The Bulldog Mountain Mine (*aka* Bulldog Mine)
"Blocks of Nearly Solid Silver"
Creede Mining District, Mineral County, Colorado

By Ken Kucera

Table of Contents

Introduction

This article provides information on the historically important silver mine in the Creede Mining district, Mineral County, Colorado, known as the Bulldog Mountain mine. It will summarize aspects of the developmental history of this legendary mine by telling two stories – one about the rich mining history of the district, the second about how the district's history impacted development of the Bulldog Mountain mine itself.

The Bulldog Mountain mine is located about one-half mile northwest of the town of Creede, Mineral County, Colorado. The last major period of silver production in the prolific Creede Mining district was from the Bulldog Mountain mine.

In the 1920's, a prospectus was published by a company called the Bulldog Leasing, Mining and Milling Company. The company held property on Bulldog Mountain, near Creede in Mineral County, Colorado. A statement in this prospectus read: "our own Bulldog lode may yet prove to be the great undiscovered mother lode of Creede." Marketing hype or not, it would prove prophetic (Huston 2005). During the period 1969 to 1985, Bulldog Mountain hosted Colorado's largest producer of silver and the fourth largest producer of silver in the United States – the Bulldog Mountain mine (Mineral Yearbook, 1991).

Figure 1 (right): Beautiful, rich vein slice – silver, baryte, and acanthite. From the Bulldog Mountain mine, 67 Stope, 9360 – 9500 Levels, Creede Mining district, Mineral County, Colorado. Hypogene silver, rimmed on both sides by baryte and base-metal/silver sulfides. Ore from this stope was some of the richest in the mine and ran up to several thousand ounces of silver per ton of ore. Specimen dimensions: 12.5 cm x 25 cm x 1.2 cm. Donation from the Daniel Aldrich, Sr. Collection. Mines Museum of Earth Science Collection, catalog #57642.

Although the Creede area was prospected extensively beginning in the 1890s, Bulldog Mountain and its rich silver ores remained relatively untouched by the early prospectors. The Homestake Mining Company's exploration would find a silver bonanza under the slopes of Bulldog Mountain in 1964. The company's Bulldog Mountain mine would go on to produce 25.3 million ounces of silver – that's over 790 tons of the precious metal, worth more than $600,000,000 based on the current value of silver – and 48.6 million pounds of lead (Huston, 2005; Eckel 1997).

Creede's Bulldog Mountain mine is famous for its fine specimens of native silver and silver-bearing minerals.

Figure 2 (above): Three (3) fine "bird nests" of delicate, tangled wires of silver. Bulldog Mountain mine, Creede Mining district, Mineral County, Colorado. These silver wire nests grew in vugs and were recovered from the upper oxidized zone of the ore body. Field of view: about 7.0 cm x 5.0 cm. Anonymous collection.

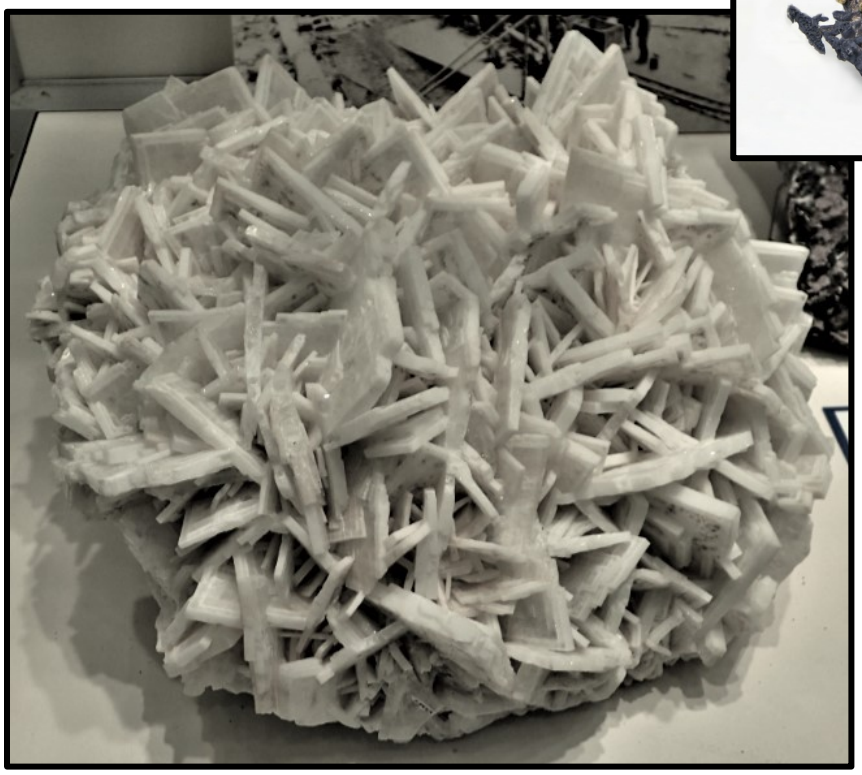


Figure 3 (above): Beautiful branching arborescent growth of silver crystals. Bulldog Mountain mine, Creede Mining district, Mineral County, Colorado. Specimen dimensions: 4.5 cm x 3.8 cm x 2.5 cm. Mines Museum of Earth Science Collection, catalog #56208.

Figure 4 (left)*:* Fine specimen of large, platy baryte crystals. Bulldog Mountain mine, Creede Mining district, Mineral County, Colorado. Specimen dimensions: 32.0 cm x 29.0 cm. Mines Museum of Earth Science Collection, catalog #92.58

The Town of Creede sits at the lofty elevation of 8,799 feet in southwest Colorado's San Juan Mountains. In some circles, it's referred to as the "Second Leadville" and was the center of mining activities for Mineral County. From 1891 through 1985, the Creede Mining district reportedly produced 85.7 million ounces of silver (Huston 2005) - having a value of about two billion dollars in today's silver prices. The Creede area has hosted floods of miners, merchants, motley assortments of characters drawn to rowdy boomtowns, along with world-renowned silver mines, including its latter day "crown jewel", the Bulldog Mountain mine.

Location Views of Creede: General Location, Terrain, Historical Mining Context

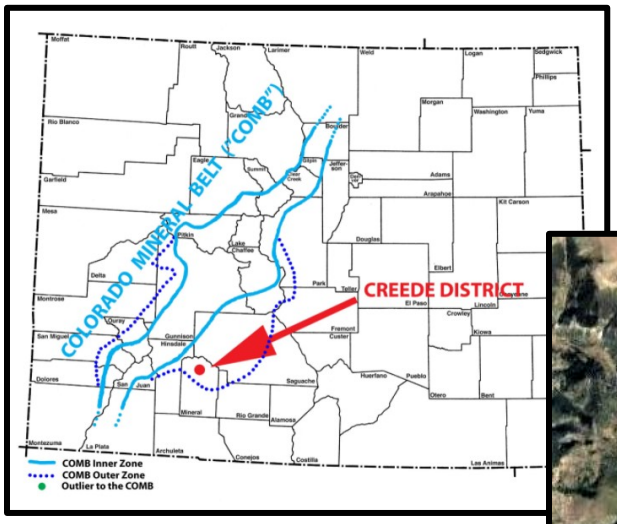
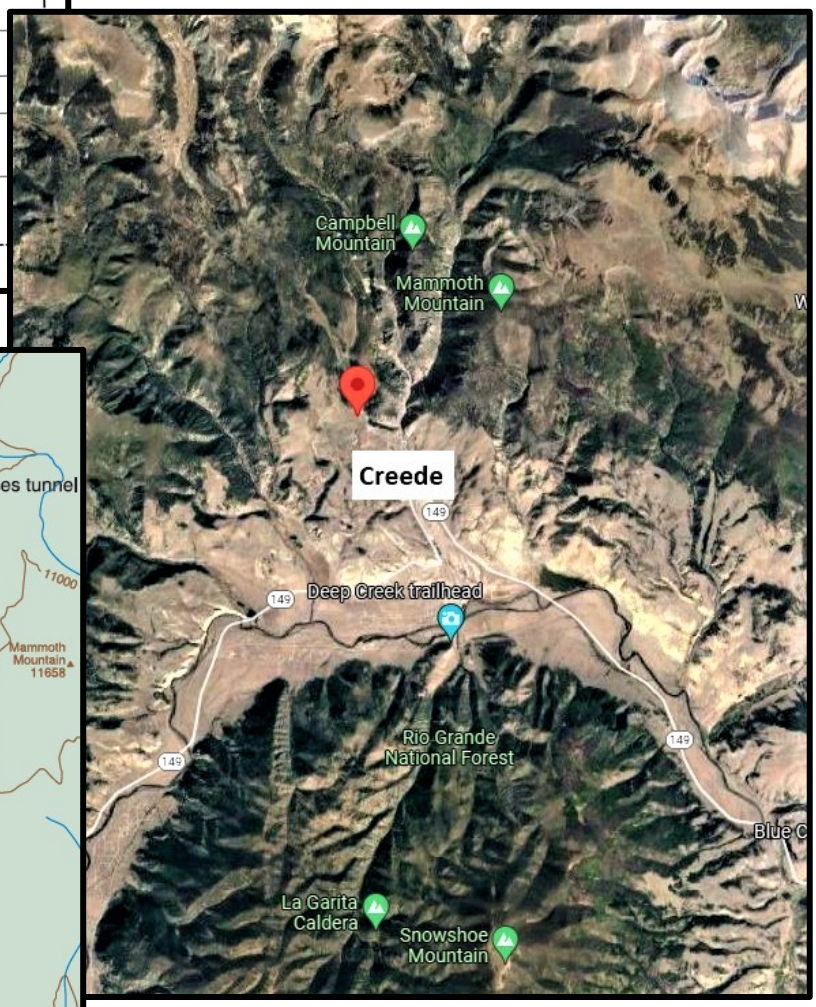


Figure 5 (left): General Location - Map showing the location of the Creede Mining district in the State of Colorado. Credit: Mines Museum of Earth Science Digital Archives.

Figure 6 (below): Terrain – Map showing terrain of area, location of Creede, and location of Bulldog Mountain mine (red circle). Top of the map is north. Credit: Google maps.



