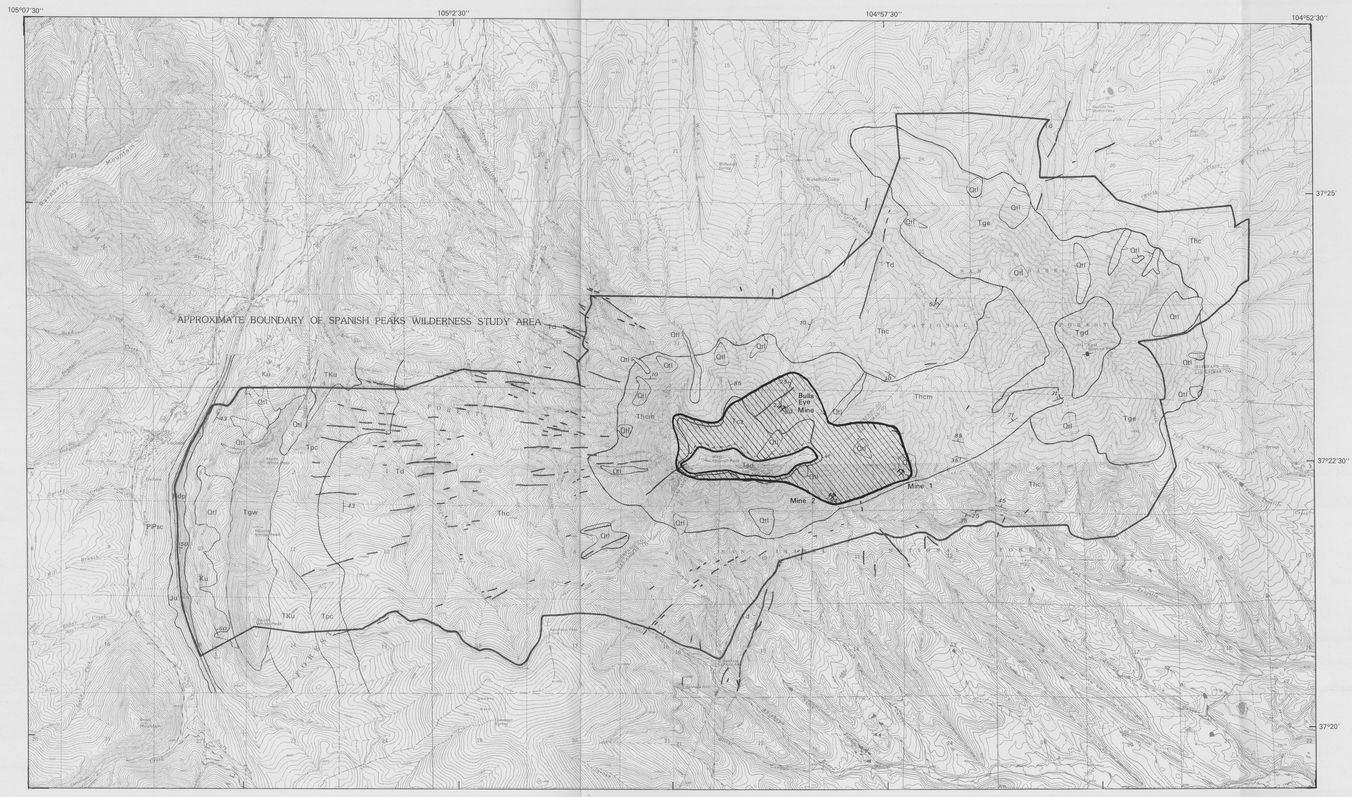
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-1542-C
PAMPHLET ACCOMPANIES MAP



Base from U.S. Geological Survey 1:24,000
Cuchara, 1963; Spanish Peaks, 1971;
Cucharas Pass, 1967; and Herlick Canyon, 1971

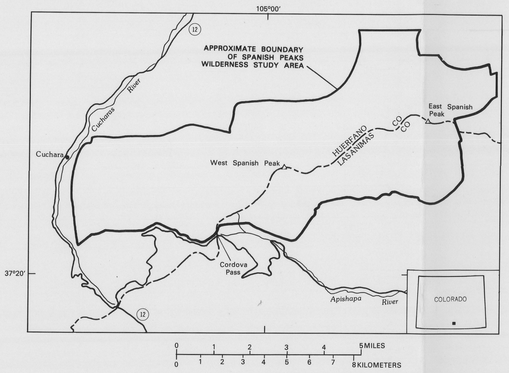
SCALE 1:50 000

1 ½ 0 1 2 3 MILES

1 5 0 1 2 3 KILOMETERS

CONTOUR INTERVAL 40 FEET

Geology from Budding and Lawrence (1983b) and modified from Johnson and others (1958)



INDEX MAP SHOWING LOCATION OF THE SPANISH PEAKS WILDERNESS STUDY AREA

EXPLANATION

⚒ MINE

AREA OF MODERATE POTENTIAL FOR SMALL DEPOSITS OF LEAD, ZINC, COPPER, SILVER, AND GOLD

(Note: The following correlation, description of map units, and list of symbols are for the screened geologic base map.)

