# An occurrence of red beryl in the Black Range, New Mexico

Frank S. Kimbler and Patrick E. Haynes

New Mexico Geology, v. 2, n. 1 pp. 15-16, Print ISSN: 0196-948X, Online ISSN: 2837-6420.
https://doi.org/10.58799/NMG-v2n1.15

*This page is intentionally left blank to maintain order of facing pages.*

rapidly subsiding, allowing considerable thicknesses of strata to accumulate during the Pennsylvanian. Abundant fauna preserved in the Rowe-Mora Basin indicates ages from Morrowan (Lower Pennsylvanian) to Upper Des Moinesian (middle Upper Pennsylvanian). As deposition continued into late Pennsylvanian, the shoreline gradually moved eastward toward the center of the basin; however deposition of continental strata continued without cessation from Upper Pennsylvanian through Permian. Several hundreds to thousands of feet of fluvial sands, silts, shales, and gravels with some isolated lacustrine and lagoonal limestone deposits were deposited throughout most of the Permian. Near the end of the Permian, deposition ceased and erosion of the continental deposits began. This hiatus extended through latest Permian and lowermost Triassic.

The first Mesozoic deposits (Upper Triassic) consist of sandstones, interbedded limestone pebble conglomerates, and red-brown shales; much of the material is derived from the underlying Pennsylvanian and Permian strata (Clark 1966). Intermittent erosion and deposition are reflected by disconformities that separate Upper Permian from Triassic, and Triassic from Jurassic rocks. Upper Jurassic beds are, in turn, separated from the *Dakota Formation* (Lower Cretaceous) by disconformity indicating a brief period of nondeposition and erosion prior to the Cretaceous marine transgression.

Cycles of marine transgressions and regressions accumulated a considerable thickness of black shale with some limestone beds in the Raton Basin, north and east of the map area. Toward the end of the Late Cretaceous, local uplifts, possible forerunners of the Laramide Orogeny, expanded the areas of the transgressive and regressive cycles, resulting in interbedded black shales and gray to buff channel sandstones. Finally, the sea withdrew entirely, depositing the Trinidad Sandstone as the last regressive unit.

The Laramide folding and upwarping that marked the end of Cretaceous time strongly compressed the basin into a series of west-dipping thrusts and folds. As the orogeny subsided during the Eocene, erosion accumulated coarse clastics in parts of the southern Cieneguilla Creek drainage basin. Sometime during the Oligocene a great period of volcanism and intrusion began, extending through the Miocene and into the Pliocene. Numerous stocks and batholiths were intruded and basalt, rhyolite, and andesite flows as well as tuffaceous materials were erupted to the north, east, and southwest of the mapped area. Normal and transverse faulting concurrently formed the Rio Grande depression to the west and displaced the earlier thrust and reverse faulting in the Cieneguilla Creek drainage basin. Locally, Precambrian rocks were exposed by the faulting, their erosion contributing to the thicknesses of alluvial fill.

Late in Pliocene time, basalt flows formed the resistant peaks of Agua Fria Mountain as well as extensive cover over adjacent areas; Ocate Mesa and numerous smaller lobes are remnants of this former flow sheet. During this time, the Cieneguilla Creek drainage was part of the south-flowing Coyote Creek system.

During the Pleistocene, headward erosion of Cimarron Creek disrupted the upper Coyote Creek drainage pattern. Cimarron Creek captured the flow of upper Coyote Creek, diverting it northward to form the present basin. Three periods of stability during the lowering of base level for Cieneguilla Creek created terrace levels which can still be identified in the Cieneguilla Creek drainage.

Clark (1966) reported Pleistocene glacial deposition north of the mapped area around Wheeler Peak. Glaciation may have contributed to the sedimentation history of the northern half of the Moreno Valley (Clark, 1966). Evidence of glacial activity is not discernible in the basin. The present basin is the result of continued adjustment to the base level of Cieneguilla Creek and the drainage system of the Cimarron River.

### References


Armstrong, A. K., 1955, Preliminary observations on the Mississippian System of northern New Mexico: New Mexico Bureau of Mines and Mineral Resources, Circ. 39, 42 p.