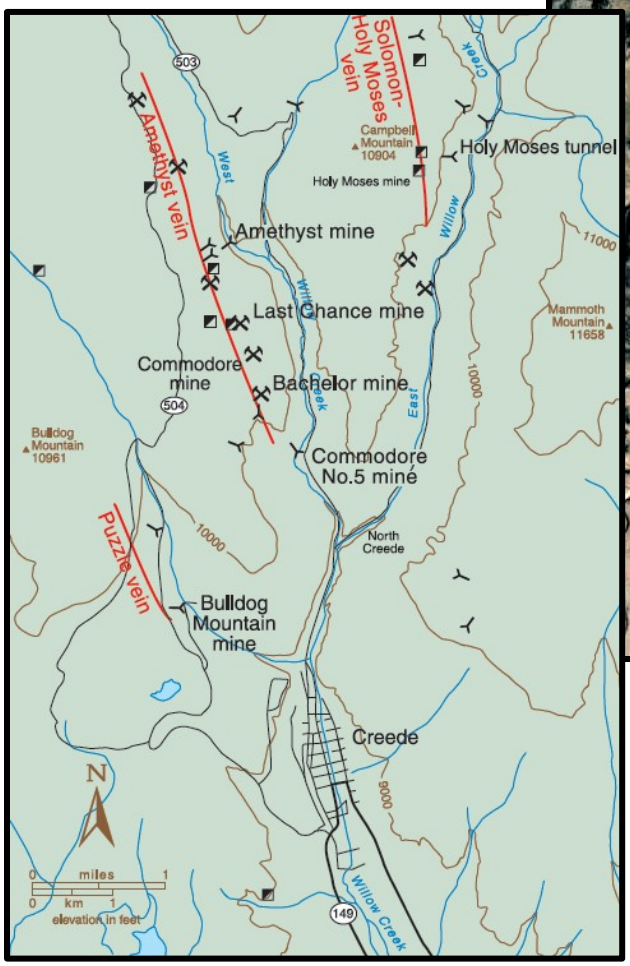


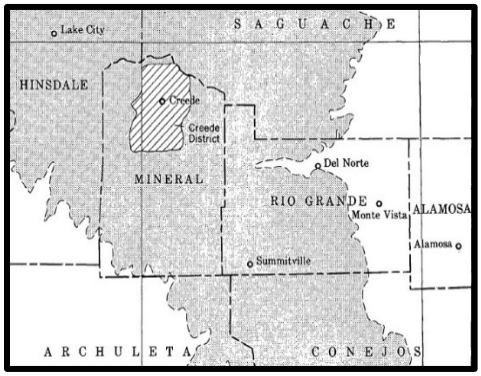
Figure 7 (left): Historical Mining Context - Map of the Creede Mining district showing major mines and three primary silver-bearing veins (Amethyst, Bulldog Mountain/Puzzle, Solomon-Holy Moses). The OH, P and Alpha-Corsair veins are not shown). Cartography credit: modified from William Besse.

Figure 8 (below and left): Click the underlined link below (control + click) to access the informative Rocky Mountain PBS video outlining the general history of Creede, Colorado. Video credit: Rocky Mountain PBS, 2019.

Video of the Colorado Experience: "Creede - The Last Boom Town" – RMPBS on YouTube

The Creede Mining District, Mineral County, Colorado

Historical Overview



Creede was one of the younger of the major mining camps in Colorado. The Creede Mining district is situated near the confluence of Willow Creek and the Rio Grande River in the northern half of Mineral County, in the San Juan Mountains of southwestern Colorado. (See figure to right, with district shown in hatching.) It includes all the mines within a few miles of the town of Creede (Hull, 1970). The district has been part of Mineral County since it separated from Hinsdale County in 1893 (Emmons and Larsen, 1923).

The district's mining activity started with John C. McKenzie. He staked the Alpha mine three miles southwest of Creede in 1876. Two years later, he located the Bachelor mine west of Willow Creek. His discoveries didn't generate a lot of interest at the time (Raines, 1992).

That changed in August 1889, when William Harvey – better known as Nicholas C. Creede - found an outcrop of amethystine quartz and native silver near East Willow Creek and staked a claim named the Holy Moses (Voynick, 2020). He reportedly found an outcrop of the silver chloride mineral, chlorargyrite, and exclaimed "Holy Moses, chloride of silver!" He named the claim the Holy Moses (Raines, 2009). One of the interested parties to this discovery was Colorado railroad magnate David Moffat, who would contract services from Nicholas Creede as a prospector. Moffat would become a major investor in the district and main stockholder in several of the area's mines.

Within a year, word spread about the rich strike, starting a rush to the area. In a short time, rich silver ore was found along West Willow Creek in veins that would later be known as the Amethyst vein system - after a primary component of the vein, distinctive lavender-colored quartz. This area was host to numerous well-known mines like the Amethyst, Last Chance, Commodore, Bachelor, Park-Regent, New York, and Del Monte. See Figure 7. Until the opening of the Homestake Mining Company's Bulldog Mountain mine in 1969, the Amethyst, Commodore, Bachelor and Last Chance mines accounted for over 90% of the district's silver production (Emmons and Larsen, 1923; Meeves and Darnell, 1968).

Figure 9 (left): Nicholas C. Creede (1843 – 1897), born William "Billy" Harvey, prospector and discoverer of the famous Holy Moses mine and namesake for the Town of Creede, Colorado. Date of photo unknown. Image credit: Wikipedia.

Figure 10 (left): Supt. Harry Van Horn and miners at the Commodore mine circa 1900. Image credit: Denver Public Library Western History digital collection.

Figure 11 (below): Early Creede saloon with its customers. Image credit: Denver Public Library Western History digital collection.

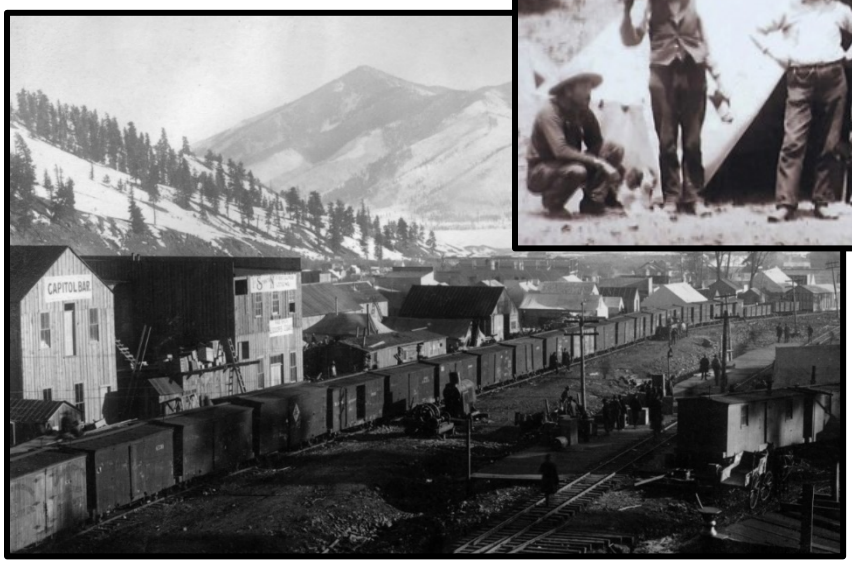


Figure 12 (left): Ore cars on the Denver and Rio Grande Railroad line in Creede circa 1895. Image credit: Denver Public Library Western Digital Archives.

During the mining boom from 1890 through 1893, the ensuing flood of miners and merchants rapidly propelled the mining camp's population to more than ten thousand inhabitants. Living conditions were tough for many. "*There were nearly a hundred hotels in Creede during its boom; some were plain board rooms, sixteen feet square with a blanket for a door and a dignified name. In such a room twenty to sixty cots were placed. The price was $1.50 a night, with a blanket furnished, or fifty cents without the blankets*" (Mumey, 1949). In 1890, the settlement was unofficially named Creede in honor of the discoverer of the rich silver ore near East Willow Creek (Mumey, 1949).

This phenomenal growth was primarily the result of three events: the federal passage of the Sherman Silver Purchase Act which increased the price of silver; the arrival of the Denver and Rio Grande Railroad extension line from nearby Wagon Wheel Gap; and development of the district's rich silver-lead deposits (RMPBS, 2019; Raines, 1988).

A notorious assortment of characters were also drawn to the mining boom town: Soapy Smith - master frontier con artist, Bat Masterson – famous frontier peace officer and saloon owner, Poker Alice - notorious gambler, and Bob Ford – killer of Jesse James. A newspaper wrote…"*Thirty saloons are in full blast night and day; each saloon has a gambling attachment and half a dozen at least promote the usual dance-hall iniquities. These places are thronged at all hours with*

men in the various stages of drunkenness, and oaths and ribaldry and wantonness, with an occasional scrap, relieve the dreadful evil monotony of jingling glasses, and clicking chips" (Colorado Sun, 1892).

Creede's early silver and base-metal production was primarily from the rich oxidized deposits, where most values came from the ore minerals chlorargyrite, silver-bearing cerussite, and native silver (Raines, 1992). In 1893, silver production peaked in Creede's mines at 4,897,684 ounces (Huston, 2005).

Creede's mining boom days started coming to an end even before its peak silver production in 1893. The congressional repeal of the Sherman Silver Purchase Act in October 1893 removed the government subsidy that helped maintain higher silver prices. The downward pressure on silver prices began years earlier. Silver prices had declined from an annual average of $1.34/ounce in 1871 to $.87 by 1892. The national economy was struggling. The excess production from silver mines and the over-extended railroad companies, helped exacerbate the problem. When the British closed their coin mints in India in June 1893, silver prices dipped from $.82/ounce to $.62/ounce. The ending of U.S. price supports for silver caused the silver market to bottom in March 1894, at only one cent lower than that previous record low price (Raines, 1988). The resulting economic havoc to the silver industry in the American West, as well as in the Creede district, was dramatic (Henderson, 1926; Mumey, 1949; Blair, 1980).

In 1894, silver production in the Creede district dropped to 1,866,927 ounces and stayed low until 1897, when improved economic conditions increased production (Huston, 2005). During this period of erratic production, the population of Creede plummeted from about 10,000 to 400 inhabitants. The menagerie of Wild West characters moved on to new abodes elsewhere.

By the early 1900's, mines had nearly exhausted the near-surface bonanza ores and were working at greater depths, extracting silver-bearing primary sulfide ores. These ores required beneficiation and the construction of expensive milling facilities to treat the lower-grade sulfides. (Beneficiation is the treatment of raw materials (such as silver-lead ores) to improve their physical or chemical properties in preparation for smelting.) Ruins of milling operations, built to assist in the beneficiation of these ores, are still visible on the area's hillsides today.

During the period around 1900, several access tunnels (Nelson, Wooster, and Humphreys) were driven to reach deeper parts of the Amethyst vein system in search of ore. No significant ore bodies were found, but they would also serve as drainage for excess water (a major problem in major mines along the Amethyst vein) and haulage ways to transport ore to the mills.

Mining in the Creede area continued to be a very tough proposition well into the 1900's. During the "Panic of 1907", the price of silver dropped yet again from $.68/ounce to $.53/ounce and cratered production (Raines, 1988; Hauck, 1979).

