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MINERALS OF THE SAN LUIS VALLEY AND ADJACENT AREAS OF COLORADO

by

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Between the narrow, jagged Sangre de Cristo Mountains on the east and the broad San Juan Mountains on the west lies the vast flat region of the San Luis Valley which contains some 5,000 square miles, an area about the size of Connecticut. The northern half of the San Luis Valley

opens south from Poncha Pass like a horseshoe, enlarges to a width of 50 miles and extends 100 miles to the New Mexico border.

The minerals of this region are found in five major districts (fig. 1). The first district is the San Luis Valley proper. The second district includes minerals of the Sangre de Cristo Mountains. The Bonanza mining area is the third district of mineral wealth. Located northwest of Del Norte, in a narrow gorge of the San Juans is Creede, the center of the fourth mineral district of the area. The fifth and final district discussed is the Platoro-Summitville mining district on the southwest edge of the valley.

SAN LUIS VALLEY DISTRICT

Within the San Luis Hills, a group of volcanic mesas trending northeast across the southern edge of the valley and 9.6 miles east of the town of Manassa is the King Turquoise Mine. It was worked in prehistoric times by Indians, whose crude implements of stone hammers, deer and elk horns, presumably used as picks, have been found on the property (Pearl, 1941, p. 25). Today the mine consists of a pit about 330 feet long, 180 feet wide and 65 feet deep. Turquoise found here ranges from clear blue to green of varying shades, with many combinations of these two colors.

Exploration and some mining work took place in the 1890's northeast of the town of San Luis. The ore found consisted of galena, anglesite, and cerussite associated with some sulfides of copper, silver, gold, and iron (Van Diest, 1894, p. 79).

Along the eastern edge of the San Luis Valley at the base of the Sangre de Cristo Mountains are some 400 square miles of shifting sand. A large portion of the Great Sand Dunes are composed of dark grains giving the dunes a salt and pepper appearance. Feldspar, quartz, hornblende, magnetite, and ilmenite are easily recognized. The dunes also contain hypersthene, sphene, epidote, pyroxene, fluorite, apatite, sanidine, cristobalite, and microcline.

Southeast of Villa Grove is the Orient Iron Mine where hematite, limonite and goethite are found. These workings once furnished ore to the steel mill at Pueblo.

Along Old Woman Creek, northwest of Del Norte in the Summer Coon volcanic area, plume agate, varicolored chalcedony, and opal are found associated with "thunder eggs."

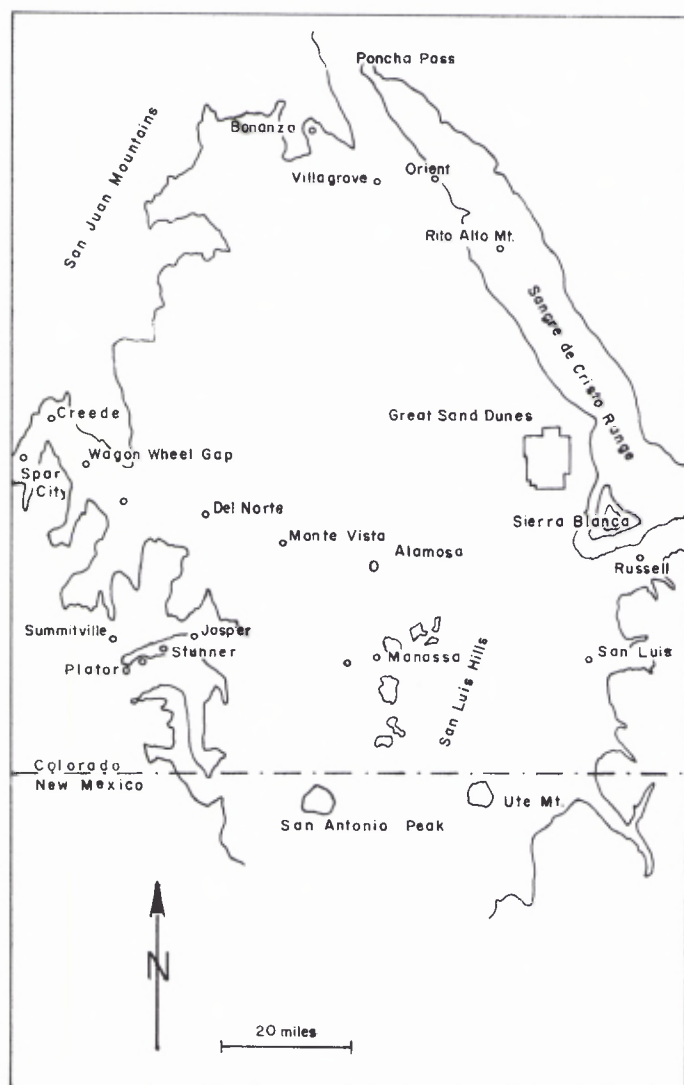


FIGURE 1.

