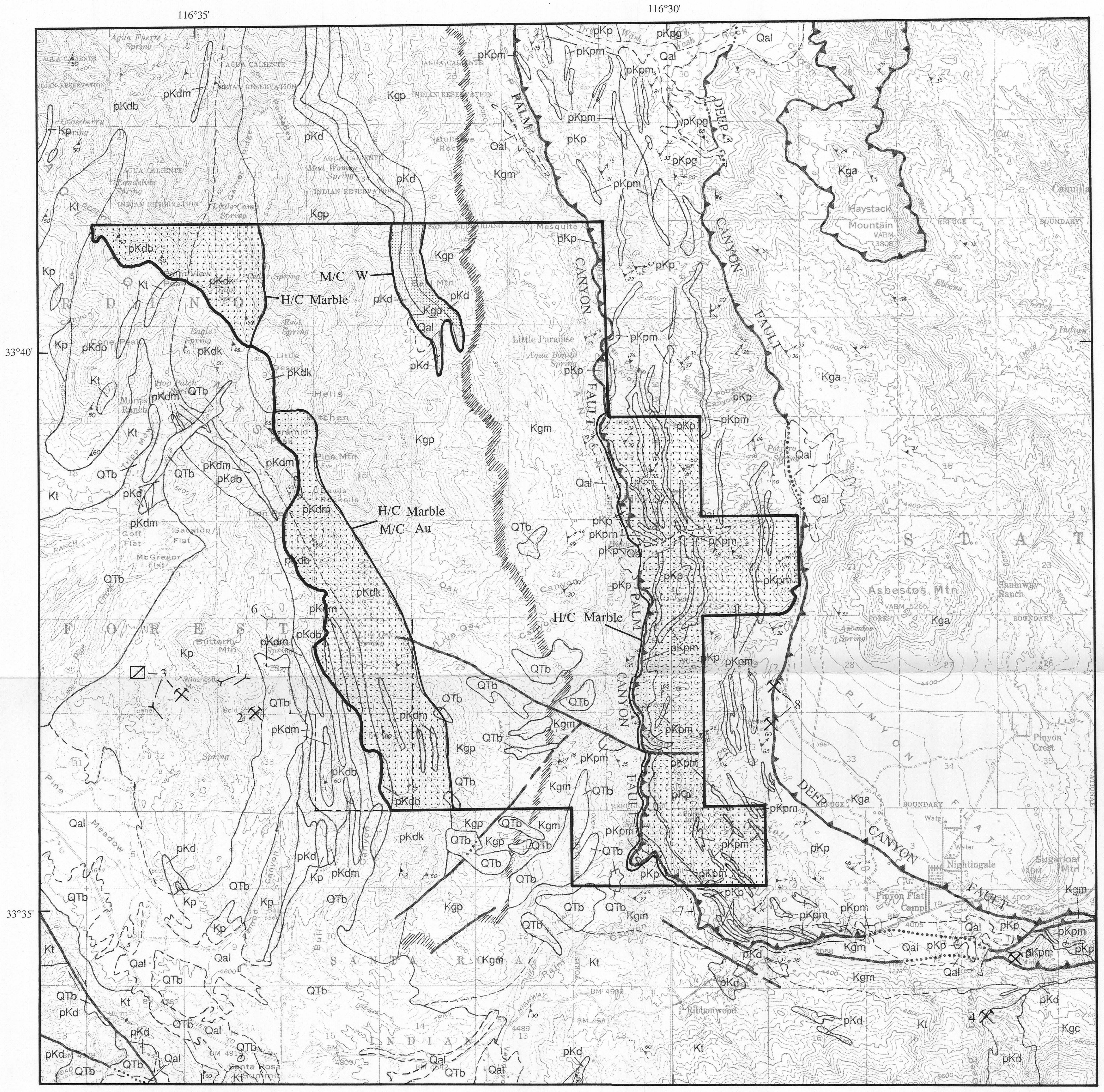
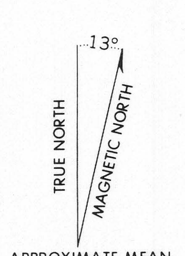


