scalenohedral calcite have also been collected, ranging in size to almost ½". Minor selenite and unreplaced calcite, as well as minor azurite and malachite have also been reported. The latter two species result from decomposition of chalcopyrite at the mine. It is the barite, however, which is truly distinctive and desirable from this mine.

MINERALS:

1) Major Species:

Barite -- bone white, tabular crystals to 2½".

2) Minor Associations:

Calcite -- small botroidal clusters on quartz and barite. Also quartz pseudomorphs after scalenohedral, double-terminated calcite.

Quartz -- clear druses on black fine-grained matrix, which imparts a bluish, greyish, or chocolate brown coloration.

The Bandora Mine

The Bandora Mine is located in San Juan County, about 8 miles northwest of Silverton, along South Mineral Creek. During the summer of 1981, some professional exploration work took place here. At the time, some excellent specimens of quartz, chalco-

pyrite, and sphalerite were recovered. Since that time, several major collecting projects have yielded several hundred more fine specimens, ranging from outstanding thumbnails to very large plates 10-12" across. Crystal size varies up to 2" on edge for all some species

The Little Todd Vein, which produced the recent specimen vugs, is a vertical-trending zone which is quite narrow. Without blasting and considerable additional development work, further specimen production would appear to be almost impossible.

Many specimens bear a marked similarity to the fine chalcopyrite and sphalerite specimens from the Camp Bird which were available in the early 1970s. The chalcopyrites, many twinned and up to 2" on edge are very lustrous. Sphalerite occurs as very bright black single crystals to 3/4"+ on edge, and in clusters to 2½" across. Quartz crystals occur both as clear to slightly milky prisms to 3", with a few pale amethyst crystal clusters found in one zone.

Pyrite and galena cubes each occur as minor accessory minerals. In a remote part of the mine, cerussite crystals of very slender jackstraw habit have been reported, probably formed as a result of the decomposition of galena. Some individual crystals are as long as 2". Other cerussite crystals are more blocky in habit, are pale golden, and form up to about ½" in length.

MINERALS:

1) Major Species:

Chalcopyrite -- crystals to 2", many twinned. Very bright, high quality.

Sphalerite -- crystals typically to ½"; a few to 3/4"+. Jet black, mostly untwinned.

Quartz -- long, slender prisms to 3". Some pale amethyst clusters, darker at base and paling to colorless at the tips (reverse of the Argentine Vein, Idarado Mine amethysts).

2) Minor Associations:

Galena -- tiny, dull grey cubes, sometimes altering to anglesite.

Pyrite -- tiny, bright cubes often growing on the bottom side of chalcopyrite crystals; sometimes in association with sphalerite.

Cerussite -- slender needles; small, brilliant honey-color crystals. Formed as an alteration product from galena.

Barite -- Rarely; small white bladed rosette on quartz.

OTHER RECENT SPECIMEN RETRIEVAL

Although the four San Juan region mines discussed above have provided by far the most quantity of fine specimen material in recent years, there have also been less extensive collection at a number of other mines, including the following:

The Ruby Mine, San Juan County -- brilliant red hubnerite blades on white quartz matrix.

The Osceola Mine, San Juan County -- tan, scalenohedral calcites; large quartz plates; small sulfide associations.

The Longfellow Mine, San Juan County -- fine enargite groups with crystals to almost 1".

The Crystal Cave, Ouray County -- quartz casts on and after calcite.

The Ohio Mine, Ouray County -- milk-white quartz crystals to 6", in large plates. Small production but outstanding specimens.

The Portland Mine, Ouray County -- many specimens of lime green sphalerite, bright small pyrites, cream-color calcite scalenohedral crystals on clear quartz clusters.