Mineral Districts of the San Luis Valley.

SUMMARY LIST OF MINERALS

Anglesite	Hornblende
Apatite	Hypersthene
Cerussite	Ilmenite
Chalcedony	Iron sulfides
Copper sulfides	Limonite
Cristobalite	Magnetite
Epidote	Opal
Feldspar	Plume agate
Fluorite	Pyroxene
Galena	Quartz
Goethite	Silver sulfides
Gold sulfides	Sphene
Hematite	Turquoise

SANGRE DE CRISTO
MOUNTAIN DISTRICT

Starting at Poncha Pass, the Sangre de Cristo Range trends southeast to La Veta Pass then southward to Santa Fe, New Mexico, where its termination marks the southern limits of the Rocky Mountains. Its elevation is culminated in Sierra Blanca which rises to a height of 14,363 feet.

Knowledge of the geology and mineral wealth of this interesting range is somewhat limited, probably because no great mining centers have yet been developed north of the New Mexico border. The major mining area of this district is found around Grayback Mountain north of Russell, Colorado, on La Veta Pass. Here, iron ores occur as replacements of metamorphosed carboniferous limestone in which garnet is usually an abundant constituent. These ores consist mainly of magnetite in somewhat granular masses and show small amounts of calcite, epidote and chlorite. Occasionally particles of gold telluride, and calaverite are found. Sometimes a grain is part metallic gold and the rest telluride, bearing a strong resemblance to some of the particles contained in partially oxidized Cripple Creek ores (Patton, 1910, p. 69). Although occasional pockets yielding good assays for copper and some silver have been found, the amount of the high-grade ore was too small to mine for profit. Lead and zinc have also been found in small amounts throughout the district.

Occurrence of telluride, possibly a variety of nagyagite or petzite, was reported by Richard Pearce (1898, p. 4), on the slopes of Sierra Blanca. Pearce found the ratio of gold to silver to be one to ten. The lode is situated on the northwest slope of Sierra Blanca, 400 feet vertically and 300 feet horizontally from the highest point on the mountain.

The base of Rito Alto, in the northern Sangre de Cristos, has been the site of some development of copper properties. Some of the workings have exposed considerable chalcopryrite and chrysocolla. The ore averaged about 10 per cent copper with a small amount of silver and a trace of gold (Ragg, 1908, p. 745). Rito Alto Mountain ores are primarily due to faulting of the sandstone, permitting passage of copper sulfide bearing solutions which deposited the ore along fractures and adjacent fault planes.

SUMMARY LIST OF MINERALS

Apatite	Gold (placer)
Augite	Hematite (specularite)
Biotite	Hornblende
Calaverite	Kaolinite
Calcite	Limonite
Chalcocite	Magnetite
Chalcopryrite	Malachite
Chlorite	Marcasite
Chrysocolla	Muscovite
Epidote	Pyrite
Feldspar	Quartz
Fluorite	Silver
Galena	Sphalerite
Garnet	Sphene

BONANZA DISTRICT

Bonanza is located within the Bonanza caldera at the northeastern edge of the San Juan volcanic province and the northwestern edge of the San Luis Valley.

The main deposits of the Bonanza mining district are lead, zinc, copper, silver, and gold. Lead and silver, up to the present time, have furnished the greater part of the productive value. W. S. Burbank (1932, p. 60) has stated that the veins contain pyrite, sphalerite, galena, chalcopryrite, bornite, silver bearing temmamite, and stromeyerite as principle sulfide minerals in a gangue of quartz, manganese calcite, rhodochrosite and barite. A number of other sulfides and gangue minerals are found in small amounts.

Considerable bodies of manganiferous ore are found in several mines of the district. This ore is found in the oxidized part of the vein and is only valuable as a flux since no pure deposit of manganese is known to occur in this area (Muilenburg, 1919, p. 32). Fluorspar crystals, both cubes, and octahedra, are found in some mines associated with the crystals of manganiferous calcite.

Also located in the district is the Hall Turquoise Mine. The bright blue color and relative freedom from matrix makes this turquoise some of the best found in Colorado.

