The Twenty-fourth Annual New Mexico Mineral Symposium was held November 8 and 9, 2003, at New Mexico Institute of Mining and Technology, Socorro. Following are abstracts from all talks given at the symposium.

GEMS OF THIEF MOUNTAIN (AMETHYST FROM THE LADRONES MOUNTAINS, NEW MEXICO), by Dylan G. Canales and Robert E. Sanders, New Mexico Institute of Mining and Technology, 801 Leroy Place, Socorro, NM 87801

(Location 1 on the index map)

The Sierra Ladrones are situated within the Rio Grande rift and are a basement block uplift formed as a result of the extensional tectonism prevalent in this region for the last 30 m.y. Alteration and mineralization in the region has spanned at least the last 500 m.y. since the intrusion of Cambrian carbonatites into the Precambrian country rock (McMillan and McLemore, 2004). Recent observation suggests that Precambrian basement rocks in the Ladrones Mountains have experienced a much older history of hydrothermal alteration and brittle deformation.

The earliest documentation of mineralization at the Cascabel mine is based on misinterpretation of the local geology and therefore necessitates a contemporary genetic model for the tectonic history and mineral paragenesis. Previous observation attributed fluorite, quartz, and hematite formation to a 1–2-m-wide "diabase dike" that intruded the granitic gneiss country rock. Several factors negate this "intrusion" as the cause of mineralization: 1) Precambrian basement rock throughout the region contains linear amphibolite bodies (not diabase) not associated with country rock alteration; 2) Diabase dikes are water poor and silica poor and would not generate a hydrothermal system capable of severely altering approximately 2 km² of country rock at the Cascabel mine. We prefer a genetic model that relies on circulation of hot, silicic-rich fluids that infiltrated and exploited faults and fractures in the country rock. Oxidized iron responsible for the coloration of amethyst implies interaction of meteoric water during the last stage of mineralization. This constrains the depth of the host rock at the time of quartz deposition to several kilometers below the paleosurface. Open voids for quartz mineralization were the result of faulting and/or volumetric loss related to chemical alteration. Goethite pseudomorphs after pyrite show that sulfides were once present in the country rock and were the likely source of acid that caused the locally intense alteration. Following this, silica saturated fluids precipitated large, milky-quartz crystals as much as 6 inches in length. Fluorite crystallized after this. A second episode of mineralization began with deposition of hematite followed by a fluid lightly charged with silica that left a thin coat of clear quartz on the milky crystals. Finally, the amethyst formed as the weak silica solution gained oxidized iron. At least two episodes of mineralization are clearly delineated as nearly all the early quartz crystals were broken, then healed, or in some cases formed "dumbbells" as amethyst grew on both tips.

The age of mineralization has not yet been definitively determined, but several observations suggest a Proterozoic ancestry: 1) host rock for mineralization is Precambrian metamorphic rock; 2) Paleozoic sediments overlying the deposit are unaltered relative to Precambrian rocks. Localized fracturing and dilation within an extensional tectonic regime are conducive to mineralization. Proterozoic extension in the southwestern United States has been documented during two time periods at ca 1000 and 800 Ma (Timmons et al., 2001). ⁴⁰Ar/³⁹Ar K-feldspar thermochronology of the basement rocks in New Mexico indicates that rocks were at approximately 10-km depth at ca 1000 Ma (Heizler, M. T., pers. comm. 2003), and were likely too deep for the style of mineralization observed at the Cascabel mine. However, by ca 800 Ma the basement over much of the region had been exhumed to a few kilometers depth that places the Precambrian host rocks at the Cascabel mine at shallow crustal levels. Based on this, we believe that ~ 800 Ma is a good representation for the timing of mineralization and alteration.

The majority of documented wulfenite finds have been made in the last 35 yrs because of new mining operations or as new discoveries in abandoned mines. The first mention of wulfenite in Colorado

REFERENCES


WULFENITE OCCURRENCES IN COLORADO, by Tom Rosemeyer, P.O. Box 369, 506 Pine Street, Magdalena, NM 87825

(Location 2 on the index map)

Connoisseurs of wulfenite probably do not think of Colorado as a noteworthy state that has produced fine specimens of wulfenite. Surprisingly though, fine microcrystals of wulfenite have been found in a variety of ore deposits throughout the state. A good part of the Colorado wulfenite localities does not compare with those in Arizona and New Mexico, but microcrystals of wulfenite and associated minerals make interesting and rare additions to the micromounter’s collection.