LITHIUM PEGMATITES OF THE SOUTHERN ROCKY MOUNTAINS WITH SPECIAL EMPHASIS ON THOSE IN COLORADO

Mark Ivan Jacobson

1350 East Easter Ave.
Littleton, CO 80122

Lithium-bearing pegmatites of the southern Rocky Mountains have many similarities and only a few differences. Two different age groups are present, the younger Silver Plume age, 1.39-1.47 billion years old and the other of Boulder Creek age, 1.68-1.75 billion years old. The Silver Plume-aged group of lithium pegmatites are made up of the Harding Mine group of pegmatites (Harding Mine), Taos County, New Mexico; the Rociata District pegmatites (Pidlite pegmatite), Mora County, New Mexico; the Quartz Creek District (Brown Derby pegmatite), Gunnison County, Colorado; the Chief pegmatite, Fremont County, Colorado; the Meyers Quarry pegmatite, Fremont County, Colorado; and the Bald Mountain Tourmaline Prospect pegmatite, Clear Creek County, Colorado. The Boulder Creek-aged lithium pegmatites are in the Crystal Mountain District (Kings Kanyon pegmatites), Larimer County, Colorado.

Geologic ages for these lithium-bearing pegmatites are known only from the Harding Mine pegmatite and the Brown Derby Mine pegmatite. The Harding Mine pegmatite has had extensive dating done on different minerals and mineral assemblages. These suggest a

1.38 to 1.42 billion year age of crystallization of the pegmatite. The Brown Derby pegmatite has also had a suite of different minerals age dated, indicating an approximate 1.4 billion year old age. Although none of the large, zoned pegmatites in the Eight Mile Park District has been age dated, the granite at Royal Gorge has been dated as being 1.68 billion years old. Heinrich (1948) argued from reasons of pegmatite zonation that the Eight Mile Park District pegmatites were derived from the granite at Royal Gorge. The Chief pegmatite, Bald Mountain Tourmaline Prospect pegmatite and Crystal Mountain District pegmatites have not been dated. But from mineralogical and internal zonation similarities the Meyers Quarry pegmatite, the Chief pegmatite, and the Bald Mountain Tourmaline Prospect pegmatite are possibly 1.4 billion years old, whereas the Crystal Mountain District pegmatites because of their strong mineralogical and internal zonation similarity to the southern Black Hills pegmatites, may possibly be 1.68 billion years old.

Other undescribed lithium-bearing pegmatites may be present in the Micanite District, Fremont County; the Holy Cross wilderness area, the Needle Mountains, Ouray County, and the Mosquito Range.

The lithium minerals in the Crystal Mountain District are the lithium phosphates - lithiophilite, triphylite, and amblygonite-montebrasite, spodumene, and lepidolite. Although colored tourmaline has not been found, since black tourmaline is fairly common in the district there is a high probability that it will

be found in the future. The rare mineral petalite, although not found in Colorado may also be found eventually in Colorado since it has been found in the Owl Creek Mountains of Wyoming. Eucryptite, an alteration mineral of spodumene will probably also be found in the Crystal Mountain District.

The mineralogy of the Brown Derby Mine pegmatites, The Chief pegmatite, the Bald Mountain Tourmaline Prospect pegmatite, and the Meyers Quarry pegmatite is similiar. All four pegmatites contain colored tourmaline and lepidolite in coarse-grained books as well as fine grained masses. The first three all contain topaz and rose muscovite. Amblygonite-montebrasite and natro-montebrasite have been found in the Quartz Creek District (Bazooka pegmatite) and in the Meyers Quarry pegmatite.

What future hope is there for gem-pocket colored tourmalines to be found in Colorado? Not very good but the best candidate would be either the Chief pegmatite (where very dark green gemmy tourmaline of very small size has been found) and the Bald Mountain Tourmaline Prospect pegmatite and possibly a pegmatite in the Crystal Mountain District.