SUMMARY LIST OF MINERALS

Adularia	Fluorite
Altaite	Galena
Alunite	Gold (native)
Anatase	Gypsum
Anglesite	Hematite
Apatite	Hessite
Argentite	Jarosite
Azurite	Kaolin
Barite	Limonite
Bornite	Malachite
Calcite	Manganite
Cerargyrite	Manganosiderite
Cerussite	Muscovite
Chalcocite	Orthoclase
Chalcedony	Petzite
Chlorite	Psilomelane
Chrysocolla	Pyrrargyrite
Copper (native)	Pyrite
Covellite	Pyrolusite
Diaspore	Quartz
Dolomite	Rhodochrosite
Empressite	Rhodonite
Enargite	Rickardite
Epidote	Rutile

Sericite
Siderite
Silver (native)
Sphalerite
Stromeyerite
Sylvanite

Tellurium (native)
Tennantite
Tetrahedrite
Turquoise
Zunyite

CREEDE DISTRICT

A detailed study of Thomas Steven and James Ratté of the volcanic rocks in the central San Juan Mountains has defined a subcircular caldera about 10 miles in diameter which they have called the Creede caldera after the nearby town and mining district.

The ores of the Creede district are localized along faults in a complex north-south trending graben that extends outward from the major lead, zinc, and silver deposits of the area. Ore near the surface is oxidized, or nearly so, and consists of cerussite, limonite, manganese, small amounts of galena and sphalerite, and a great deal of pyrite.

Small quantities of fluorite and rhodochrosite are also present. An apparent hypogene alteration of chlorite has produced some hematite, which also is found as a primary mineral (Steven and Ratté, 1965, p. 74).

Spar City, also located in the Creede district, is a small mineralized area along the south flank of the Creede caldera. Workings have revealed a few small veins containing galena, sphalerite, barite, manganese oxides, and jasper to amethystine quartz.

South and east of Creede, just outside of Wagon Wheel Gap, Colorado, is a small fluorspar mine. The ore is found to contain two rare fluoride minerals, gearksutite and creedite (Eckel, 1961, p. 26). Gearksutite characterizes the lower levels whereas creedite represents the upper parts of the mine.

SUMMARY LIST OF MINERALS

Alunite	Goslarite
Ankerite	Halloysite
Anglesite	Hematite
Argentite	Jarosite
Barite	Kaolinite
Beidellite	Limonite
Bromyrite	Manganese dioxide and oxides
Carnelian agate	Marcasite
Cerargyrite	Melanterite
Cerussite	Pyrite
Chalcocopyrite	Pyromorphite
Chlorite	Quartz
Chrysocolla	Rhodochrosite
Creedite	Silver (native)
Feldspar	Sphalerite
Fluorite	Stephanite
Galena	Turquoise
Gearksutite	

Gold was first discovered in the Summitville area in 1870. The chief values have come from gold, silver, copper, and lead. Gold usually occurs with limonite or with limonite mixed with clay. The ores of the oxidized zone are free from copper and the values are almost entirely from gold with a small amount coming from silver. In the sulfide zone silver remains the same while the amount of gold dwindles to very small values, and copper shows higher values than that of gold and silver combined (Patton, 1917, p. 83).

Copper occurring in the form of enargite, covellite, tetrahedrite, chalcocite, and chalcopyrite is found with pyrite. These copper minerals compose the major ore presently being taken from the ground at Summitville. Sphalerite and galena are found sporadically. Apatite, barite, and magnetite form the abundant accessory minerals. Alunite occurs fairly uniformly and thickly distributed through the rock in well developed crystals.

The Platoro camp came into being some ten years after ore was found in Summitville. Silver, the major value in this area, soon gave out and the boom was over. The gangue was composed of quartz, marcasite and arsenopyrite while the ore was a sulpho-telluride. The tellurium is present in the form of silver telluride and petzite $(\text{Au,Ag})_2\text{Te}$. Other minerals of the ore are argentite, pyrrargyrite, and proustite (Patton, 1917, p. 92).

Very little ore was actually found in Stunner and Jasper after the discovery of the rich Summitville ore. Vugs were found that contained some sphalerite, galena, and pyrite but the values, if present, have not yet been discovered.

As a general rule the gold-silver-copper ores of this district were deposited in very shallow volcanic environments. The metallic minerals, chiefly pyrite and enargite, fill vugs that formed by local intense leaching of the quartz alunite rock (Lipman and Steven, 1970, p. 25).

SUMMARY LIST OF MINERALS

Alunite	Limonite
Apatite	Magnetite
Argentite	Marcasite
Arsenopyrite	Petzite
Barite	Proustite
Chalcocite	Pyrrargyrite
Chalcocopyrite	Pyrite
Covellite	Quartz
Diopside	Sandine
Enargite	Sphalerite
Galena	Sphene
Gold	Sulfur
Hornblende	Tetrahedrite
Huebnerite	Tridymite
Hypersthene	Zircon (rare)
Ilmenite	

REFERENCES

Four mining camps are located within this district. They are: Summitville, Platoro, Stunner, and Jasper. These camps have seen considerable prospecting and development work in years past. A number of mines have been opened but only in the Summitville area have extensive shipments of ore occurred. Mining operations are presently being conducted in this area.

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