Figure 13 (left): 1910 postcard view of the large Humphrey's concentrating mill that operated from 1902 to 1918. The mill treated base-metal ores from the Amethyst vein zone. The Commodore mine is in the background. Image credit: John Taylor collection.

The consolidation of mining properties was common during this period to cut mining and milling costs and to keep the mining operations viable. After World War I, district mines were operated primarily by leasors. From the 1920's through the 1950's, a number of these companies operated in the Amethyst vein area, including: Sloan Lease (Amethyst), Dean Lease (Commodore), Withrow Lease Co. (Commodore), Morgan and Sloan (Last Chance), Hollister and Futterer (Del Monte, New York, and Equity), and Herman Emperius's famous Emperius Mining Company (Huston, 2005; Emmons and Larsen, 1923; Larsen, 1929; Meeves and Darnell, 1968; Steven and Ratte, 1965).

The most well-known and successful of these companies was the Emperius Mining Company, which by the 1930's, controlled much of the Amethyst vein system. Emperius Mining was responsible for developing the rich OH, P, and E veins. The discovery of the OH vein in 1938 or 1939, was the most important, with most of Creede's silver and base-metal production in the 1940s and 1950s coming from this vein (Steven and Ratte, 1965; Meeves and Darnell, 1968).

Figure 14 (right): Herman Emperius (1874 – 1932). Credentials include co-founder of the Emperius Mining Company, mayor of Alamosa, Colorado, and President of American National Bank in Alamosa. Image credit: sangreheritage.org

These leasing operations lifted Creede through the tough 1930's. But when silver prices hit an all-time low of $.25/ounce during the Great Depression in 1930-1933, all mining operations in the district stopped (Raines, 1988). In 1934, the price of silver was fixed at 65.65 cents/ounce by federal government decree, and mining in the district resumed in some of the larger mines (Rosemeyer, 2010).

By 1946, most of the ore mined was lower-grade primary sulfides, with high base-metal values. Very little oxidized ore was being produced. Silver production was generally low and remained so until Homestake's Bulldog Mountain mine was brought into production.

In the early 1960's, the Amethyst and Solomon-Holy Moses vein systems were still the center of Creede's mining universe. Larger companies like the Emperius Mining Company, Creede Mines, Inc., and the Colorado Imperial Mining Company, controlled most of the claims on these veins (Meeves and Darnell, 1968). However, it would be the U.S. Geological Survey who would soon turn this mining universe upside down.

In the early days of the district, the Bulldog Mountain's upper reaches had been unsuccessfully explored by prospectors. In the 1950s and 1960s, the Creede Mining district was studied again by the U.S. Geological Survey, and a short professional paper was published by Steven and Ratte (1960). The report suggested that the Bulldog Mountain Fault Zone would be a favorable structure to prospect. It indicated the Bulldog Mountain fault system might intersect the Amethyst vein system at depth. See Figure 18. According to this hypothesis, the Bulldog system should have received the same flows of mineralizing solutions that resulted in the rich Amethyst ore bodies. Based on recommendations from this study, an exploration project would lead to the discovery of an immense, rich deposit of silver ore in the deeper portions of the Bulldog Mountain fault system (Meeves and Darnell, 1968).

"Quick Read": Geology and Mineralogy of the Creede Mining District

The geology and mineralogy of the Creede and San Juan Mountain areas, including the Bulldog Mountain mine, have been described in detail in numerous sources. Interested readers are referred to the **Appendix on page 17** of this article for more detailed information and references about the geology and mineralogy.

Bulldog Mountain and the Bulldog Mountain Mine

Introduction

The Bulldog Mountain mine is located about one-half mile northwest of the town of Creede, Mineral County, Colorado. The last major period of silver production in the Creede Mining district was from the Bulldog Mountain mine. From 1969 to 1985, the mine produced silver and base-metal ores from the Puzzle and West Strand veins, part of the Bulldog Mountain Fault system**.** See Figure 15.

The Bulldog Mountain Fault system and its high-grade silver ores remained relatively untouched by the thousands of prospectors and miners who explored the Creede area in the 1890's. The area was prospected in the early days through the Bulldog and Puzzle/Nickel Plate tunnels or adits, and in numerous shallow shafts and pits on the mountain's barren cap rock. See Figure 16. To the north and south, the Bulldog vein structures pass under large landslide masses, leaving only subtle surface expressions. At the few localities where the Bulldog Mountain veins crop out, they are mineralized only by brecciated chalcedony and manganese oxides, and small baryte veinlets, with no indication of the high-grade ores at depth. At a few outcrops, the "veins" are simply unmineralized faults (Plumlee, 1994; Meeves and Darnell, 1968).

The rich silver ores of Bulldog Mountain were not found by the early prospectors….the Bulldog vein structures pass under large landscape masses and are largely concealed.

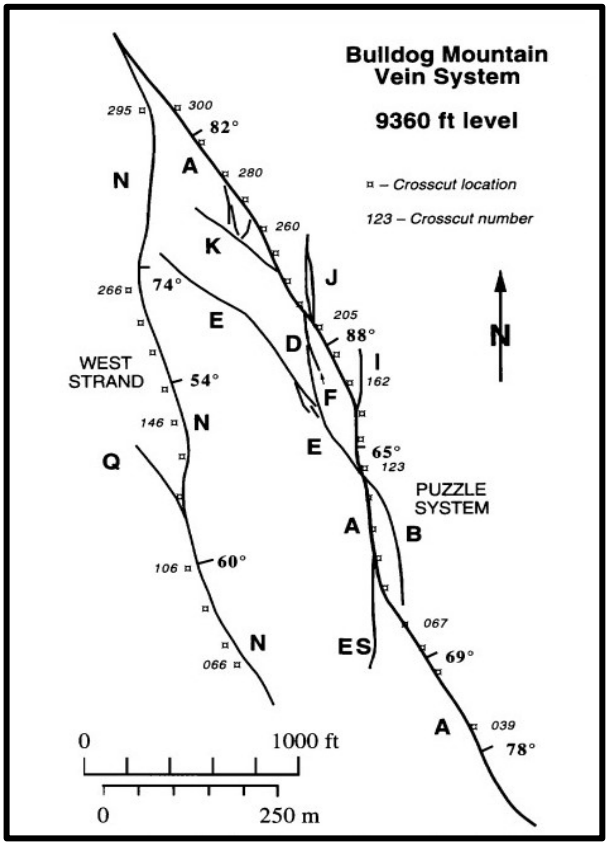


Figure 15 (right): Generalized geologic map of the 9360 ft Level, Bulldog Mountain mine, showing the attitudes and distributions of major veins within the Bulldog Mountain vein system – Puzzle (East Strand) and West Strand. Major veins are noted and crosscuts are numbered. (Plumlee, 1994. Reproduced from geologic mine maps compiled by Homestake Mining Company mine geologists. Reproduced with the permission of the Homestake Mining Company.)

Mining Pioneers: Lead-Up to Homestake

Small-scale mining operators have deep roots in the area. They have had important roles in the district's sociocultural history, generation of employment, and in helping to evaluate and develop mineral resources. From 1894 to 1974, small-scale operators were important players in exploration work on Bulldog Mountain, including:

- Dr. A.J. Biles
- Bulldog Leasing, Mining, and Milling Company
- Manning W. "Bill" Cox and Fred Baker, Jr.
- Bulldog Mountain, Inc.
- Humphreys Exploration Company and McCulloch Oil Company of California

In the 1920's, the Bulldog Leasing, Mining and Milling Company's efforts would come tantalizingly close to finding Bulldog Mountain's massive trove of silver. They abandoned their mining efforts nearly forty years before Homestake Mining Company made their discovery on virtually the same ground.

Link to Bulldog Mountain mine

- **Biles procured valuable mining claims, including the rich Kansas City Star.**
- **Started development of some early mining infrastructure on Bulldog Mountain.**

Dr. A.J Biles

Dr. A.J. Biles procured claims on Bulldog Mountain back in 1894, including the famous Kansas City Star claim. Biles attempted to develop the claims himself and found the task daunting. Biles formed a small partnership of residents, where members contributed $5.00 each per month to help pay for the mining effort. Biles sunk a shaft on the Kansas City Star claim to a depth of about seventy feet on the apex of the Bulldog Mountain vein (Emmons and Larsen, 1923). Biles reportedly said: "In 1894 the Kansas City Star ran assays from 4 to as high as 82 ounces of silver per ton." (Blanchette, 1926; Huston, 2005). The Kansas City Star shaft soon filled with water. Over a period of three years, the Biles partnership also drove a tunnel 861 feet into the belly of Bulldog Mountain. But soaring prices for goods, scarce labor, difficult working conditions (excess water in mine workings), all contributed to the decision by Biles to dissolve the partnership (BLMM Prospectus, circa 1915).