THE MINERALS OF THE POINT OF ROCKS PHONOLITE SILL, COLFAX COUNTY, NEW MEXICO

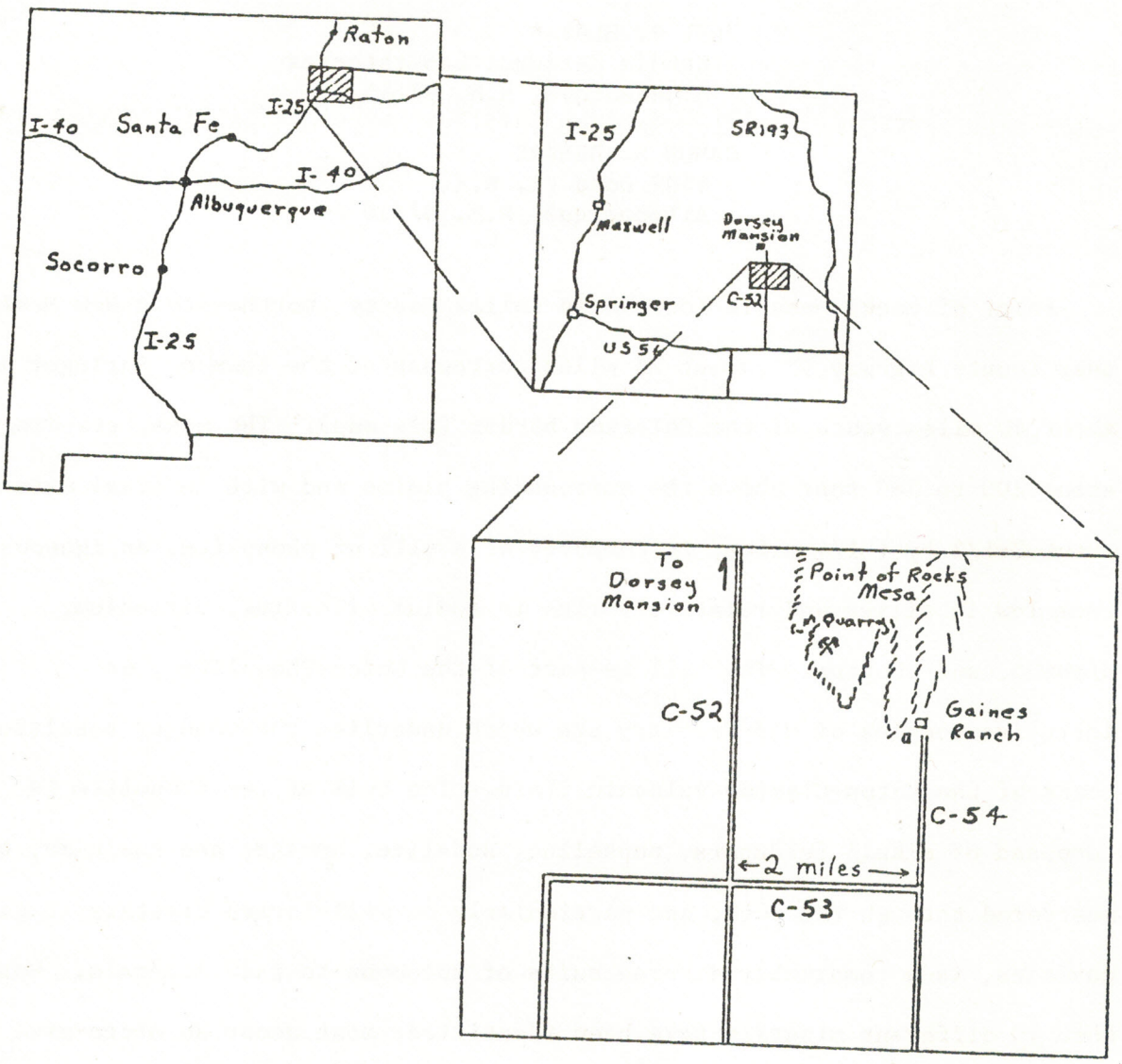
PETER J. MODRESKI
U.S. Geological Survey
Box 25046, Federal Center, M.S. 922
Denver, Colo. 80225