Base from U.S. Geological Survey, Idyllwild, Palm desert, 1959

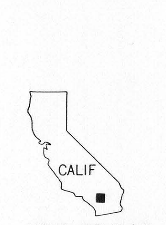
SCALE 1:62500

CONTOUR INTERVAL 80 FEET
DOTTED LINES REPRESENT 40-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Geology compiled from Sharp (1967), Dibblee (1981), and Erskine (1985)



APPROXIMATE MEAN DECLINATION, 1987



AREA OF MAP

TABLE 1. Mines, claims, and workings in and adjacent to the Pyramid Peak Roadless Area

Map No.	Name	Commodity	Workings and production	Reference
1	Hemet Belle	Au	One-hundred foot deep shaft with tunnels at the 100-ft and deeper levels. Gold in 0.5- to 1.0-ft thick quartz veins in Penrod Quartz Monzonite and in schist of Desert Divide Group. Ore averaged 0.5-0.75 oz/ton Au in 1917. Recent assays show high grade pockets to 2.0 oz/ton Au.	Unruh and Ruff, 1981
2	Gold Shot mine	Au	Workings include an 80-ft adit, a 100-ft deep shaft with a 100 ft drift at the 50-ft level. Gold in 3- to 4-in.-wide iron-stained quartz veins in Penrod Quartz Monzonite. Veins strike N. 55° W., dip northeast, are traceable for approximately 200 ft at surface, and extend to a depth of about 100 ft. Veins reported to average 0.17 oz/ton Au; assays in 1981 indicate 0.06-0.08 oz/ton Au in remaining veins.	Do.
3	Mufich Workings	Au	Gold found in northeast-trending quartz veins that are iron stained and contain no visible sulfides. High-grade ore assays 0.1-2.0 oz/ton Au.	Do.
4	Pigeon Creek	W	Tactite lenses contain sheelite in schist of Matti & others, 1983 Desert Divide Group. Workings consist of 10-ft-long adit that trends N. 7° E., a 40 by 8 ft open cut, and a 8 by 5 ft pit. Select samples contain 0.04-0.61 percent WO_3.	Matti and others, 1983
5	Dolomite mine	Marble	White marble, approximately 80 ft thick. Mine consists of 200 by 60 ft quarry with 80-ft-high highwall. No production reported.	Do.
6	Harris limestone claims	Marble		--
7	Nightingale limestone claims	Marble		--
8	Asbestos mines	Asbestos	Slip-fibre tremolite asbestos occurs in north-trending layers that dip 60° E. Workings at the northern mine consist of an open cut 150 ft long by 100 ft wide. A series of cross-cut tunnels are driven from the floor of the open cut. Two open cuts about 20 ft apart expose thin asbestos layers in the southern mine. The open cuts are 20 to 40 ft long by 15 ft deep. About 800 tons of asbestos was shipped from the northern mine in 1930.	Tucker and Sampson, 1945