CORRELATION OF MAP UNITS

Qtl			QUATERNARY
UNCONFORMITY			
Tsd, Tcz, Td		Miocene	TERTIARY
	Tgd, Tgw, Tge	Oligocene	TERTIARY
UNCONFORMITY			
Thc, Thcm		Eocene	TERTIARY
UNCONFORMITY			
Tpc		Paleocene	TERTIARY
LOCAL UNCONFORMITY			
TKu		Paleocene and Upper Cretaceous	TERTIARY AND CRETACEOUS
Ku		Upper Cretaceous	CRETACEOUS
Kdp		Upper and Lower Cretaceous	CRETACEOUS
DISCONFORMITY			
Ju		Upper Jurassic	JURASSIC
DISCONFORMITY			
PPsc			PERMIAN AND PENNSYLVANIAN

DESCRIPTION OF MAP UNITS

Qtl TALUS, ROCK GLACIERS (QUATERNARY)

Tsd SYENODIORITE OF WEST SPANISH PEAK (MIOCENE)--Fine-grained to porphyritic; contains a few small lenses of hornfels

Tcz WEST SPANISH PEAK CONTACT ZONE (MIOCENE)--Chiefly syenodiorite containing pendants and lenses of hornfels

Tgd GRANODIORITE OF EAST SPANISH PEAK (MIOCENE)--Porphyritic

Tgw GRANITE OF WHITE PEAKS (MIOCENE)--Porphyritic; contains small phenocrysts

Tge GRANITE OF EAST SPANISH PEAK (MIOCENE)--Porphyritic; contains distinctive spheroidal quartz crystals

Td ANDESITE, LATITE, AND TRACHYANDESITE (MIOCENE AND OLIGOCENE)--Radial dikes around West Spanish Peak intrusive (Tsd); not all dikes are labeled

Thc HUERFANO AND CUCHARA FORMATIONS, UNDIFFERENTIATED (EOCENE)--Sandstone, siltstone, shale, and claystone

Thcm HUERFANO AND CUCHARA FORMATIONS, METAMORPHOSED (EOCENE)--Hornfels, quartzite, and slate

Tpc POISON CANYON FORMATION (PALEOCENE)--Conglomerate, sandstone, siltstone, and shale

TKu SEDIMENTARY ROCKS, UNDIFFERENTIATED (PALEOCENE AND UPPER CRETACEOUS)--Siltstone, sandstone, shale, and coal of the Raton Formation, Vermejo Formation, and Trinidad Sandstone

Ku SEDIMENTARY ROCKS, UNDIFFERENTIATED (UPPER CRETACEOUS)--Shale, siltstone, and limestone of the Pierre Shale, Niobrara Formation, Carlile Shale, Greenhorn Limestone, and Graneros Shale

Kdp DAKOTA SANDSTONE AND PURGATOIRE FORMATION, UNDIFFERENTIATED (UPPER AND LOWER CRETACEOUS)--Sandstone and shale

Ju SEDIMENTARY ROCKS, UNDIFFERENTIATED (UPPER JURASSIC)

PPsc SANGRE DE CRISTO FORMATION (PERMIAN AND PENNSYLVANIAN)

——— CONTACT--Dashed where gradational

STRIKE AND DIP OF BEDDING

⊥ 10 Inclined

— Vertical

STRIKE OF VERTICAL JOINT

DIKES

STUDIES RELATED TO WILDERNESS

The Wilderness Act (Public Law 88-577, September 3, 1964) and related acts require the U.S. Geological Survey and the U.S. Bureau of Mines to survey certain areas on Federal lands to determine their mineral resource potential. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a mineral survey of the Spanish Peaks Wilderness Study Area in the San Isabel National Forest, Huerfano and Las Animas Counties, Colo. The Spanish Peaks Wilderness Study Area was established by Public Law 96-560, December 22, 1980.

MINERAL RESOURCE POTENTIAL SUMMARY STATEMENT

Most of the study area lacks significant geochemical anomalies and has a low mineral potential. Anomalous concentrations of gold, silver, copper, lead, and zinc in the rocks and drainage basins in the vicinity of the old mines and prospects on West Spanish Peak indicate a moderate potential for small mineralized veins in this area. Ore-bearing veinlets have been worked in the past, primarily for silver and lead; however, the sparsity, small size, and low grade of the veins diminish their significance.

The depth of several thousand feet at which coal may underlie the surface rocks of the study area makes development extremely unlikely. The potential for oil and gas appears low because of the apparent lack of structural traps and the igneous activity in the area.

INTRODUCTION

The Spanish Peaks Wilderness Study Area covers about 19,570 acres of the San Isabel National Forest in south-central Colorado. The area is in the westernmost part of the Great Plains, bordering the eastern foothills of the Sangre de Cristo Mountains. Elevations range from 13,626 ft on the summit of West Spanish Peak to about 8,400 ft in the western part, near Cuchara. The east half of the study area is characterized by rugged terrain in which the land and drainages slope radially away from East and West Spanish Peaks. The principal drainages are Wahatoya and Trujillo Creeks. In the west half of the study area the terrain is less severe. The major drainages are the north-flowing Chaparral and Echo Creeks. North, Middle, and South White Peaks (elevation 10,446 ft) are near the west boundary of the study area.