PAUL F. HLAVA*
Sandia National Laboratories
Albuquerque, N.M. 87185

RAMON S. DEMARK
6509 Dodd Pl. N.E.
Albuquerque, N.M. 87110

Point of Rocks Mesa is located in Colfax County, northeastern New Mexico, near county highway 52, about 25 miles northeast of the town of Springer and about 40 miles south of the Colorado border (see map). The mesa, standing about 200 to 500 feet above the surrounding plains and with an areal extent of about 2-1/2 by 1-1/4 miles, is composed of a sill of phonolite, an igneous rock low in silica and relatively rich in sodium, fluorine, zirconium, niobium, and thorium. The sill is part of the Chico Phonolites, an intrusive complex of mid-Tertiary age which underlies the younger basaltic rocks of the Raton-Clayton volcanic field. The bulk of the phonolite is composed of alkali feldspars, nepheline, sodalite, acmite, and analcime, but scattered through the rock, and particularly as well-formed crystals in gas cavities, is a remarkably diverse suite of uncommon to rare minerals. More than 40 different minerals have been identified; most occur as micro-size crystals (about 0.01 to 1 mm), but a few are as much as 1-2 cm in maximum size.

*Work performed at Sandia National Laboratories, supported by the U.S. Department of Energy under Contract No. DE-AC04-76DP00789.



Location Map of Point of Rocks Mesa, New Mexico; from DeMark, 1984, Mineral. Record v. 15, p.150.

One of the first unusual minerals to be identified here was the rare, water-soluble mineral villiaumite, NaF. It is fairly common at Point of Rocks as pink to purplish octahedral crystals or anhedral patches, as much as 1 cm in size. Abundant minerals lining the vugs include acmite, as dark green or black-appearing needle-like prisms up to a few millimeters in length; alkali feldspars (presumably orthoclase and albite--the feldspars have not yet been completely studied); colorless to white crystals of analcime and natrolite; nepheline, typically forming gray, short hexagonal prisms several mm long; euhedral, thin, pseudohexagonal platelets of polylithionite mica, sometimes color-zoned with brown cores; and cancrinite as elongate, nearly cylindrical hexagonal prisms, gray with pale violet cores, and sometimes coated with natrolite and analcime. The cancrinite is a sulfatian variety (vishnevite); analyzed samples have contained about 30 mole percent of the vishnevite end-member. Eudialyte is fairly abundant, as small disseminated rose or orange to cinnamon-color grains in the rock (they turn darker red on weathered surfaces) and as euhedral crystals (<0.5 mm) in the vugs.

Many less common minerals have a distinctive appearance. Neptunite forms very dark red (nearly black) lustrous, stubby prismatic crystals; mangan-neptunite tends to be lighter colored, with crystal faces that are more irregularly developed. Various members of the Ca-Mn mineral series ranging from pectolite to serandite occur at Point of Rocks; pectolite tends to be white and acicular, whereas serandite forms stubbier, pyramidal, pale pink or yellowish crystals. Most of the serandite is near 50:50 Ca:Mn in composition, and is best described as the variety schizolite (manganoan pectolite or calcian serandite). Searlesite, a sodium borosilicate, occurs as colorless to white clusters of bladed prisms as much as 2 cm in length; Point of Rocks