EXPLANATION

Study area boundary

Area with high mineral resource potential

Area with moderate mineral resource potential

Claim and workings--Numbers refer to table 1

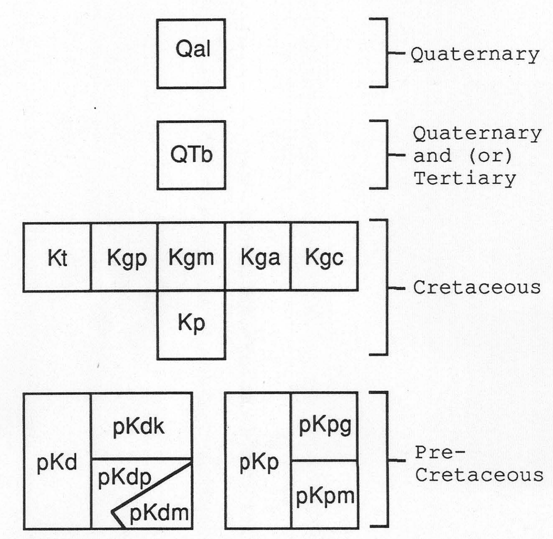
Claim

Mine

Adit

Vertical shaft

CORRELATION OF MAP UNITS



LIST OF MAP UNITS

Qal	Alluvium (Quaternary)
QTb	Bautista Formation (Quaternary and(or) Tertiary)
Kt	Tonalite (Cretaceous)
Kgp	Granodiorite of Palm Canyon (Cretaceous)
Kgm	Mylonitic granodiorite (Cretaceous)
Kga	Granodiorite of Asbestos Mountain (Cretaceous)
Kgc	Leucogranite of Cactus Spring (Cretaceous)
Kp	Penrod Quartz Monzonite (Cretaceous)
pKd	Desert Divide Group (pre-Cretaceous)--
pKdk	Ken Quartzite
pKdp	Bull Canyon Formation
pKdm	Marble
pKp	Palm Canyon Complex of Miller (1944) (pre-Cretaceous)--
pKpg	Mylonitic orthogneiss
pKpm	Marble

Contact--Dashed where approximately located; hachured where gradational

Fault--Dashed where approximately located; dotted where concealed; arrows show relative horizontal movement

Thrust fault--Sawteeth on upper plate; dotted where concealed

Foliation--Showing strike and dip; arrow indicates bearing and plunge of lineation

Vertically inclined foliation

Strike and dip of inclined beds

Commodities

Au Gold

W Tungsten

LEVELS OF RESOURCE POTENTIAL

H High mineral resource potential

M Moderate mineral resource potential

L Low mineral resource potential

U Unknown mineral resource potential

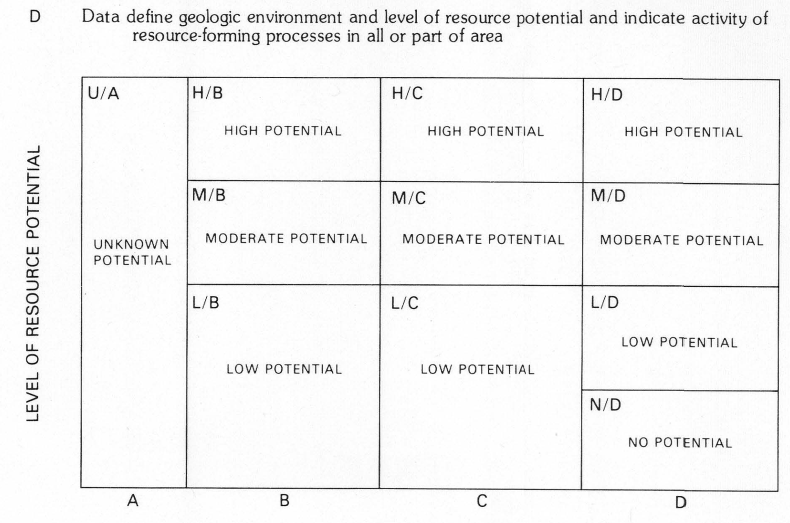
LEVELS OF CERTAINTY

A Available data not adequate

B Data indicate geologic environment, and suggest level of resource potential

C Data indicate geologic environment, indicate resource potential, but do not establish activity of resource-forming processes

D Data define geologic environment and level of resource potential and indicate activity of resource-forming processes in all or part of area



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 values, if any, that may be present. 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 Pyramid Peak (A5-189) Planning Area, San Bernardino National Forest, Riverside County, California. The area was classified as a further planning area or proposed wilderness during the Second Roadless Area Review and Evaluation (RARE II) by the Forest Service, January 1979.