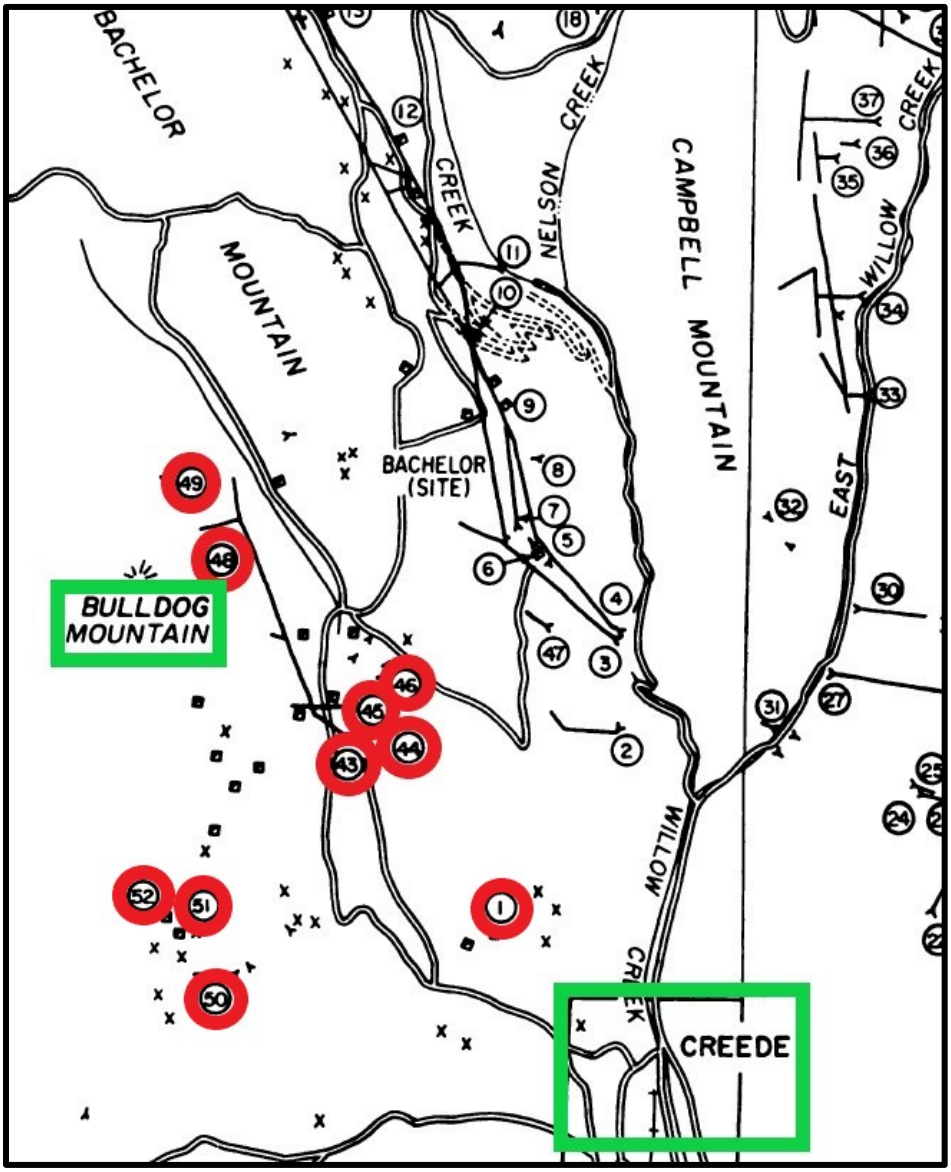


Figure 16 (left): Map showing the location of ten (10) of the most significant mining exploration and development efforts on Bulldog Mountain. Top of map is north. The map numbers circled in red show their locations. Development numbers, their names, and corresponding page(s) of discussion in this article, are shown below:

1 – Tahrshathea shaft
P-11
43 – Bulldog tunnel **
P-10
44 – Cleveland tunnel
45 – Puzzle adit (Nickel Plate) **
P-10, 11, 12
46 – Conejos tunnel **
P-10
48 – Kansas City Star shaft **
P-10, 11, 12, 13
49 – North Star tunnel
P-11
50 – Oxford tunnel
P-11
51 – Bethel shaft
P-11
52 – Little Gold Dust shaft

Exploration and mining efforts listed above and tagged by ** will be discussed later in this article as important pieces in the mosaic of rich ore bodies exploited by the future Bulldog Mountain mine.

Map credit: modified from Meeves and Darnell, 1968.

Link to Bulldog Mountain mine

- **Bulldog Leasing, Mining, and Milling Company absorbed mining properties from A. J. Biles.**
- **Drove exploration shafts and tunnels into Bulldog Mountain, including the Bulldog and Nickel Plate (later called the Puzzle) tunnels.**

Bulldog Leasing, Mining and Milling Company

The A.J. Bile holdings on Bulldog Mountain were absorbed into a newly incorporated company - the Bulldog Leasing, Mining and Milling Company. Thousands of shares of stock were issued. The new company's holdings included: Biles's "861 feet of finished tunnel" and his Kansas City Star shaft; six non-patented mining claims; bonds and leases on the Kansas City Star, Puzzle, and Conejos patented lode claims; and a tunnel site called the Nickel Plate (BLMM Prospectus, circa 1915; Huston, 2005).

In 1926, George Bancroft, a well-known mining engineer in the 1920's, was hired by the Bulldog Leasing, Mining and Milling Company (BLMM) to evaluate their properties on Bulldog Mountain (Creede Candle, 1927). Bancroft reported favorably on the mining potential of the properties and recommended BLMM drive drifts (tunnels) north and south along the Bulldog fault. A Bancroft report later stated the Bulldog tunnel was extended some 1,113 feet by July 26, 1926, where it did intersect the Bulldog fault zone**.** Little or no mineral value was reported from this work (Boppe, 2001; Huston, 2005).

Although the operator and timing of origination is not certain, it's believed the Nickel Plate tunnel (later known as the Puzzle tunnel) was started into Bulldog Mountain sometime between 1914 and 1920, at an elevation of 9,940 feet above sea level. It was reported the company extended this tunnel in the 1920's to go under the shaft of the nearby Kansas City Star claim to intersect the Bulldog fault zone. The tunnel extension intersected the upper portion of the Puzzle vein for about 120 feet, where only a two-inch wide baryte seam was encountered. The tunnel was then abandoned in the late 1920's. No mineral value was reported (Homestake, 1969; Hull, 1970; Birdsley, 1968).

The financing for the Bulldog Leasing, Mining and Milling Company ended and soon, so did the company. There is no mention of mining activity on Bulldog Mountain in 1929 production reports (Huston 2005). Records of the Colorado Department of State show the Bulldog Leasing, Mining and Milling Company was no longer incorporated by October 12, 1931.

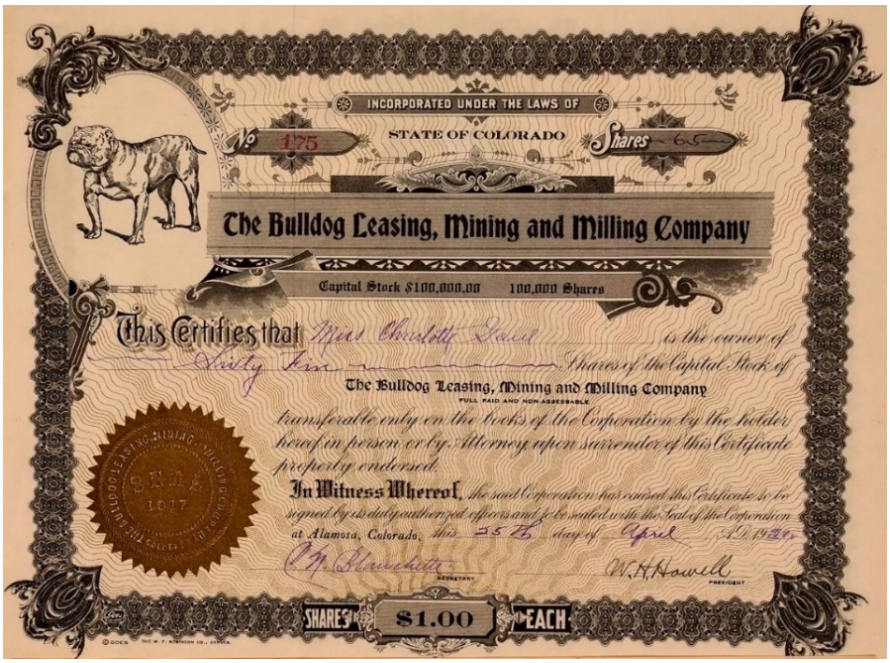


Figure 17 (above): Stock certificate of the Bulldog Leasing, Mining and Milling Company. Issue date 1921 for 65 shares. Credit: Western Americana Collections, Reno, Nevada.

The prospectus of the Bulldog Leasing, Mining and Milling Company would prophetically say: "Our own Bulldog lode may yet prove to be the great undiscovered mother lode of Creede." This would turn out to be right.

“Close, But No Cigar”, or Silver Is Where You Find It!

In 2001, Robert A. Boppe (Mine Engineer for the Homestake Mining Company’s Bulldog Mountain mine) wrote that the exploration work done by the Bulldog Leasing, Mining and Milling Company in the 1920’s, came very close to contacting the rich Puzzle vein. Had the company extended the Nickel Plate (Puzzle) tunnel another 200 feet with a little higher elevation along the Bulldog Vein, they would have contacted exceedingly rich silver ore. They would have made the silver discovery on Bulldog Mountain before the Homestake Mining Company. Boppe also stated some of the Bulldog Mountain mine’s richest silver ore came from A.J. Biles’s abandoned Kansas City Star claim, including a stope where massive, highly compacted native silver wire nests were found (Boppe, 2001; Huston, 2005).

In the 1950’s, the Emperius Mining Company took samples of a vein cut by the Nickel Plate Tunnel. The company decided the low metal prices did not justify purchasing the property (Hull, 1970, oral communication with R.C. Huston).

No further underground exploration was reportedly undertaken on Bulldog Mountain until 1961, when a company named Bulldog Mountain, Inc. would extend the Nickel Plate Tunnel (Hanscom, 1968).

Fast-forward to 1953 – 1960

From 1953 to 1957, Thomas A. Steven and James C. Ratte conducted geological investigations as part of a cooperative program of the U. S. Geological Survey and the Colorado Metal Mining Fund Board (Howell, 1969). In a preliminary report on the Creede district released in 1960 (Steven and Ratte, 1960), they indicated the Bulldog Mountain fault system might intersect the Amethyst vein system at depth. The Bulldog system should have received the same flows of mineralizing solutions that resulted in the rich ores of the Amethyst vein**.** Therefore, the area had potential for undiscovered mineralization. Steven and Ratte followed up with a final Creede report in 1965.

Figure 18 (right): Section of Tectonic Map of the Creede district, Colorado, (Steven and Ratte, 1965; Plate 2; top of map is north). Stevens and Ratte postulated the Bulldog Fault zone “probably intersects the Amethyst fault zone at depth, and it may have an economic potential that greatly exceeds its structural significance.” Note dashed-line from Amethyst to Bulldog fault at top-center of map.

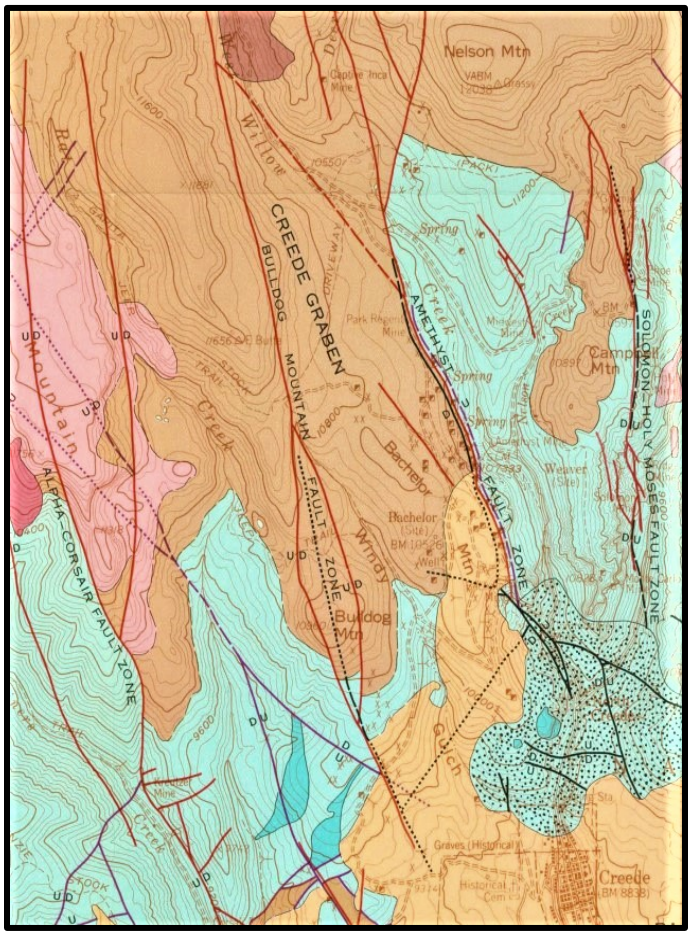
In the Bulldog Fault zone (center of map), there are two well-defined mineralized faults. Both faults have curving trends - the western fault convex to the west, and the eastern fault convex to the east.