appears to be the first occurrence of this mineral in an igneous rock not associated with evaporites. In addition to natrolite, its dimorph, tetranatrolite, has been found as small (<0.5 mm) white prisms with pyramidal terminations on both ends. Some of these crystals are observed to be transparent and amber or pale yellow when the rock is freshly broken, but they rapidly become white, porcelaneous, and translucent. This probably represents a dehydration of original paranatrolite into tetranatrolite. Lorenzenite occurs as clusters of golden-brown, transparent, elongate bladed prisms a few tenths of a mm in length. Acicular crystals of apatite, determined to be carbonate-fluorapatite (francolite) have been found in a few samples. Titanite occurs as tan-colored, crudely wedge-shaped crystals; some titanite in the groundmass of the phonolite contains minute (0.01 mm) dark reddish-brown inclusions of pyrophanite. Kupletskite forms bladed, bronze-colored prisms; thorbastnaesite, reddish-tan balls with opalescent luster; and rosenbuschite, clusters of thin, colorless to yellowish needles. A small amount of white, sugary fluorite is present. Quartz is rare; the prismatic crystals described by DeMark (1984) as "unknown no. 5" are quartz.

Sulfide minerals found at Point of Rocks include galena, sphalerite, and pyrrhotite, all as lustrous, well-formed crystals. Rarely found is a potassium-iron sulfide mineral, which also contains significant amounts of the rare metals rubidium, cesium, and thallium. It occurs as clusters of steely-gray to bronze-colored, bladed crystals up to about 1-2 mm in length. It is similar to the mineral rasvumite, but may be a new species, and is presently under study by the authors. Numerous other unidentified minerals have been and are continuing to be discovered at Point of Rocks; they should provide a fruitful area for mineralogical study for many years to come.

The locality is one at which the amateur mineralogist, as a careful observer, can make significant contributions to our knowledge of the minerals.

The unusual minerals at Point of Rocks, including villiaumite, were first noted by J. C. Stormer (Amer. Mineral. v. 55, p. 126-134, 1970; and Geol. Soc. Amer. Abst. with Prog., v. 13, p 561, 1981). Additional minerals from the locality have subsequently been described by R. S. DeMark (Mineralogical Record, v. 15, p. 149-156, 1984) and in a series of papers (1982-85) given at mineralogical symposia in Tucson, Ariz., and Socorro, N. M. by DeMark, Hlava, and Modreski. The unweathered phonolite is best exposed in a small, abandoned quarry located atop the southwest side of the mesa. Most of the mesa and access roads are on private ranch land belonging to Pete and Faye Gaines. The Gaines have been very cooperative in readily granting permission for persons to visit the site, and this cooperation has been invaluable in making possible the discovery of the many minerals now known from Point of Rocks. Continued respect of the property by all visitors will be important to preserve this good relationship.