SUMMARY

The Pyramid Peak Roadless Area is underlain by mid-Cretaceous plutonic rocks (granite, granodiorite, and tonalite) that intrude metasedimentary rocks of the Desert Divide Group. The granodiorite grades eastward into strongly deformed mylonitic rocks mapped as part of the Santa Rosa mylonite zone. Metasedimentary rocks, orthogneiss, and anatexites of the Palm Canyon Complex were displaced westward over the Santa Rosa mylonite zone along low-angle thrust faults that are nearly synchronous with the mylonite zone. The Pliocene and (or) Pleistocene Bautista Formation unconformably overlies the mid-Cretaceous plutonic rocks.

Geologic and geochemical data indicate that the study area has high resource potential for marble, and moderate resource potential for epithermal gold deposits and tungsten skarns. The Desert Divide Group and the Palm Canyon Complex contain large resources of marble quarried for Portland cement and for construction applications. Gold occurs in quartz veins and pegmatites in the Desert Divide Group and the Penrod Quartz Monzonite. Skarns in the Desert Divide Group contain scheelite and anomalous concentrations of arsenic and beryllium. Thin layers of tremolite asbestos along low-angle thrust faults occur outside of the study area.

INTRODUCTION

The Pyramid Peak Roadless Area (A5-189 in RARE II inventory) is located in the southern San Jacinto Mountains about 15 mi south of Palm Springs, California. The study area is accessible by State Highway 74 (the Palms to Pines highway) that connects Palm Springs with the mountain settlements of Pinyon Flat and Ribbonwood. The study area encompasses approximately 17,000 acres of mountainous terrain within the Idyllwild and Palm Desert 15-minute quadrangles. Elevations range from approximately 2,000 ft in Palm Canyon to approximately 7,160 ft at Palm View Peak.

The geology of the San Jacinto Mountains was mapped by Fraser (1931), Miller (1944), Sharp (1967), and Dibblee (1981). Erskine (1985) described in detail the plutonic rocks and the Santa Rosa mylonite zone in the Pyramid Peak area. Wright (1946), Unruh and Ruff (1980), and Brown (1980) described the mines and mineral deposits within the study area.

The U.S. Geological Survey conducted geologic studies in 1986 to assess the mineral resource potential of the study area. This work identified the extent and geologic controls of known mineralized areas as a guide to undiscovered mineralized areas. Geologic studies included field checking existing geologic maps and visiting known mines and prospects.

The U.S. Bureau of Mines completed library research and field studies to appraise the known mines, prospects, and mineral occurrences in and adjacent to the study area. Mining and mineral lease records were obtained from the U.S. Bureau of Mines, U.S. Bureau of Land Management, and Riverside County files.

GEOLOGY

The study area is located in the southern San Jacinto Mountains, the northern segment of the Peninsular Ranges batholith of southern California. This Cretaceous batholith is part of the large batholithic belt of western North America that includes the Sierra Nevada and the Idaho batholiths.

The oldest rocks in the study area, the Desert Divide Group of Brown (1980, 1981), predate the batholithic rocks. The Desert Divide Group, which occurs along the western edge of study area, consists of about 8,000 ft of quartz- and carbonate-rich metasedimentary rocks. The Desert Divide Group is subdivided into the Bull Canyon Formation overlain by the Ken Quartzite. The Bull Canyon Formation consists of well-foliated sillimanite gneiss, schist, quartzite, and marble. The Ken Quartzite consists of 95 to 98 percent quartzite with minor lenses of marble, schist, and gneiss. Metamorphic mineral assemblages within the Bull Canyon Formation indicate that the Desert Divide Group is regionally metamorphosed to the almandine-amphibolite facies.