The Index map showing the locations referred to in the abstracts.


WULFENITE OCCURRENCES IN COLORADO, by Tom Rosemeyer, P.O. Box 369, 506 Pine Street, Magdalena, NM 87825

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was made in 1878 by F.M. Endlich in his mineralogical report in the Tenth Annual Hayden Survey Report. The reports of wulfenite in Colorado include the Central City district, the Silver Cliff district, and the Breckenridge district.

The crème de la crème wulfenite locality for Colorado is the Sherman tunnel, located east of Leadville at the base of Elisea Amphitheater at an elevation of 12,200 ft. The deposit was discovered in 1968, and the Sherman tunnel was started in 1970.

Strong oxidation and enrichment in parts of the irregular orebodies in the Leadville Dolomite have formed a large variety of secondary minerals, such as malachite, azurite, cerussite, smithsonite, hemimorphite, wulfenite, and native silver. All of the minerals occur as microcrystals in various associations.

The mines of the San Juan Mountains of southwestern Colorado have produced some of the best microcrystals of wulfenite that have been found in the last 30 yrs; before that wulfenite was not mentioned as occurring in the San Juans.

**WULFENITE AND ASSOCIATED MINERALIZATION AT THE WULFENITE GAP MINES, SOUTHWESTERN NEW MEXICO**

by Robert E. Walstrom, walstrominerals @gilanet.com, P.O. Box 1978, Silver City, NM 88062

(Location 3 on the index map)

Recent collecting activity in parts of the Central district, Grant County, and San Simon district, Hidalgo County, New Mexico, has revealed an interesting suite of wulfenite in numerous habits and associations. Specimens collected from dumps, pits, cuts, and one underground locality are suitable for micromount and thumbnail presentation. Larger hand specimens are rare.

Central district—Localities covered by this investigation in the Central district include a group of 10 prospects and mines located 1 mi west of Colorado and 2 mi north of Bayard, Grant County, New Mexico. The area is overshadowed by the large Chino open pit copper operation at Santa Rita located 3 mi north-north-east. The workings investigated include the following mines: Betty Jo, Silver King, Home, Napoleon, and an unnamed mine high on the east side of Granite Gap Mountain. The adit is caved, but square tabular wulfenite can be found sparingly on the dumps in gossan material. The Granite Gap mines are all located on private property, and a fee is charged for entry.

**References**


**NEW PROCESS IN MAKING METEORITE REPLICA**s, by Jack Thompson and Jack A. Murphy, Department of Earth Sciences, Denver Museum of Nature and Science, 2001 Colorado Blvd., Denver, CO 80205

(Location 5 on the index map)

The casting of meteorites to preserve their original character, especially before they are cut, is a well-known procedure. Casting of meteorites has been a part of museum operations through the years; Harvey Nininger, curator of meteorites in the 1930s, made reproductions of several meteorites. In an effort to improve replicas for exhibition, we have used scanned digital images of the meteorites’ polished faces on the cut surface of the cast, which give a remarkably realistic appearance. This paper discusses this technique applied to the Rifle iron meteorite and two new stony meteorites from Weld County, Colorado.

The rifle iron, originally a 226-lb mass, was found in 1948 about 6 mi northwest of Rifle, Colorado. It was sold to Harvey Nininger, and when he divided his collection in the 1950s, it was cut into two almost equal-sized pieces. The Denver Museum’s piece weighs 100 lb and is about the size of half a watermelon. Recently we made a replica for the Rifle Creek Museum in Rifle, Colorado, which they placed on display May 28, 2003.

We applied the scanned-image technique to show the dramatic Widmanstätten pattern on the cast and polish, a modern procedure for molding and casting the piece was traditional: several layers of latex rubber applied to the original, a plaster support jacket made, then plaster poured into the mold to make the cast. For our 100-lb Rifle meteorite, Chief Preparator and Curator of Vertebrate Paleontology, Kenneth Carpenter, made the mold and poured the casts. Denver artist Helen Barndt painted the white plaster surface to look like the rusty brown iron meteorite.