MINERALS FOUND AT POINT OF ROCKS MESA

Sulfides:	Galena	PbS
	Pyrrhotite	$Fe_{1-x}S$
	"Rasvumite" (?)	$(K,Rb,Cs,Tl)Fe_3S_4$
	Sphalerite	ZnS
Oxides:	Magnetite	Fe_3O_4
	Birnessite (?)	$Na_4Mn_{14}O_{27}\cdot 9H_2O$
	Pyrochlore	$(Na,Ca)_2Nb_2O_6(OH,F)$
	Pyrophanite	$MnTiO_3$
Halides:	Fluorite	CaF_2
	Villiaumite	NaF
Carbonates:	Brenkite (?)	$Ca_2(CO_3)F_2$
	Calcite (?)	$CaCO_3$
	Rhodochrosite	$MnCO_3$
	Thorbastnaesite	$Th(Ca,Ce)(CO_3)_2F_2\cdot 3H_2O$
Phosphates:	Carbonate-fluorapatite	$Ca_5(PO_4,CO_3)_3F$ (francolite)
	Monazite	$(Ce,La)PO_4$
Sulfates:	Barite	$BaSO_4$
Silicates:	Acmite	$NaFeSi_2O_6$
	Albite	$NaAlSi_3O_8$
	Analcime	$NaAlSi_2O_6\cdot H_2O$
	Augite	$(Ca,Na)(Mg,Fe,Al,Ti)(Si,Al)_2O_6$
	Biotite (?)	$K(Fe,Mg)_3(Al,Fe)Si_3O_{10}(OH,F)_2$
	Cancrinite (vishnevite)	$Na_8Al_6Si_6O_{24}(CO_3,SO_4)$
	Catapleiite (?)	$Na_2ZrSi_3O_9\cdot 2H_2O$
	Chabazite	$CaAl_2Si_4O_{12}\cdot 6H_2O$
	Ekanite (?)	$ThCa_2Si_8O_{20}$
	Eudialyte	$Na_4(Ca,Ce,Fe)_2ZrSi_6O_{17}(OH,Cl)_2$
	Kupletskite	$(K,Na)_3(Mn,Fe)_7(Ti,Nb)_2Si_8O_{24}(O,OH)_7$
	Lorenzenite	$Na_2(Ti,Nb)_2Si_2O_9$
	Mangan-neptunite	$KNa_2Li(Mn,Fe)_2Ti_2Si_8O_{24}$
	Natrolite	$Na_2Al_2Si_3O_{10}\cdot 2H_2O$
	Nepheline	$(Na,K)AlSiO_4$
	Neptunite	$KNa_2Li(Fe,Mn)_2Ti_2Si_8O_{24}$
	Opal	$SiO_2\cdot nH_2O$
	Orthoclase	$KAlSi_3O_8$
	Paranatrolite (?)	$Na_2Al_2Si_3O_{10}\cdot 3H_2O$
	Pectolite	$NaCa_2Si_3O_8(OH)$
	Polylithionite	$KLi_2AlSi_4O_{10}(F,OH)_2$
	Quartz	SiO_2
	Riebeckite (?)	$Na_2(Fe,Mg)_3Fe_2Si_8O_{22}(OH)_2$
	Rosenbuschite	$(Ca,Na)_3(Zr,Ti)Si_2O_8F$
	Searlesite	$NaBSi_2O_5(OH)_2$
	Serandite (schizolite)	$Na(Mn,Ca)_2Si_3O_8(OH)$
	Sodalite	$Na_8Al_6Si_6O_{24}Cl_2$
	Tetranatrolite	$Na_2Al_2Si_3O_{10}\cdot 2H_2O$
	Thorite	$ThSiO_4$
	Titanite	$CaTiSiO_5$
	Tundrite (?)	$Na_3(Ce,La)_4(Ti,Nb)_2(SiO_4)_2(CO_3)_3O_4(OH)\cdot 2H_2O$

minerals not completely confirmed are queried (?)

SPEAKERS

EUGENE E.FOORD. Dr. Foord is a geologist-mineralogist with the U.S. Geological Survey-Central Mineral Resources Branch-Denver, Colorado. He received his A.B. degree from Franklin and Marshall College (1968) in geology, his M.S. degree in geology from Rensselaer Polytechnic Institute (1969), and his Ph.D. degree in geology-mineralogy from Stanford University (1976). One year of post-doctoral work was done at Stanford before coming to the U.S. Geological Survey. Dr. Foord's Ph.D. thesis was on the mineralogy and paragenesis of the Himalaya pegmatite-aplite dike system, Mesa Grande district, San Diego Co., California. His research has involved continuation of his southern California pegmatite studies; the mineralogy of niobium and tantalum; geology of quartz-huebnerite veins near Round Mountain, Nevada; chemistry, structure, and origin of the coloration of amazonite; mineralogy of Pb-Bi-Ag sulfosalts, studies of various new or rare mineral species--rynersonite, corderoite, hashemite, minasgeraisite, volkonskoite, planerite, aheylite, zimbabweite, scrutinyite, durangite, iimoriite, jeremejevite, and others; petrology of alkalic rocks in Otero Co., New Mexico; and other topics. He has written more than 40 articles for mineralogical journals including the American Mineralogist, Canadian Mineralogist, Mineralogical Magazine, Bulletin de Mineralogie, Gems and Gemology, the Mineralogical Record, and others. He has also been both vice-president and president of the Colorado chapter of the Friends of Mineralogy, and is currently serving on the National Friends of Mineralogy board of directors. For the last seven years, Dr. Foord has been in charge on the Friends of Mineralogy committee to update the U.S.G.S. Bulletin 1114: Minerals of Colorado- a 100 year record.