The Desert Divide Group is intruded by mid-Cretaceous plutons in the northern San Jacinto Mountains. Metasedimentary rocks in the southern Peninsular Ranges, similar to the Desert Divide Group, yield Ordovician conodonts (Dockum and Miller, 1982). These relations indicate that the Desert Divide Group is older than the mid-Cretaceous Peninsular Ranges batholith and may be Ordovician or at least Paleozoic in age.

Hill (1984) divided the mid-Cretaceous (93 to 99 million years old) plutonic rocks in the Peninsular Ranges batholith into early intrusives and late tonalites. The early intrusives are small and vary in composition from gabbro to granite. These rocks are intruded by relatively homogeneous tonalite.

The Penrod Quartz Monzonite of Brown (1980, 1981) is the only early intrusive rock mapped within the study area. This granitic rock is medium grained and includes red garnet and trace amounts of muscovite. Moderately well developed foliation is defined by biotite flakes and occasional mafic inclusions. The foliation is parallel to sharp intrusive contacts with the Desert Divide Group.

Plutonic rocks mapped as part of the late tonalites include medium-grained tonalite and the granodiorite of Palm Canyon. The medium-grained tonalite consists of variable amounts of hornblende, biotite, and sphene. Schlieren and associated xenolith trains are parallel or subparallel to nearby plutonic contacts. Fine-grained granodiorite and poikilitic sphene facies are also associated with the margins of plutons.

The granodiorite of Palm Canyon (Erskine, 1985), equivalent to the Palm Canyon Quartz Diorite of Brown (1980, 1981), crops out in the central third of the study area. These plutonic rocks are highly variable in composition and texture. Modal variation ranges from tonalite to granite with granodiorite the most common composition. The granodiorite is fine to coarse grained, porphyritic, and nonfoliated to foliated or protoclastic. The granodiorite grades eastward into strongly deformed mylonitic rocks, including mylonitic gneiss and ultramylonite, characterized by a well-developed east-dipping foliation and a northeast-trending lineation.

The strongly deformed mylonitic granodiorite is mapped as part of the Santa Rosa mylonite zone, the northernmost segment of the Peninsular Ranges mylonite zone of Sharp (1979). Regional geology and small-scale structures suggest that the Santa Rosa mylonite zone represents a southwest-directed thrust fault (Sharp, 1979; Erskine, 1985) that is nearly synchronous with the mid-Cretaceous plutonic rocks.

The Palm Canyon and Deep Canyon faults are part of a series of imbricate low-angle thrust faults that are temporally and spatially related to the Santa Rosa mylonite zone. These thrust faults are characterized by zones of sheared, crushed, and fractured rocks that contain one or more fault surfaces and that exhibit cataclastic fabrics. Sharp (1979) suggested that the mylonite zone and the thrust faults are genetically related although Matti and others (1983) reported that the mylonitic fabric is cut by the low-angle thrust faults. Dokka (1984) and Wallace (1982) reported fission-track and K-Ar dates that range from 60 to 64 million years. These data represent cooling and uplift ages of the mylonitic rocks, and suggest that the Santa Rosa mylonite zone and the closely associated low-angle thrust faults were formed from mid- to late-Cretaceous time.

The leucogranite of Cactus Spring (Matti and others, 1983) is a large sheet like intrusion included within the Santa Rosa mylonite zone. This coarse-grained leucogranite includes muscovite and garnet and is characterized by pervasive mylonitic foliation and lineation. The fabric is produced by oriented quartz grains and quartz-feldspar aggregates.

The Palm Canyon Complex of Miller (1944) includes complexly deformed metasedimentary rocks, orthogneiss, and anatexites thrust over the Santa Rosa mylonite zone. The metasedimentary rocks include amphibolite, calc-silicate hornfels, pelitic schist and gneiss, and marble that probably represent lower Paleozoic and possibly upper Precambrian miogeoclinal sedimentary rocks. Metamorphic mineral assemblages indicate that the metasedimentary rocks were regionally metamorphosed to the almandine-amphibolite facies. The metasedimentary sequence is similar to the Desert Divide Group except for the lack of quartzite, and probably is older than the mid-Cretaceous plutonic rocks (Erskine, 1985). The orthogneiss consists of coarse-grained granodiorite with well-developed pervasive mylonitic foliation and lineation. The anatexites consist of garnet leucogranites intimately associated with the metasedimentary rocks and the orthogneiss. The anatexites probably represent in-place partial melting of the metasedimentary rocks.