Baltz, E. H., and Read, C. B., 1960, Rocks of Mississippian and probable Devonian age in Sangre de Cristo Mountains, New Mexico: American Association of Petroleum Geologists, Bull., v. 44, p. 1749-1774

Callender, J. F., Robertson, J. M., and Brookins, D. G., 1976, Summary of Precambrian geology and geochronology of northeastern New Mexico: New Mexico Geological Society, Guidebook 27th field conference, p. 129-135

Clark, K. F., 1966, Geology and ore deposits of the Eagle Nest quadrangle, New Mexico: Ph.D. thesis, University of New Mexico, 363 p.

Goodknight, C. S., 1976, Cenozoic structural geology of the Central Cimarron Range, New Mexico: New Mexico Geological Society, Guidebook 27th field conference, p. 137-140

Kudo, A. M., 1976, A review of the volcanic history and stratigraphy of northeastern New Mexico: New Mexico Geological Society, Guidebook 27th field conference, p. 109-110

Miller, J. P., Montgomery, A., and Sutherland, P. K., 1963, Geology of part of the southern Sangre de Cristo Mountains, New Mexico: New Mexico Bureau of Mines and Mineral Resources, Mem. 11, 106 p.

Ray, L. L., and Smith, J. F., Jr., 1941, Geology of the Moreno Valley, New Mexico: Geological Society of America Bull., v. 52, p. 177-210

Robinson, G. D., Wanek, A. A., Hays, W. H., and McCallum, M. E., 1964, Philmont Country—the rocks and landscape of a famous New Mexico ranch: U.S. Geological Survey, Prof. Paper 505, 152 p.

Smith, J. F., Jr., and Ray, L. L., 1943, Geology of the Cimarron Range, New Mexico: Geological Society of America, Bull., 54, p. 891-924

Thompson, M. L., 1942, Pennsylvanian system in New Mexico: New Mexico Bureau of Mines and Mineral Resources, Bull. 17, 92 p.

Wanek, A. A., and Read, C. B., 1956, Taos to Eagle Nest and Elizabethtown: New Mexico Geological Society, Guidebook 7th field conference, p. 82-93


□

# An occurrence of red beryl in the Black Range, New Mexico


by Frank S. Kimbler and Patrick E. Haynes, P.O. Box 2439, Campus Station, Socorro, NM 87801


A locality for red beryl in rhyolite was found on May 23, 1979 by P. E. Haynes while prospecting for the Virgin Mining Company. The locality, on the west side of the Black Range in the Gila National Forest of northwestern Sierra County, New Mexico, has been named the Beryllium Virgin prospect.

### General geology and structure

The rocks in the region, mid-Tertiary or younger, are comprised of rhyolite, basalt flows, and clastic sediments. Of primary interest are extensive outcrops of flow-layered, purple-brown to pink, porphyritic rhyolite. Phenocrysts are abundant, accounting for about 40 percent of the rock. One to three percent of the rhyolite consists of vesicles which, in part, are lined with several oxide and silicate minerals, including beryl (Fries and others, 1942; Lufkin, 1972).

The porphyritic rhyolite is cut by numerous north-trending fissures; rocks adjacent to the fissures are highly fractured. These fissures and fracture zones provided a channel for escaping vapors during the cooling of the lava. These gaseous emanations were responsible for much of the mineralization in the area.

The Beryllium Virgin prospect, in sec. 22, T. 10 S., R. 11 W., Sierra County, New Mexico, has at least two distinct north-trending fracture zones. Both are mineralized and run parallel to one another; each has its own distinct mineral assemblage.

### Mineralogy

Red beryl occurs in the fracture zone on the east side of the mining claim. A more highly mineralized zone, devoid of beryl, lies on the western side of the claim. Adjacent to this zone are veins of massive hematite that contain crystalline grains of bixbyite and cassiterite. The following descriptions cover the characteristics and associations of the different minerals of interest found at the Beryllium Virgin prospect.

BERYL—$Be_3Al_2(Si_6O_{18})$—The red beryl from the Black Range of New Mexico is the third known source for red beryl found in rhyolite. Specimens from two other localities, the Thomas Range and the Wah Wah Mountains in Utah, have larger, more colorful, and more abundant crystals. Microprobe analysis of the Utah crystals (Nassau and Wood, 1968)

☞

(*continued from previous page*)

indicate that the red coloration is due to a high concentration of manganese ($Mn^{+2}$). The color of the Black Range crystals grades from pale pink to raspberry red, with the darker color occurring only in a few crystals. The raspberry-red crystals are zoned parallel to the C axis, with the red color in the center of the crystal.