MARK I. JACOBSON. Mr. Jacobson is a senior Geophysicist with Chevron, USA. He received his B.S. degree in geology from Pennsylvania State University and his M.S. in geology from University of California at Berkeley in 1976. Mr Jacobson has been studying pegmatites and their minerals since 1966. He has visited and collected samples at most U.S. pegmatite districts. Mr. Jacobson has written several articles on pegmatite minerals for the Mineralogical Record and Rocks and Minerals. He is also a member of the Colorado Chapter of Friends of Mineralogy.

JAMES A. MCGLASSON. Mr McGlasson is a consulting mining geologist and mineral dealer. He received his B.S. degree in geology from New Mexico Institute of Mining and Technology (1971) and an M.S. in geology from Colorado School of Mines (1976). Mr McGlasson was employed as an exploration geologist for thirteen years. During this time he worked on projects in all western states, Alaska, and western Canada. He has published several

papers concerning volcanic and plutonic hosted ore deposits, and is currently completing a manuscript describing the silver sulfosalt minerals for publication in the Mineralogical Record. During the past few years, his interest has been directed towards the silver minerals, especially the sulfides and sulfosalts as they relate to ore formation processes. Mineral collecting has been one of his hobbies for many years. In the late sixties he won several titles in the Texas Federation of Mineral Societies for thumbnail minerals in the junior classes. He is a member of Friends of Mineralogy, Colorado Chapter; Mineralogical Society of Great Britain and Ireland; Sociedad Mexicana de Mineralogia; International Thumbnail Mineral Collectors Club; Society of Economic Geologists and the Society of Exploration Geochemists. Mr. McGlasson has been a mineral dealer, specializing in rare species, for the past five years.

PETER J. MODRESKI. Dr. Modreski is a geochemist for the U.S. Geological Survey- Branch of Central Mineral Resources. He received a B.A. in chemistry from Rutgers College and his Ph.D. in geochemistry from Pennsylvania State University. Dr. Modreski worked for Sandia Laboratories in New Mexico before joining the U.S.G.S.. His current work involves high-pressure, high-temperature experiments, geologic mapping and the study of cobalt deposits near Salmon, Idaho. Dr. Modreski is a member of the Mineralogical Society of America, Geological Society of America, Littleton Gem and Mineral Club, is currently president of the Colorado Chapter of Friends of Mineralogy, as well as president of the National Friends of Mineralogy, and is journal editor for the Fluorescent Mineral Society.

BARBARA J. MUNTYAN. Mrs. Muntyan is Director of Personnel for Affiliated Bank Shares of Colorado. She has been collecting minerals for over 20 years and has taught introductory courses in mineralogy at Parkman Junior College in Illinois. Mrs. Muntyan has personally visited most of the "classic" mineral collecting localities in Colorado. She has recently become involved in the cleaning and preparation of fine mineral specimens. Mineral photography is also one of Mrs. Muntyan's recent interests and she is quickly becoming one of the best mineral photographers in Colorado.

KEITH WILLIAMS. Mr. Williams is a consulting mining geologist with a retail mineral business. He received his B.S. degree in geology, specializing in mineralogy and crystallography, from Indiana University. Mr. Williams has worked in underground exploration for six years. This time was spent in such places as Tombstone, Arizona; the Front Range, Colorado; and several districts in northern Nevada. He has been in the retail mineral business for ten years. He has a personal interest in the minerals of the Front Range, especially those from Clear Creek and Gilpin Counties. His collection of outstanding specimens from this area is a reflection of his expertice in the area. Mr. Williams is a member of the Friends of Mineralogy, Colorado Chapter and the Mineralogical Society of America.