Reproducing the beautiful Widmanstätten pattern on the cut and etched surface of the nickel-iron meteorite was a real challenge. Ken Erickson, department volunteer, made a high-quality, flat-field black and white photograph of the meteorite. This was scanned to create a digital image from which an inkjet photo-quality print was made. The gloss of the paper was matched to the gloss of the meteorite’s surface.

After sanding and coating the flat surface of the cast with a grout and tile sealer, the image was glued to the cast with super ply-bond cement. The replica was carefully trimmed with a scalpel and touched up with paint.
This technique was also used by Jack Thompson on two other meteorites in the museum collection, both stony meteorites from Weld County, Colorado. One is a fairly fresh (unoxidized) ordinary chondrite found near Stoneham. It had been cut in two directions and shows well-proounced internal structures including metal veining. The other, found near New Raymer, has a dark-brown oxidized color and an end piece cut off. The meteorite was cleaned for molding, casting, and surface painting were used as with the Rifle meteorite. However, these meteorites were small enough to be placed on a flatbed scanner, resulting in digital images for the cut surfaces. The suggestion for this method came from Wilson (2003). The scans were printed on photo-quality paper, and the images were glued to the flat surfaces on the casts, providing realistic exhibit-quality reproductions.

The meteorite from New Raymer was taken one step further because we did not get a chance to cast it before the end piece was cut off. The two ends were reassembled using cardboard shims and molding clay to make up for the space lost during cutting. A latex mold of the whole mass was made, and the casts were painted to look like the original. The final result is one cast with the shape of the original mass and another cast of the existing piece with the digital image of the interior on the cut surface. We believe that these projects are the first to use digital images on meteorite replicas.

Reference
Wilson, W., 2003, Record-keeping for mineral collectors: Mineralogical Record, v. 34, pp. 210–212.

BISBEE—QUEEN OF THE COPPER CAMPS, by Les Presnyk, SRP-Fuels Division, PO. Box 52025, Phoenix, AZ 85072

(Location 6 on the index map)
Although two other mining districts in Arizona have produced more copper than Bisbee, none have produced such an impressive array of metals or meant so much to the development of Arizona. In Arizona, the original location was made when lead mineralization in the summer of 1877. In 1882 Dr. James Douglas was sent out by the firm of Phelps, Dodge and Company to examine the adjoining Atlanta claim. They purchased it and spent $80,000 and the next 2 years exploring it. No ore was found, but Dr. Douglas made the case for spending another $15,000, which finally paid off with the discovery of a rich oxide body.

In 1884, rather than continuing to compete for adjoining properties, the Copper Queen Mining Company and the Atlanta Mining Company merged into a single company. Thus began a lifetime partnership and kinship between James Douglas and the Williams brothers.

Smelting capacity was constantly changing by upgrading and expanding. This was necessary to keep the operations as economic as possible. The Czar mine had the most distinctive smelter stack because it was constructed up the side of the mountain instead of built vertically.

Before 1889 all supplies were hauled into Bisbee with 20 mule teams, and the black matte copper was hauled out. An attempt was made to replace mules with mechanical pulling devices, such as a steam-powered tractor. The tractor worked fine, but it was not used because the mule teams could work in all kinds of weather. Once the railroad came to Bisbee in 1889, the cost of moving freight plummeted.

As the sulhide mineralization oxidized, it left a network of tunnels. A high school graduation was held in one of the caverns, and a second cavern hosted a board of directors meeting. The miners learned that the caverns could be used as exploration targets by digging straight down. Fortunately, not all of the ore bodies were directly below the caverns, and some of these still exist.

By 1898 Bisbee was a prosperous mining town with the usual collection of bars and saloons and even a photographic business located on Main Street. The Fourth of July celebrations included single and double jack contests—a mining camp knew they had made it if they were around long enough to participate in such contests.