Other Early Developments on Bulldog Mountain (See Figure 16):

Tahrshathea shaft: In 1893, R.I. Fisher reportedly drove a shaft and tunnel for Dr. Al Dean of Denver. The shaft was sunk to 326 feet. Ore assayed 5 – 10 ounces of Ag per ton (Clark, 1934).

Oxford tunnel and Bethel shaft: In the 1920’s, the Oxford Tunnel and Bethel Shaft were driven on the south side of Bulldog Mountain. Owner F.G. Blake reported ore assays of 5.5% Pb, 2 ounces of Ag, and 0.8 ounce of Au. (Emmons & Larsen, 1923; Larsen, 1929).

North Star claim: A tunnel was run on the north side of Bulldog Mountain for 175 feet. Ore assays a few ounces of Ag per ton (Emmons and Larsen, 1923).



Two events would help fuel a second mining boom in the Creede district (1960 to mid-1980's). First, mining operators took note of the Steven and Ratte report (1960). And second, a 1961 Presidential Order helped increase the price of silver, by ending government controls over its price. This second boom was very different from the first. Instead of the thousands of prospectors that flooded into the Creede district during the 1890's, mineral exploration geologists with sophisticated scientific methods now scoured the area instead.

Link to Bulldog Mountain mine

- **Baker and Cox team-up and stake mining claims that blanket Bulldog Mountain.**
- **Baker and Cox form Bulldog Mountain, Inc., to hold and explore their claims.**
- **In 1961, the company extends the old Nickel Plate tunnel and finds silver and lead ore.**
- **In 1963, Cox makes business pitch to Homestake Mining Company. Homestake acquires mining claims from Bulldog Mountain, Inc.**

Manning W. "Bill" Cox, Fred Baker, Jr., and Bulldog Mountain, Inc.

In the 1960's, Manning W. "Bill" Cox and Fred Baker, Jr., became mining "rock stars" in the Creede district. They were behind much of the latter-day exploration of the Bulldog vein system after mining exploration activities on the vein had been idle for many years**.**

Shortly after the Steven and Ratte (1960) report was released, Bill Cox contacted Fred Baker and suggested he stake mining claims over the probable surface projections of the Bulldog Mountain vein system. Baker responded by blanketing Bulldog Mountain with claims. He abutted his claims on all sides of the old Kansas City Star claim patented by A.J. Biles in 1894 (BLM Map). Bulldog Mountain, Inc., was then organized by Baker, Cox, and friends, to hold and explore the company's block of 61 mining claims (Huston, 2005; Del Norte Prospector, 1961).

The Bulldog Leasing, Mining and Milling Company's old Nickel Plate Tunnel (later known as the Puzzle tunnel) was extended by Bulldog Mountain, Inc. in 1961. They found early indications of rich silver and lead ore in the Puzzle vein (Hanscom, 1970; Hull, 1970; Huston, 2005).

Sidebar…Fred Baker, Jr., had also been associated with a company named Statesman Mining Company, which had a limited partner and loan source in the famed cowboy and action movie actor John Wayne.

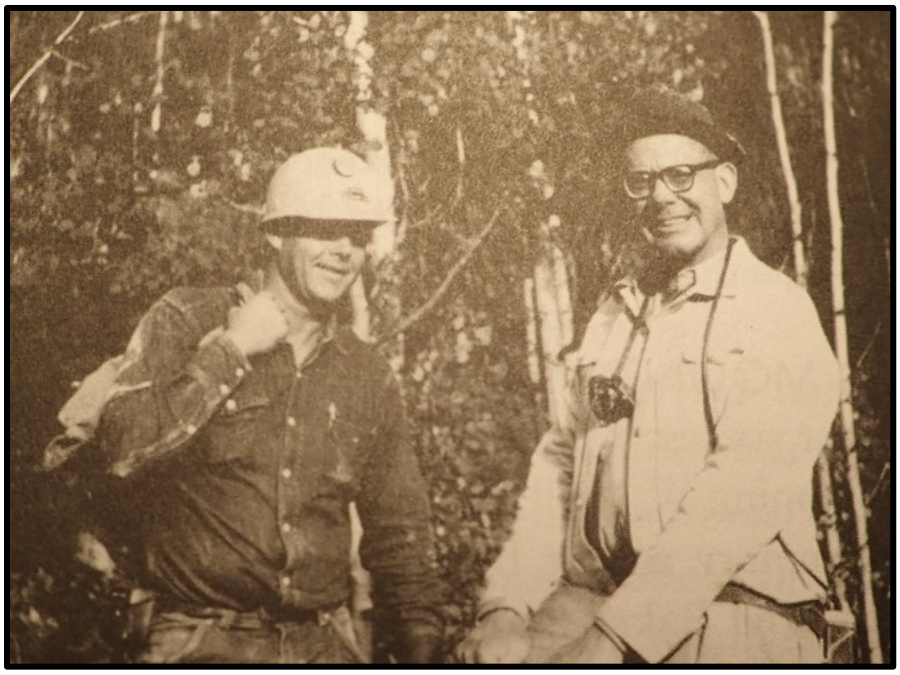


Figure 19 (left): Grainy image of Fred Baker, Jr. (left) and Manning W. "Bill" Cox (right) exploring the "Pogo" claims. These claims were owned by long-time Creede residents and mine owners John and Inez Jackson. Image credits: John Jackson (photographer) and Richard C. Huston (publisher).

Link to Bulldog Mountain mine

- **Cox convinces Humphreys Exploration Company to drill the south end of Bulldog Vein system. No mineral values were found.**
- **In 1968, McCulloch Oil Company purchases claims from Bulldog Mountain, Inc., that were not acquired in 1963 by Homestake.**

Humphreys Exploration Company and McCulloch Oil Company of California

Cox, the consummate "shaker and mover", contacted Humphreys Exploration Company and convinced them to drill the south end of the Bulldog Vein system. In 1961 and 1962, multiple exploration holes were drilled by Humphreys, but no mineral values were encountered.

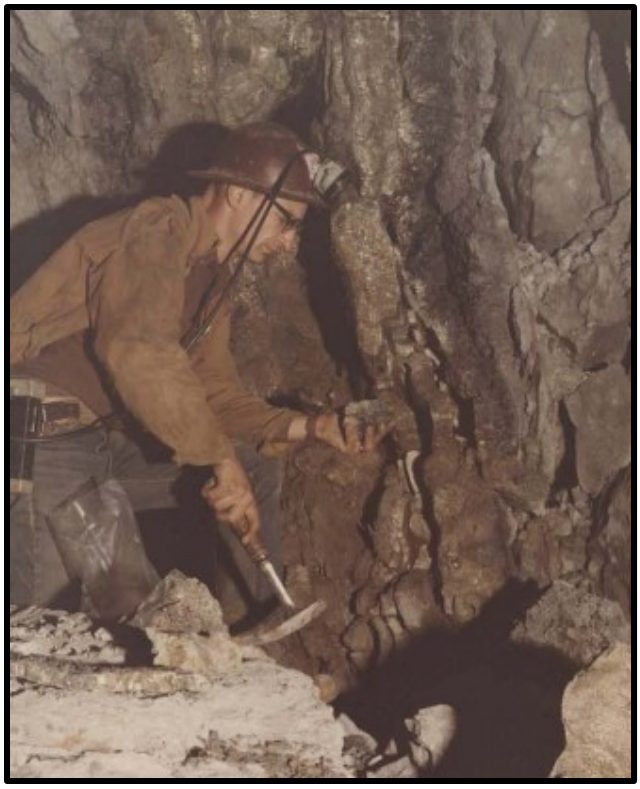
In 1963, Cox contacted the Homestake Mining Company and recommended they lease Bulldog Mountain, Inc. property**.** Homestake would soon oblige by leasing most of their claims (Howell, 1969; Huston 2005).

McCulloch Oil Company of Los Angeles, California, purchased the remaining Bulldog Mountain, Inc. holdings in February 1968 from Baker and Cox. (The Homestake's lease and mining control on about 55 claims previously held by Bulldog Mountain Inc., was not affected by the McCulloch transaction.) Rumors say Cox and Baker pocketed around a million dollars each.

The Homestake Mining Company

On September 4, 1963, based on the recommendation from Bill Cox and augmented by the preliminary report from Steven and Ratte (1960), most of the Bulldog Mountain, Inc. properties (55 claims) were leased by the Homestake Mining Company making them majority owner. The project was financed by an O. M. E. loan and under a Lease and Option Agreement, Homestake backed the venture by furnishing additional funds plus management (Howell, 1969; Huston, 2005).

The Bulldog Mountain mine project was directed and managed by the Black Hills Division of Homestake. Numerous Homestake employees from the Lead, South Dakota, gold mining operation, were temporarily transferred to Creede for mine and mill development (Howell, 1969).



Homestake's new properties consisted of patented claims (including the rich Kansas City Star claim), mill site claims, water rights, and various surface holdings. Homestake purchased the old Kansas City Star claim in a separate transaction from a local group that sponsored the annual raft race on the nearby Rio Grande River. As the story goes, the race committee had originally purchased the claim from Mineral County for back taxes many years after the Bulldog Leasing, Mining, and Milling Company folded. They intended to raffle it off as part of their race activities. Evidently, the committee had already raffled off a one-tenth interest in the claim to a woman in Denver. The committee sold the remaining nine-tenths of the claim to Homestake. Of course, Homestake wanted the whole claim and paid the woman's demand for $10,000 and a new car. The Kansas City Star would go on to be one of Homestake's most profitable properties (Boppe, 2001).

Figure 20 (left): Bulldog Mountain mine geologist examining botryoidal layers and masses of pyrite in the Puzzle vein. Image credit: Hull, 1970.

Even though silver production would not start until 1969, Homestake did not acquire full control of the Bulldog Mountain properties until 1974. They purchased the remaining property from McCulloch Oil Company of California on September 26, 1973, then finished royalty payments to Bulldog Mountain, Inc. in October of 1974 (Boppe, 2001).