Details of the geology of the study area (Budding and Lawrence, 1983b) and the results of the geochemical survey (Budding and Lawrence, 1983a) are presented as separate maps of the Spanish Peaks Wilderness Study Area. Only the aspects of the work pertinent to resource appraisal are included here. No geophysical work was done.

GEOLOGY

Sedimentary rocks, Paleozoic to Tertiary in age, crop out near the Spanish Peaks. In the western part of the study area, these include sandstone, shale, limestone, siltstone, coal, and conglomerate from the Upper and Lower Cretaceous Dakota Sandstone upward through the Paleocene Poison Canyon Formation (Johnson, 1969). Most of the sedimentary rocks are included in the Eocene sandstone, siltstone, claystone, and shale of the undifferentiated Cuchara and Huerfano Formations (Robinson, 1966; Scott and Taylor, 1975).

The sedimentary rocks were invaded by the granite porphyry of East Spanish Peak 21.7±1.0 m.y. ago (Stormer, 1972); this event was closely followed by the intrusion of the compositionally similar granite of North, Middle, and South White Peaks. The core of East Spanish Peak was then intruded by porphyritic granodiorite. The syenodiorite of West Spanish Peak was emplaced 22.9±2.0 m.y. ago (Smith, 1973) and is composed of several compositional varieties of syenodiorite. A large aureole of metamorphosed sedimentary rocks surrounds the body of syenodiorite. An impressive swarm of radial dikes, having trends related to stresses developed around the West Spanish Peak during magmatic activity, is found in the study area. Four radial dikes south of the peaks range in age from 22.4±3.1 m.y. to 28.5±5.0 m.y. (Smith, 1973). The compositions of the radial dikes vary from trachyte to augite-plagioclase lamprophyre; most are trachyandesite porphyries (Smith, 1977).

MINES AND PROSPECTS

All known workings in the study area are found in the zone of contact-metamorphosed sedimentary rocks surrounding the West Spanish Peak intrusive. Mineralized veinlets along a shear zone trending N. 65° E. have been worked in the Bulls Eye Mine on the north side of West Spanish Peak (see map). Quartz veins bear argentiferous galena, tetrahedrite, chalcopyrite, and sphalerite, associated with siderite, calcite, and barite. Two mines on the eastern side and southeastern side of West Spanish Peak (here named "Mine 1" and "Mine 2," see map), along with workings on several ridge tops, indicate areas of past mining activity. Vein material here is similiar to that found at the Bulls Eye Mine (Kluender, 1983).

The total production prior to 1908 from the mines on West Spanish Peak was 168 oz of gold, 1,176 oz of silver, 92 lb of copper, and 1,067 lb of lead (Vanderwilt, 1947). Placer gold was reported by Hills (1901) from streams tributary to Wahatoya Creek and the Apishapa River. In 1932 and 1934, a few ounces of placer gold was produced from the north side of the study area. Four tons of lead-silver ore was shipped from the study area in 1934 and 1935 (Vanderwilt, 1947).

GEOCHEMICAL SURVEY

To assist the assessment of the mineral resource potential of the study area, a geochemical survey was made, utilizing stream-sediment, panned-concentrate, and rock samples. Most anomalous samples were taken in the vicinity of the old workings on West Spanish Peak. Elements present in anomalous concentrations are lead, zinc, silver, copper, and minor gold.

ASSESSMENT OF MINERAL RESOURCE POTENTIAL

The majority of the geochemical anomalies, primarily defined by lead, zinc, silver, copper, and minor gold, were found in the vicinity of the inactive Bulls Eye Mine and Mine 1 and Mine 2 on West Spanish Peak. The mineralized areas are associated with veins in the aureole of metamorphosed sedimentary rocks surrounding the West Spanish Peak intrusive. The veins are present near the contact with the intrusive mass, and many are associated with shear zones. A vein sample from the Bulls Eye Mine assayed 0.026 oz/ton gold, 2.2 oz/ton silver, 2.28 percent lead, and 4.40 percent zinc (Kluender, 1983). The mineralized veinlets are few and low in grade; therefore, a moderate potential for small deposits of lead, zinc, copper, silver, and gold is assigned to those areas proximal to the old workings and to other mineralized or anomalous areas as is indicated on the map.

Most of the study area lacks significant anomalies related to metallic deposits. Coal may underlie the study area but only at a depth of several thousand feet; therefore, it is a resource that has little likelihood of development. The oil and gas potential likewise appears low because of the apparent lack of structural traps and the igneous activity in the area.

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MINERAL RESOURCE POTENTIAL MAP OF THE SPANISH PEAKS WILDERNESS STUDY AREA, HUERFANO AND LAS ANIMAS COUNTIES, COLORADO

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1983

INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1983

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