By 1908 there had been three devastating fires. Firebreaks were created when the miners brought dynamite out of the mines and blew up some of the buildings. After 1908 brick buildings replaced wood buildings. Adding insult to injury, the summer monsoon rains came with a vengeance. With the mountainsides stripped of trees that fed the smelters and provided timber for mules, the smelters and the buildings blew down through the canyon in Bisbee.

John Dunn then made the mistake of grub-staking George Warren. It was the custom in those days to stake claims on an equal basis with the person who grubstaked him. Mr. Warren drank Dunn’s money away in Tombstone, then went out and staked the claims, including the Copper Queen claim, in his name and others he took with him. He ultimately lost his share of the Copper Queen claim by betting he could outrace a horse in a 100 yard race. Unfortunately, he was drunk at the time and misjudged both the distance and his running ability. He died in 1895 as one of the town’s drunks, but his name lives on with Warren, Arizona.

Development started on the Copper Queen, and 22 percent oxide copper ore was found. The property was then sold to Lewis and Ben Williams in 1880, and they brought the technical expertise so badly needed to really develop the property (Lewis for his smelting experience and Ben for his knowledge of mining).

Meteors and Meteorite Replicas

As with many of the early mineral discoveries, the Southwest must have been a preferred spot for meteorite collectors, and the area has the specimens to prove it. The Calumet and Arizona was the other big mining operation in Bisbee in 1993, its list had grown to 285 distinct specimens.

Williams and their main seller to dealers, including A.E. Foote. Ben Williams saved hundreds, if not thousands, of Bisbee specimens. Bisbee is also one of the best known meteorite collections in the world. As of the printing of Dick Graeme’s second article on the minerals of Bisbee in 1993, his list had grown to 285 distinct species, including several that Bisbee is the type locality. We are all familiar with the magnificent azurites, malachites, cuprites, coppers, and calcites that have come from here. These specimens grace collections throughout the world. In addition, some of the rare minerals are attractive and well crystallized, including spangolite, connel-lite, and evagranite.

Meteorites of New Mexico, by Bill Nash, 1160 Via Ixtapa, Corona, CA 92882

Not all New Mexico visitors from outer space pick Roswell! Many have landed all over the state and continue their visits on a daily basis. However, their trip is one way as avid meteorite collectors of the world refuse to let them return home!

You may question, “Why should meteorites be part of the Mineral Symposium?” Simply put, they are relics of the same material that formed our Earth and solar system eons ago. The materials that formed the minerals we enjoy and collect today were pulled together in the dim past by cosmic forces to create Earth and the other planets in our solar system. This ancient collection of materials is a window into the past, allowing us to see what our planet was like in the very early days of our solar system. This is one reason why we must continue our search for meteorites. We must continue to search as we are a part of the International Mineral Symposium. The International Mineral Symposium is a collection of scientists and people of all walks of life who are interested in meteorites.

The ecletic collection of meteorite material that continues to help us understand our world man has yet to visit and that we are just beginning to visualize and understand. Our first material from the Moon, Mars, and asteroids...
come from meteorites. Material from the beginning of our solar system, the most ancient there is, is delivered to Earth daily by the cosmic space shuttle.

These visitors, mostly from the asteroid belt between Mars and Jupiter, left over from the creation of our solar system, are controlled by the massive gravity of Jupiter, which acts as Earth’s protector. When material does escape and a meteorite material reaches the atmosphere, it is contained with a “shooting star” display and an occasional lucky find. Past visitors have left their mark on Earth in the form of some 150 known impact craters or asteroids. Some of these like Meteor Crater in Arizona are spectacular, while others are less visible to the untrained eye. Many are old and weathered and hardly recognizable from our terrestrial view. Space views and mapping have helped identify many of these structures, but many event remnants have been completely obliterated by Earth’s geologic processes. The cosmic visitor that formed Chichiculub Crater in the Yucatan is thought to be responsible for one of the mass extinctions on Earth about 65 million years ago.

The visitor that created the impact craters at Sikhote–Alin in the USSR in 1947, created affordable and available collecting material that has the potential to reach the most curious forces that accompany our visitors from space.