The first Homestake tunnel driven into Bulldog Mountain, the 9700 Level (2956 meters), was started in June 1964. See Figure 21. The 9700 Level was driven along the East Strand of the Puzzle vein for about 7,000 feet and exposed rich silver and lead ore, proving the theory of Steven and Ratte (1960) was correct (Homestake, 1969).

This exploration and development indicated they had found a rich silver-and-lead bearing vein system similar to the silver-rich upper portion of the historic Amethyst vein system (Meeves and Darnell, 1968). The width of ore bodies encountered in this exploration ranged from a stringer of a few inches to a shear zone of some eight feet in width. Mineralization ranged from weak to high-grade. The ore-grade material was oxidized in appearance and contained abundant wire silver, other silver-bearing minerals, and galena. Baryte and quartz were the primary gangue minerals.

The commercial value of the deposit had not yet been determined at this point, because the vertical extent of the ore was unknown. In June 1966, a new tunnel was started 340 feet below the 9700 Level. Work on this level (9360 Level) showed that rich ore values extended at least to the 9360 level (Hull, 1970; Homestake, 1969). See Figure 21.

The 9700 Level Was Like a "Pirate's Treasure Chest, Only Much Larger!"

Of the veins in the Puzzle system, the "A" vein would be the best developed and most productive (Plumlee, 1994). Driving the 9700 Level exposed very rich silver and lead ore. Robert A. Boppe described this silver bonanza…

"While driving tunnel on the 9700-foot level, the miners intercepted some of the most beautiful native silver ever discovered in the Creede mines. There was wire silver that looked like steel wool, massive leaf silver over an inch-wide, and large amounts of ruby silver (pyrargyrite). When the miners went into the mine and saw what the previous shift had blasted into, they could not believe their eyes. It was likened to a pirate's treasure chest, only much larger! This high-grade ore pocket was mined upward a distance of 240 feet from the 9700-foot level." (account in Rosemeyer, 2010)

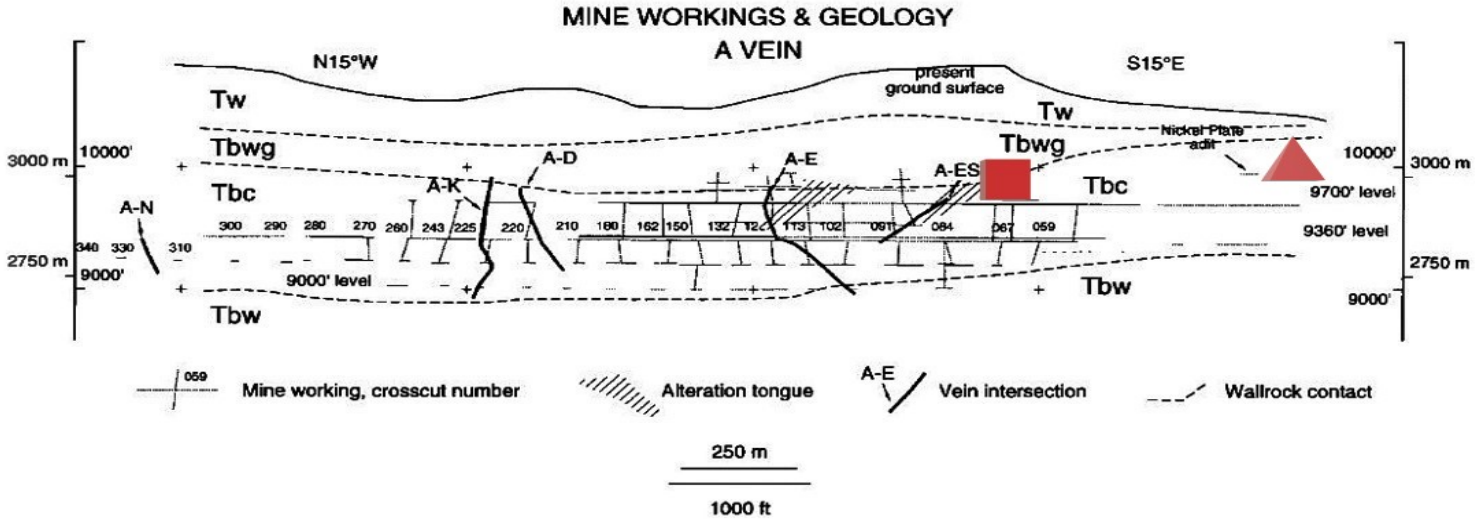


Figure 21 (above): Longitudinal section of the "A" vein, Bulldog Mountain vein system, showing mine workings, vein junctions, lithologic contacts, and location of wall rock alteration caps. Below the red square indicates the location of the famous 67 Stope. The location of the old Nickel Plate Tunnel/adit is indicated by the red triangle. Abbreviation for names of wall rock units: Tw = Wason Park rhyolite: Tbwg = Windy Gulch welding unit of the Bachelor Mountain member of the Carpenter Ridge Tuff; Tbc = Campbell Mountain welding unit of the Bachelor Mountain Member of the Carpenter Ridge Tuff; Tbw = Willow Creek welding unit of the Bachelor Mountain Member of the Carpenter Ridge Tuff. Modified from Plumlee, 1994.

Homestake now believed operation of the Bulldog Mountain mine was economically feasible at silver prices of the time. In early 1968, the decision was reached to build a 300-ton capacity/day mill. In September 1968, the mill building was completed (Homestake, 1969; Howell, 1969).

Figure 22 (right): A 1970 view of the Bulldog Mountain mine and mill complex. The 9360 Level portal is in the lower center of image, the 300-ton per day capacity mill is shown as the large structure in center foreground, Town of Creede is center left, and the Rio Grande River follows the curved outline of the Creede caldera in the background. Image credit: Hull, 1970.

Production of rich silver-lead ore from the Puzzle vein began in May 1969. The statement in the old 1920's prospectus from Bulldog Leasing, Mining and Milling Company saying "our own Bulldog lode may yet prove to be the great undiscovered mother lode of Creede" turned out to be true.

Once the mining and milling of ore commenced, the silver-lead concentrates resulting from on-site milling were trucked to the Denver and Rio Grande Western Railroad's railhead some **3** miles away and loaded into flat-bottom cars for shipment to the ASARCO Works in El Paso, Texas (Howell, 1969).

The Bulldog Mountain mine was eventually developed along four major mining levels. These levels were labeled according to their elevation in feet above sea level: 9000 Level (2,744 meters), 9200 Level (2,805 meters), 9360 Level (2,854 meters), and 9700 Level (2,957 meters). The productive workings extended vertically from slightly below 9,000 ft to near 10,000 ft in elevation - about 1,000 feet in all (300 meters). An estimated 24 miles of mine workings were required for production of ore (e.g., tunnels, adits, drifts, shafts, raises, and winzes) (Boppe, 2001). The bulk of the Bulldog Mountain mine production came from veins of the Puzzle system – particularly the eastern strand of the Bulldog Mountain fault zone.

The development and start-up of the Bulldog Mountain mine took six years, from the time the property was leased in 1963 to the first silver and lead production in 1969. At peak production, the mine employed about 136 employees.

Blocks of Nearly Solid Silver – The Legendary 67 Stope

The 67 stope was a miner's dream! The highest-grade silver ore zone in the mine, a nearly vertical zone between the 9,360-ft and 9,700-ft levels on the Puzzle's "A" vein, was along what was called the 67 stope**.** See Figure 21. The stope – an open space left behind after the extraction of ore - was composed mainly of native silver, baryte, and sulfides. The ore was extremely high grade, assaying up to several thousand ounces of silver per ton of ore**.** An amazing sample in the Denver Museum of Nature and Science from the 67 stope weighs nearly 70 pounds and appears to be about two-thirds native silver by volume (Plumlee, 1994).

Figure 23 (right): Very thick, rich vein slice comprised of wire and massive silver, acanthite, and baryte. 67 stope, Puzzle Vein, Bulldog Mountain mine, Creede district, Mineral County, Colorado. Specimen dimensions: 7.0 cm x 5.0 cm x 2.5 cm. Anonymous collection.

By the 1970s, the mine had become well known as a source of fine silver specimens. The rich silver-lead deposit of the Bulldog Mountain mine was a "high-grader's" paradise – hundreds, if not thousands of native silver specimens, ranging in size from micro to cabinet-sized pieces, were brought out in miners' lunch pails during the mine's operation. The pieces ended up in the commercial pipeline going to eager collectors and mineral dealers. In a story told by Ken Wyley, a former miner in the Bulldog Mountain mine and current resident of Creede, he describes miners finding a large mass of silver that was blasted loose from the Puzzle vein**:** (account in Rosemeyer, 2010)…

"…they found a large chunk of the vein, about the size of a small washtub, partially buried in the muck pile. On closer inspection they noticed that the chunk was about 75% native silver that gleamed in their mine lights. One miner set up to start drilling a round at the far end of the stope while the other miner attacked the huge chunk of silver ore with a miner's axe to knock off the barite and quartz. When he finally removed most of the waste, he tried to cut up the mass with the axe but could only make shallow cuts in the silver. At lunchtime both miners attacked the mass with the axe, acting as a wide chisel, and a double jack and proceeded to cut the chunk up into manageable pieces. It took them a week to ferret all the pieces out of the mine and to their homes."

For interested readers, additional information about the Bulldog Mountain's mine operations, deposits, and production statistics by year, can be found at U.S Geological Survey Mineral Resources Data System (MRDS), by clicking the following link (ctrl + click):

https://mrdata.usgs.gov/mrds/show-mrds.php?dep_id=10281277

The Storied Bulldog Mountain Mine Goes Quiet

In January 1985, after producing over 25 million ounces of silver and 48 million pounds of lead, the Bulldog Mountain mine was closed due to low silver prices. With mine production costs at $7.50 - $8.00 per ounce of silver, it was not economically viable to operate with silver prices at about $6.00 per ounce at the time. It was reported 97 of the 114 workers, one-sixth of the population of Creede, were laid off (US Bureau of Mines Yearbook for 1985).

On August 5, 1992, Homestake issued a news release…"*Al Winters, Vice President and General Manager of Homestake Mining Company, announced the company will begin the decommissioning and final reclamation of the Bulldog Mountain Mine. Closure activities will include removal of the mill, sealing of portals, and recontouring and revegetation of disturbed areas*" (Homestake, 1992). The decommissioning and reclamation work was completed in July 1994.

With the closure of the Bulldog Mountain mine, even though minor surface and underground production of ore would continue for a few more years, almost a century of mining ended in the Creede district. Over a period of 94 years (1891-1985), the district produced an estimated 85.7 million ounces (more than 2,600 tons) of silver, 169,000 tons of lead, and 54,000 tons of zinc. All of this from an estimated 5.0 million tons of ore and 182 miles of mine workings (modified from Huston, 2005; Meeves and Darnell, 1968; Boppe, 2001; Ridge, 1933-1967; Jackson, 2001 and 2002).