The crystals observed occur only in simple tabular prisms. Under magnification, they show numerous fractures. Modifications or twins have not been noted among the fifty specimens collected to date. The crystals are weakly attached to the rhyolite matrix due to the small amount of quartz sand occurring in the vugs. Size of the beryl crystals ranges from 1 to 3 mm. Crystals much larger than 3 mm probably do not occur at the Beryllium Virgin prospect. Other deposits of red beryl may occur in the Black Range of Sierra and Catron Counties, but have not been discovered to date. The minerals occurring in the lithophysal cavities with the red beryl are quartz, hematite (variety specularite), and pseudobrookite; all may penetrate the beryl crystals.

BIXBYITE—$(Mn,Fe)_2O_3$—Bixbyite occurs as dull to very lustrous submetallic cubes in the fracture zone on the west side of the claim. The cubes are rarely modified by the trisoctahedron {221}, the octahedron {111}, or, as observed in one specimen, the trapezohedron {211}. The usual size of the bixbyite cubes is less than 2 mm on an edge; two specimens collected in 1978 measured 8 mm on an edge.

PSEUDOBROOKITE—$Fe_2TiO_5$—Pseudobrookite, when found with red beryl, occurs as thin, needle-like crystals less than 2 mm long and like the beryl, are lightly attached to the rhyolite matrix. Pseudobrookite crystals associated with the bixbyite attain a length of up to 5 mm and a width of 1.5 mm, while single pseudobrookite crystals may be found penetrating the bixbyite cubes.

HEMATITE—$Fe_2O_3$—Hematite occurs as bright, thin plates (specularite) throughout the deposit. The largest crystals occur adajcent to the bixbyite in the mineralized western fracture zone as vein fillings composed of interlocking plates and blades with a maximum size of about 1 cm.

QUARTZ—$SiO_2$—Colorless quartz crystals occur abundantly throughout the deposit, in nearly every vug. Maximum size for a crystal is about 3 mm; doubly terminated crystals have been found.

OPAL (variety hyalite)—$SiO_2 \cdot nH_2O$, amorphous—Hyalite opal rarely occurs with the bixbyite but more commonly with the red beryl. Found as small, irregular masses or thin crusts of pale lavender that fades on exposure to sunlight (Fries, 1942).

### Present collecting status

Collecting red beryl crystals with hammer and chisel usually yields only one specimen per working hour due to their scarcity and poor attachment to the matrix. The area where red beryl is found is under claim; collecting is prohibited until exploration of the claim by the Virgin Mining Company is completed.

### Selected references


Fries, Carl, 1940, Tin deposits of the Black Range, Catron and Sierra Counties, New Mexico: U.S. Geological Survey, Bull. 922-M, p. 355

Fries, Carl, and others, 1942, Bixbyite and pseudobrookite from the tin-bearing rhyolite of the Black Range, New Mexico: American Mineralogist, v. 27, p. 305

Lufkin, J. L., 1972, Tin mineralization within rhyolite flow-domes, Black Range, New Mexico: Ph.D. thesis, Stanford University, New Mexico Bureau of Mines and Mineral Resources, Open-file Rept. 57, 149 p.

———, 1976, Oxide minerals in microlite rhyolite, Black Range, New Mexico: American Mineralogist, v. 61, no. 5-6, p. 425-430

Nassau, K., and Wood, D. L., 1968, An examination of red beryl from Utah: American Mineralogist, v. 53, p. 801

Northrop, S. A., 1959, Minerals of New Mexico: Albuquerque, New Mexico, University of New Mexico Press, 665 p.

Palache, C., 1934, Minerals from Topaz Mountain, Utah: American Mineralogist, v. 19, p. 14 □


## New Mexico's minerals


GYPSUM, $CaSO_4 \cdot 2H_2O$. LADRON MOUNTAINS, SOCORRO COUNTY, NEW MEXICO
Crystal system: monoclinic. Hardness: 2
Specific gravity: 2.32; Cleavage: {010}, perfect; {100} distinct; {011} distinct.

Gypsum is a common mineral found in sedimentary rocks, cave deposits, and associated with metallic ore deposits. This particular specimen is from a cave near the Ladron Mountains. Gypsum's primary use is in the manufacture of plaster of paris. *Photo by Mark R. Leo*


New Mexico GEOLOGY
• Science and Service
New Mexico Bureau of Mines & Mineral Resources, Socorro, NM 87801