New Mexico craters are volcanic in origin and are not meteorite impact craters. New Mexico is known, though, for a diverse selection of falls and finds representing the three major classifications of meteorites—stones, irons, and stony-irons. There are about 200 documented New Mexico meteorite falls/finds, each named for a prominent geographic area where it was discovered. Wagon Mound, Chico, Clovis, Glorieta Mountain, Portales, Kenna, Columbus, Socorro, and Oro Grande are a few of the locations represented. Meteorites have been collected in most counties in New Mexico, with a greater representation coming from Roosevelt County. New Mexico ranks above the United States average in material found per million square miles. Several New Mexico pieces can be viewed in the New Mexico Museum and in the symposium display at Macey Center.

New Mexico is prominently represented in the educational and research arena by the Institute of Meteoritics at the University of New Mexico in Albuquerque. An in depth and quality public museum, publications, research, web page http://eps.unm.edu/iom, authentication service, and noted personalities make this institution one of the highly regarded centers of meteoritic expertise in the world.

Meteorites, impact breccias, shatter cones, tektites, and other meteorite collectibles are available from many sources. Material sells for less than a dollar to several hundred dollars per gram. Moon rocks are not cheap!

What a thrill to hold and own part of the Moon, or Mars, or an asteroid like Vesta, or material from the beginning of the solar system!

THE CAUSES OF COLOR IN MINERALS WITH SPECIAL REFERENCE TO FLUORITES FROM BINGHAM, NEW MEXICO, by John Rakovan, Department of Geology, Miami University, Oxford, OH 45056

(Location 8 on the index map)

The Hansburg mining district, Bingham, New Mexico, is famous for its vividly colored fluorite crystals. “Bingham blue” with its characteristic sensitivity to sunlight is the most common and widely recognized color found at Bingham, by itself and its parageneses of purple, green, and colorless cubes. Color is also found. Color zoning is also common. Zoning of color between concentric zones from the center of the crystal outward is most commonly seen. Examples include crystals with green cores and blue or violet rims and fine alternations of purple bixbyalcitrinal and colorless cubes (and sectors). New Mexico mines have produced wonderful examples of sectoral zoning of color. In these samples, symmetrically different crystal faces and the zones beneath them (called sectors) exhibit different colors. For example, cubohexagonal crystals have been found with purple hexagonal faces (and sectors) and colorless cube faces (and sectors). Figure 1 is a sector zoned cubohexagonal crystal.

To understand the origin of color in these fluorites, and in minerals in general, we have to look at how visible light interacts with crystals or individual atoms within crystals. Color is imparted to a material that is illuminated with white light (that contains all wavelengths in the visible region of the electromagnetic spectrum) when the material absorbs certain wavelengths and other wavelengths are transmitted or reflected so that they reach your eyes. Color is the physical sensation of the human eye to these wavelengths that reach it. For example, if white light enters a transparent crystal and all of the visible wavelengths from red through green (wavelengths roughly from 740 to 500 nm) are absorbed, only the remaining wavelengths of light (wavelengths roughly from 500 to 350 nm) will be transmitted through the crystal and eventually reach your eye. What you perceive as the color of the crystal will be the response of your eyes and brain to the combination of visible wavelengths of light from 500 to 350 nm—a blue or violet color.

Thus the question “What causes color in minerals?” can be rephrased as “What causes differential absorption of visible wavelengths of light when white light interacts with a crystal?” Most of the mechanisms of the absorption of light by minerals involve the interaction of light and electrons within crystals. Particles of light are known as photons, and photons not only have energy (the wavelength) but can impart energy (the wavelength) to those wavelengths that reach it. For example, if a photon can be trapped within the electrostatic field of this vacancy and undergo energy level transitions by the absorption of optical wavelengths of light, thus imparting color to the crystal.

Several studies of the relationship between color and structure, and trace element chemistry of fluorites from Bingham, New Mexico, have been conducted at Miami University (Bosze, 2003; Bosze and Rakovan, 2002; Wright, 2002; Wright and Rakovan, 2001). The results show a complex interplay of color-causing mechanisms in these samples. One mechanism that has been identified is electron transitions on simple F-centers. These are associated with the characteristic “Bingham blue” color. A trait of defects like F-centers is that they can easily be destroyed. If enough energy is imparted to the crystal to move the displaced fluorine atom back to its original position within the structure then the F-center and the color associated with it are lost. This can be done by heating or by exposure to an ultraviolet light source such as the sun. This is exactly the reason that the “Bingham blue” color will fade on exposure to sunlight.