Figure 24 (left): Downtown Creede in 2016. Image credit – Unknown.

"The cliffs are solid silver with wondrous wealth untold
And the beds of running rivers are lined with glittering gold
While the world is filled with sorrows and hearts must break and bleed
It's day all day in the day-time and there is no night in Creede"

Cy Warman

> **In Memoriam by the author to Frank N. Kucera, Jr. (1930 – 2021), an employee of the Homestake Mining Company for 37 years and part of the Bulldog Mountain mine development operation.**

Appendix

Geology and Mineralogy of the Creede Mining District

The geology and mineralogy of the Creede Mining district and the Bulldog Mountain mine have been described in detail in numerous excellent sources.

- For detailed information about the geology and geochemistry, interested readers are referred to the following references: (Bethke et al, 1976), (Barton, Bethke, and Roedder, 1977), (Bethke and Rye, 1979), (Robinson and Norman, 1984), (Plumlee, 1994), and (Plumlee and Whitehouse-Veaux, 1994).
- For detailed information about mineralogy, readers are referred to the following references: (Emmons and Larson, 1923), (Smith, 1974 and 2008), (Holmes and Kennedy, 1983), (Raines, 1988 and 1992), and (Plumlee and Whitehouse-Veaux, 1994).

"Quick Read"

The Creede district is in the central portion of the San Juan volcanic field, in a complex set of nested calderas. These calderas were formed by the eruption of seven major ash flow sheets during the period 28.25 to 26.15 million years ago (Lipman and Sawyer, 1988).

As geologic movement caused fractures and zones of fractures in the surrounding rhyolitic country rocks, hydrothermal solutions rich in silica, silver, lead, and zinc ascended toward the surface. Because of the decreased temperatures and pressures encountered by solutions as they moved upward along the fault zones, the solutions solidified to form massive veins with epithermal banding and crustified open-space fillings of minerals. These epithermal veins contained banded agate, amethystine quartz, native silver, and a variety of silver, lead, and zinc sulfides and sulfosalts. Erosion later carved and shaped the area into present topography and exposed some of the mineralized veins.

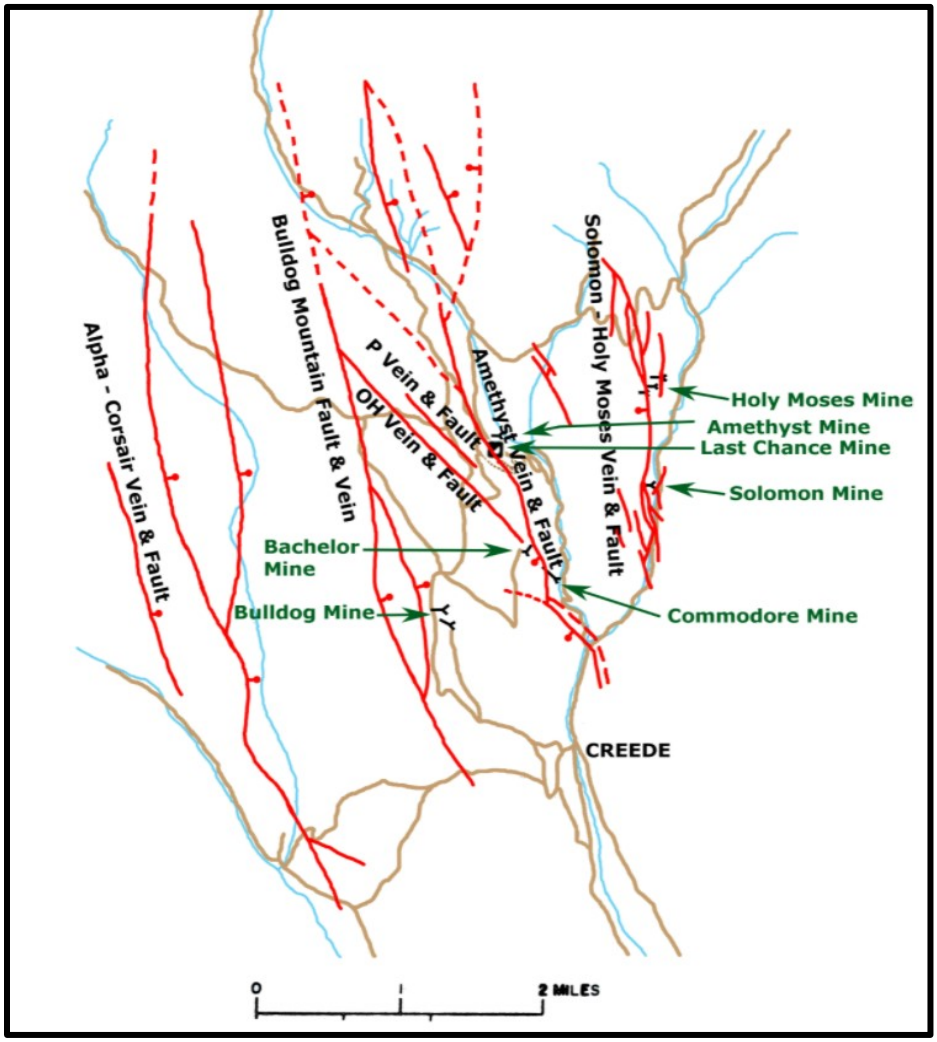


Figure 25 (above): Map showing primary fault and vein systems, and major mines, in the Creede Mining district. Credit: Mines Museum of Earth Science digital archives.

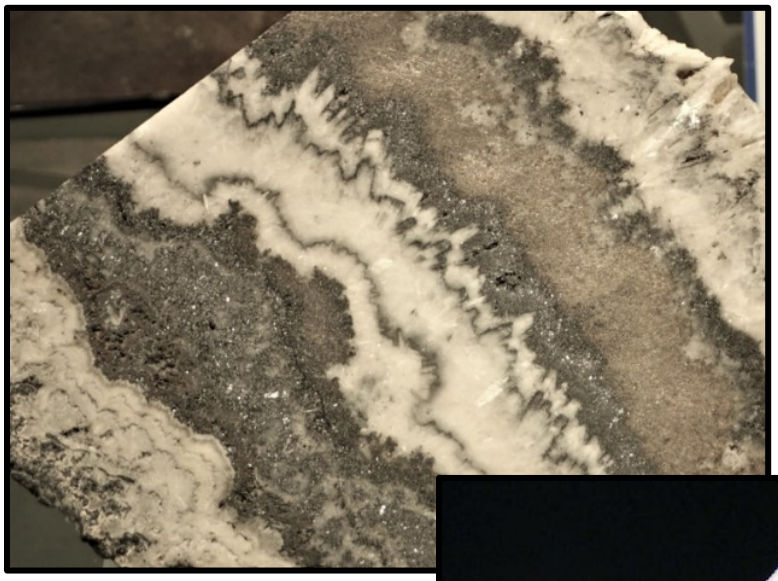


Figure 26 (left): Rich vein slice of interlayered native silver, acanthite, and baryte, showing epithermal banding. From the 67 Stope, Bulldog Mountain mine, Creede Mining district, Mineral County, Colorado. Specimen dimensions: 10.5 cm x 9.5 cm x 1.5 cm. Mines Museum of Earth Science Collection, catalog #57644.

Figure 27 (below): Unusual specimen of light pink Rhodochrosite replacing sharp crystals of a carbonate mineral (Calcite?). Bulldog Mountain mine, Creede district, Mineral County, Colorado. Field of view: 6.5 cm x 4.5 cm. Each crystal has been replaced and hollowed out as seen in the photo. Small, light pink Rhodochrosite rhombohedral XLs are also observed. Anonymous collection.

The district's vein deposits occur primarily as fillings in fractures of a graben extending between the Creede caldera and San Luis caldera to the northwest. The majority of Creede ores occur in the Bachelor caldera, the third caldera to form in the nested caldera complex, situated between the Creede and San Luis calderas. The geologic movement that caused the formation of the graben created six major fault zones. The two fault zones forming the west side of the graben are the Bulldog Mountain and Alpha-Corsair faults. The eastern side of the graben is bounded by the Amethyst and Solomon-Holy Moses fault zones. The OH and P fault zones occupy the center of the district**.** See Figure 25. The bulk of the production to date has come from four veins or fault systems, including the Bulldog Mountain, Amethyst, OH, and P. Lesser production has come from the Solomon-Holy Moses and Alpha-Corsair veins.

The most important ore deposits in the district are the silver-lead fissure veins, occupying these fractured zones. Generally, ore bodies do not exhibit pronounced out-crops. Many of these veins have been leached to significant depths, causing the removal of ore minerals from the upper elevations of bodies and redeposition into underlying zones of secondary enrichment (Meeves and Darnell, 1968).

The district's most productive mineral vein and fault system, the three-mile-long Amethyst, is known for its beautiful layered epithermal deposits. See Figure 28. These typically have well-defined, concentric, geode-like structures/layers of minerals. Some banded layers consisted of white and bluish chalcedony, masses of dark mineralized quartz, and a zone of translucent amethystine quartz, in which traces of manganese created pink, violet, and lavender colors. (Hence, the name Amethyst vein.) In some places, the center of veins were filled with solid masses of acanthite, argentiferous galena, and native silver. During Creede's boom days, this material could assay to several thousand ounces of silver per ton (Voynick, 2020).

The ore deposits in the vein and fault zones of the district are mineralogically complex and spatially zoned.

- The southernmost veins are silver rich and gold poor, with native silver, acanthite, sulphosalts, sphalerite, galena, and copper sulphides, in a gangue of baryte, rhodochrosite, quartz, pyrite, hematite and adularia. Silver to gold ratios are >1000:1. This is known as the Bulldog Assemblage (Plumlee et al, 1994).
- Further north along the OH, P, central Amethyst and Bulldog Mountain vein systems, the ores become more base metal rich. This is the OH Assemblage, comprising sphalerite, galena, chalcopyrite and lesser tetrahedrite, in a gangue of quartz, pyrite, chlorite, hematite and lesser adularia and fluorite. Gold is present in slightly greater amounts, but is still rare (Plumlee et al, 1994).
- To the north, the vein systems take on the Northern Assemblage, marked by high precious metal values, with silver to gold ratios below 100:1. Ore minerals include electrum, acanthite, pyrargyrite, jalpaite, sphalerite and galena, in a gangue of quartz, adularia, calcite, kutnahorite, rhodonite, rhodochrosite, pyrite, fluorite, hematite, magnetite and chlorite. Higher precious metal levels are marked by adularia-rhodonite-kutnahorite gangue. Baryte is rare, but increases toward the south (Plumlee et al, 1994).