A more complex color center that has been identified is a rare-earth element associated fluorine vacancy. In this case, rare-earth element impurities residing directly adjacent to a fluorine vacancy create a unique electrostatic field by the coupling of the two entities. Two free electrons can become trapped in this field and undergo energy level transitions that absorb light in the visible part of the spectrum, thus imparting color to the crystals.

Color in the sectorally zoned crystals is the result of rare-earth element associated fluorine vacancies. During growth of these crystals the rare-earth elements are preferentially incorporated into the 321 faces that face the [100] faces. Thus the higher concentration of rare-earth elements in association with defects causes more intense color on the [321] faces and their associated sectors.

References
Bosze, S., Rakovan, J., and Lueth, V.W., 2003, Mineralogical and paragenetic history of fluorites from Bingham, New Mexico—Links between rare-earth element chemistry, color, and morphology:
ROCKS AND RELICS, by Jack W. Burgess, Mining Engineer, P.O. Box 110, Corrales, NM 87048

(Location 9 on the index map)
The Chihuahuan Desert Mining Heritage Exhibit has been constructed on site to replicate a vibrant and dynamic time in the history of the Southwest. The exhibit includes an 18-ft-high timber head frame and Davis Horse Whim hoisting system; a tramming layout with ore hoisting system; a backhoe was used to uncover cavities as large as six inches high, 6 ft long, and 3 ft deep. Some pockets contained abundant free-standing barite crystals, and other cavities were devoid of barite. Individual pale to sky-blue crystals as large as 10 cm were found, and numerous smaller single crystals were also recovered. Generally, the crystals were either very thin or had only a thin clay coating and were found in cavities formed by fault movement. This information, coupled with a report of large native silver occurrences at the bottom of the shaft suggest that mineral collectors had not previously visited this mine.

Reference

MINING FOR BLUE BARI TE AT STONEHAM, COLORADO, by Michael R. Sanders, 3300 Hastings NE, Albuquerque, NM 87106; and Frank Bendrick, 2021 23rd Avenue, Greeley, CO 80634

(Location 10 on the index map)
For one week in July 2002 a mining operation was conducted for blue barite mineral specimens at the famous Stoneham, Colorado, barite locality. The collecting site is about 4 mi northeast of the village of Stoneham in Weld County, Colorado, which is in the high rolling plains about 100 mi northeast of Denver. The collecting site is located on state land and is currently under lease by a local resident.

The barite crystals occur in open pockets developed in the lower most member of the early Oligocene (35–37 million years old) Chadron Formation of the White River Group of sedimentary rocks. The most common member is a 15–20-ft-thick, tan to cream claystone layer that is rich in volcanic glass shards. The Chadron Formation lies unconformably above the regionally extensive Cretaceous Pierre Shale (Modreski et al., 1990). In the project area, the crystal pockets occurred along two major fault trends, both of which strike northwest-southeast, but one dips southwest and the other dips to the northeast. Dips along the undulating fault planes were highly variable and ranged from about 10 to 45 degrees. The faults were identified in the field by striated slickensided surfaces indicating essentially vertical movement.

Open (and crystal-bearing) pockets occurred predictably in only the flat-dipping part of the faults. Modreski et al. explain that “pull-apart” movement along the flat part of the fault planes created the open pockets. Evidently only the lower most member of the Chadron Formation is sufficiently brittle (rather than plastic) to form open cavities. Pockets were not observed to have developed along the faults in either an overlying siltstone layer, or the underlying Pierre Shale, both of which are apparently more plastic in nature and are not sufficiently brittle to form open pockets when fault movement occurs.

A backhoe was used to uncover cavities as large as six inches high, 6 ft long, and 3 ft deep. Some pockets contained abundant free-standing barite crystals, and other cavities were devoid of barite. Individual pale to sky-blue crystals as large as 10 cm were found, and numerous smaller single crystals were also recovered. Generally, the crystals were either very thin or had only a thin clay coating and were found in cavities formed by fault movement. This information, coupled with a report of large native silver occurrences at the bottom of the shaft suggest that mineral collectors had not previously visited this mine.

Reference

NATIVE SILVER AND WULFENITE AT THE ANCHOR MINE, MAGDALENA DISTRICT, SOCORRO COUNTY, NEW MEXICO, by Ramon S. DeMark, 8240 Eddy Avenue, NE, Albuquerque, NM 87109

(Location 11 on the index map)
Although native silver is uncommon in the Magdalena mining district of Socorro County, New Mexico, it has nevertheless been reported from several mines. In particular, wire silver reputedly occurred at the Anchor mine in seams and crevices (Loughlin and Koschmann, 1942). This information, coupled with a report of large native silver crystals at Cerro Pinto mine (Hammersons, pers. comm. 2002) inspired Mike Sanders, Chris Cowan, Tom Rosemeyer, and me to investigate the Anchor mine on January 25, 2003. The mine is reached by driving up Anchor Canyon at the north end of the Magdalena district. According to Loughlin and Koschmann (1942), it was opened in 1907 and has produced some rich silver ore with a total value of about $60,000, but it was abandoned about 1893 when the price of silver declined. It was reopened in 1924 and operated intermittently until 1926 when operations ceased. Mine workings consist of an inclined (about 50°) shaft 170 ft deep from which two short levels have been driven and an adit level about 900 ft long. The adit level for most of its length is flooded, but a section at the bottom of the decline remains partially dry.

The average thickness of the vein is about 4 ft and consists primarily of quartz, barite, and calcite with some fluorite. Galena and sphalerite are the primary sulfide ore minerals. The vein exposed on the second level is quite rich in fluorite and galena, and rich ore samples were collected. At the bottom of the shaft (adit level), examination of the vein showed numerous yellow tabular wulfenite crystals to 6 mm and cerussite crystals to 2.5 cm. Wulfenite in the Magdalena district is quite rare. It was found associated with azurite from the sixth level of the Kelly mine in 1897 by Chris Cowan and at the Mistletoe mine in 1993 by me. Wulfenite has also been found at the Linchburg mine by Brian D. Huntsman.

Following this trip, close inspection of the galena ore with a microscope revealed quartz-lined vugs containing small wires of silver. This discovery led to a second trip on January 30, 2003, by Mike Sanders, John Ottea, and me. A number of wire silver specimens were collected from the vein on the second level along with one specimen of yellow pyramidal wulfenite. The silver wires are mostly coiled and as long as 1 cm. Many of the wires are encrusted with small colorless quartz crystals and are partially altered to acanthite. Acanthite is also found coating sphalerite crystals in the vicinity of the silver. Additional minerals found on the dumps and in the shaft and adit include: pyrite, chalcopyrite, siderite, smithsonite, and hemimorphite. Identification of the acanthite, siderite, and hemimorphite was aided by microprobe analysis (Paul Haiva, pers. comm. 2003). Mine artifacts found at the bottom of the shaft suggest that mineral collectors had not previously visited this mine.

Reference

THE GODSEND CLAIM: A PRELIMINARY REPORT, LAKE GEORGE PEGMATITE DISTRICT, TELLER COUNTY, COLORADO, by Steven Wade Vategch, sageveatch @att.net, Earth Science Department, Emporia State University, Emporia, KS 66801; Reinhard A. Wobus, Department of Geology, Williams College, Williamstown, MA 01267; and Richard W. Frettered, Colorado Springs Mineralogical Society

(Location 12 on the index map)
The Godsend mining claim, staked by Richard Fretterdam in 2001, is in the Crystal Creek area, west of Crystal Peak, in Teller County, Colorado. North of U.S. Highway 24 between the towns of Florissant and Lake George, this famous collecting site spans the Teller–Park county lines. Since the 1870s, some of the world’s finest examples of amazomite, smoky quartz, and other minerals have been mined from the Lake George pegmatite district, which includes Crystal Peak and the Crystal Creek area.

The Godsend mining claim is also located