Mineralogically, the Creede district is noted for the many fine crystallized and wire silver specimens. Many were recovered from mines along the prolific Amethyst vein system, and more recently from the Bulldog Mountain mine's Puzzle and West Strand veins. As in other mining camps, very few silver specimens survived that can be attributed to the early "boom days". In addition, many fine specimens of crystallized sphalerite, galena, acanthite, baryte, chalcopyrite, and "sowbelly agate" (banded quartz – varieties of amethyst and chalcedony) grace collections around the world.

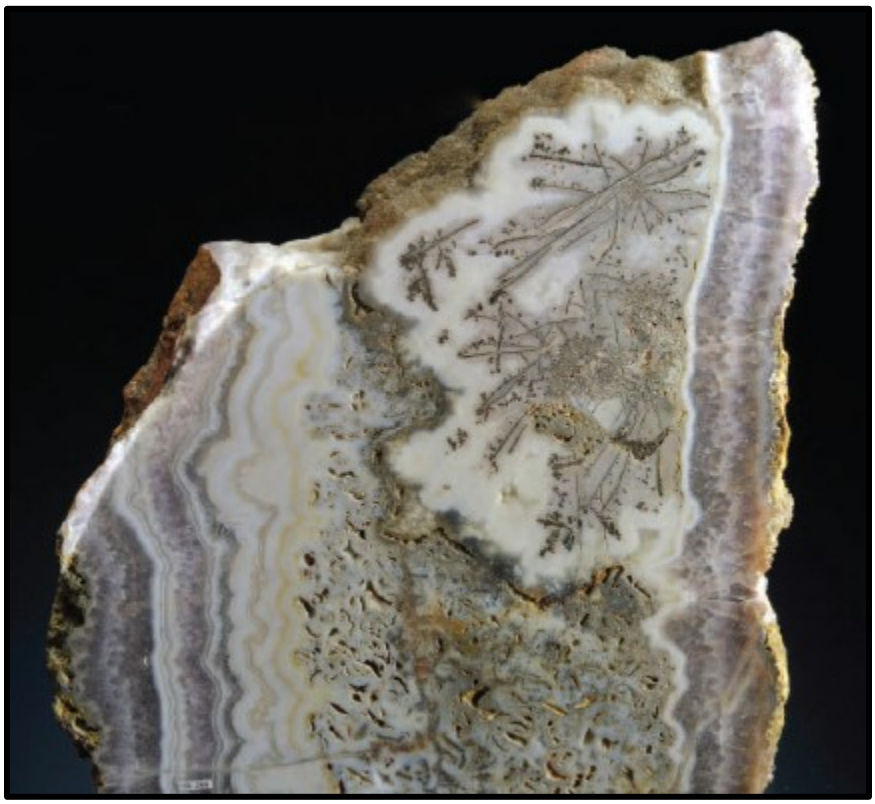


Figure 28 (right): Cut slab showing dendritic arborescent growths of hypogene silver enclosed in chalcedony in a crustified vug of amethystine quartz ("sowbelly agate"). Specimen dimensions 14 cm x 16 cm. Last Chance mine, Creede district, Mineral County, Colorado. Credit: Dave Bunk specimen, Jesse La Plante photo. (Rosemeyer, 2010)

References

Barton, P.B., Bethke, P.M., and Roedder, E. 1977. "Environment of Ore Deposition in the Creede Mining District, San Juan Mountains, Colorado – Part 3: Progress Toward Interpretation of the Chemistry of the Ore-Forming Fluids in the OH Vein". Economic Geology 72: 1-24.

Barton, P.E., Rye, R.O., and Bethke, P.M. 2000. "Evolution of the Creede Caldera and its Relation to Mineralization in the Creede Mining District, Colorado". In Ancient Lake Creede: Its Volcano-Tectonic Setting, History of Sedimentation, and Relation to Mineralization in the Creede Mining District. Geological Society of America special paper 346.

Bethke, P.M. and Rye, R.O. 1979. "Environment of Ore Deposition in the Creede Mining District, San Juan Mountains, Colorado – Part 4: Source of Fluids from Oxygen, Hydrogen, and Carbon Isotope Studies". Economic Geology 74:1832-1851.

Bethke, P.M., Barton, P.B. Jr., Lanphere, M.A., and Steven, T.A. 1976. “Environment of Ore Deposition in the Creede Mining District, San Juan Mountains, Colorado – Part 2: Age of Mineralization”. Economic Geology 71:1006-1011.

Birdsley, A. 1968. Oral communication with D.A. Hull concerning history of the Bulldog Mountain Mine. Reported in Hull, D.A., 1970. “Geology of the Puzzle Vein, Creede Mining District”. Dissertation submitted for degree of Doctor of Philosophy I Geology. University of Nevada – Reno.

Blair, E. 1980. “Leadville: Colorado’s Magic City”. Boulder: Pruett Publishing.

Blanchette, C.N. 1926. Letter from Blanchette to George Bancroft, dated July 29, 1926. Reported in Huston, R.C., 2005. “A Silver Camp Called Creede – A Century of Mining”. Montrose, Colorado: Western Reflections Publishing Company.

BLM - Bureau of Land Management mining claims map, Creede Mining District, Colorado. Bureau of Land Management Office. Wheat Ridge, Colorado.

BLMM Prospectus, circa 1915. Prospectus of the Bulldog Leasing, Mining and Milling Company. Date circa 1915.

Boppe, Robert A. 2001. Letter from Boppe, Engineer Homestake’s Bulldog Mountain Mine, to Richard C. Huston, dated October 2, 2001. Reported in Huston, R.C., 2005. “A Silver Camp Called Creede – A Century of Mining”. Montrose, Colorado: Western Reflections Publishing Company.

Clark, V.V. 1934. “A Geological Study with Historical Note of Creede Mines, Inc.”. In report furnished by G.E. Humphreys.

Colorado Sun, February 25, 1892. “Gossip from Creede”. Denver, Colorado.

Creede Candle “Mining Issue”. January 1, 1927.

Del Norte Prospector and Candle. April 7, 1961.

Eckel, E.B. et al. 1997. “The Minerals of Colorado – Updated and Revised”. Friends of Mineralogy Colorado Chapter. Golden, Colorado: Fulcrum Publishing.

Emmons, W.H., and Larsen, E.S. 1923. “Geology and Ore Deposits of the Creede District, Colorado”. USGS Bulletin 718.

Foley, N.K., and Ayuso, R.A. 1994. “Lead Isotope Compositions as Guides to Early Mineralization: The North Amethyst Vein System, Creede District, Colorado”. Economic Geology 89:1842-1895.

Hanscom, W.R. 1968. Homestake Mining Geologist, Bulldog Mountain Mine. Oral communication with D.A. Hull concerning mine geology and history. Reported in Hull, D.A., 1970. “Geology of the Puzzle Vein, Creede Mining District”. Dissertation submitted for degree of Doctor of Philosophy I Geology. University of Nevada – Reno.

Hauck, C.W. 1979. “Creede!” In G.S. Chappell, editor, Colorado Rail Annual no. 14. Golden: Colorado Railroad Museum, p. 111-219.

Henderson, C.W. 1926. “Mining in Colorado”. USGS Professional Paper 138.

Homestake Mining Company, August 5, 1992. Company news release.

Homestake Mining Company, 1969. “Sharp Bits” in-house publication. Summer 1969.

Howell, F.M. 1969. “Homestake’s Bulldog Mountain Mill, Creede, Colorado”. Society of Mining Engineers. Rocky Mountain Minerals Conference, September 17-19, 1969.

Hull, D.A. 1970. “Geology of the Puzzle Vein, Creede Mining District”. Dissertation submitted for degree of Doctor of Philosophy I Geology. University of Nevada – Reno.

Huston, R.C. 2005. “A Silver Camp Called Creede – A Century of Mining”. Montrose, Colorado: Western Reflections Publishing Company.

Jackson, J. Letters from John Jackson to Richard C. Huston (Author of “A Silver Camp Called Creede”.) November 29, 2001, and January 11, 2002.

Larsen, E.S. 1929. “Recent Mining Developments in the Creede District, Colorado”. USGS Bulletin 811-B.

Meeves, H.C., and Darnell, R.P. 1968. “Study of the Silver Potential of the Creede District, Mineral County, Colorado”. U.S. Bureau of Mines Information Circular no. 8370.

Minerals Yearbook, 1991. U.S Bureau of Mines. Washington, D.C.

Monkemeyer, F. 1928. Letter to Fred Monkemeyer of Creede, Colorado, from Herman Emperius concerning the Bulldog Leasing, Mining and Milling Company dated April 10, 1928. Reported in Huston, R.C., 2005. “A Silver Camp Called Creede – A Century of Mining”. Montrose, Colorado: Western Reflections Publishing Company.

Mumey, N. 1949. “Creede”. Denver: Artcraft Press.

Plumlee, G.S. 1994. “Fluid Chemistry and Mineral Depositions in the Main-Stage Creede Epithermal System”. Economic Geology 89:1860-1882.

Plumlee, G.S., and Whitehouse-Veaux, P.H. 1994. “Mineralogy, Paragenesis, and Mineral Zoning in the Bulldog Mountain Vein System, Creede, Colorado”. Economic Geology 89:1883-1905.

Raines, C.E. 1988. “Mineralogy of the Creede District, Mineral County, Colorado”. In Mineralogy of Precious Metal Deposits – A Symposium on the Mineralogy of Gold and Silver Deposits in Colorado and Other Areas. Editor P.J. Modreski, p. 94-105. Denver: Friends of Mineralogy Colorado Chapter.

Raines, C.E. 1992. “The Geology, Mineralogy, and History of Four Native Silver Localities in Colorado”. Rocks and Minerals, vol. 67, no. 4, p. 230-254.

Raines, C.E. 2009. “Historic Photos of Colorado Mining”. Nashville: Turner Publishing Company.

Ridge, J.D. “Ore Deposits of the United States 1933-1967”. American Institute of Mining and Metallurgical Engineers. New York: vol 1, part V, p 706-713.

RMPBS – Rocky Mountain Public Broadcasting System. 2019. “Creede: The Last Boom Town.” Video on YouTube.

Robinson, R.W., and Norman, D.I. 1984. “Mineralogy and Fluid Inclusion Study of the Southern Amethyst Vein System, Creede Mining District, Colorado”. Economic Geology 79:439-447.

Rosemeyer, T. 2010. “Creede: The Last Wild West Silver Mining Camp in Colorado”. Rocks and Minerals, 85:5, p. 396-413.

Steven, T.A., and Ratte, J.C. 1965. “Geology and Structural Control of Ore Deposition in the Creede District, San Juan Mountains, Colorado”. USGS Professional Paper 487.

Voynick, S. 2020. “Silver Mining Survivor – Creede Colorado Navigates Transition While Preserving History”. Rock & Gem, vol. 50, no. 6.

KK - v 1.1 - 110921