The granodiorite of Asbestos Mountain (Erskine, 1985) is thrust over the Palm Canyon Complex. This granodiorite is medium to coarse grained with a moderate to strong foliation that locally becomes gneissic, and is characterized by large subhedral hornblende, magnetite, and sphene as long as 0.5 in. Amphibolite inclusions are scattered randomly throughout the unit.

The Pliocene and (or) Pleistocene Bautista Formation of Axlerod (1966), equivalent to the "Bautista beds" of Fraser (1931), unconformably overlies the mid-Cretaceous plutonic rocks and the Santa Rosa mylonite zone. The Bautista Formation consists of poorly indurated fanglomerate deposits that were shed southwestward off the San Jacinto Mountains.

MINERAL RESOURCES

Unruh and Ruff (1981) reported that a gold rush to the San Jacinto Mountains began in the early 1890s as a result of a swindle that "salted" several local claims. Most of the miners left around 1895 when the swindle was discovered. Serious mining began in 1900 when the Hemet Belle (No. 1, table 1) was developed. This mine changed hands so many times that it became known locally as the "Grubstake Mine". Gold occurs in quartz veins in the Penrod Quartz Monzonite and in the Desert Divide Group. In 1917, ore from the Hemet Belle averaged 0.5 to 0.75 oz/ton gold. Production values in the early 1980s were similar although the richer pockets contain almost 2.0 oz/ton gold. The mine was inoperative in 1986.

The Gold Shot mine (No. 2, table 1) was discovered around 1927 and was worked for several years along with the adjacent Golden Libra claims before the owners' corporation dissolved. Gold occurs in iron-stained quartz veins. The ore averaged 0.17 oz/ton gold during production. Higher grade pockets contain 0.4 oz/ton gold. The Gold Shot is presently inactive although the current owner occassionally works the mine as a hobby.

The Mufich claims (No. 3, table 1) originally consisted of the Alpha I, Alpha II, Bilsabayba, Diana, and Doughboy claims. Small amounts of gold occur in all the quartz veins developed at these claims. The Mufich claims were under development in 1986.

Wright (1946) reported scheelite in skarn lenses south of the study area along the contact between pendants of the Desert Divide Group and the tonalite plutons. Matti and others (1983) reported that the pendants consist mostly of biotite schist, gneiss, and phyllite with minor calcareous phyllite and thin discontinuous beds of metacarborate rock. They reported that select samples of skarn at Pigeon Creek (No. 4, table 1) contain 0.04 to 0.61 percent tungsten.

Marble (metamorphosed limestone) in the Desert Divide Group and in the Palm Canyon Complex is mined for Portland cement, for roofing granules, decorative stone, and roof base, and for riprap and building stone. Brown (1980) reported that more than 140 million tons of marble may be mined from the Desert Divide Group by surface mining techniques without removing overburden. This marble contains approximately 51 percent calcium oxide (CaO), about 3.5 to 6.0 percent silica (SiO_2), and less than 0.5 percent iron (Brown, 1980). Local variation of SiO_2 precludes use of this marble as flux for smelting iron ore. Marble from the Dolomite mine (No. 5, table 1) is used for roofing granules and decorative stone (Matti and others, 1983). This mine, as well as the Harris limestone claims (No. 6, table 1) and the Nightingale limestone claims (No. 7, table 1), were inactive in 1986.

Two asbestos mines (No. 8, table 1) are located along the Deep Canyon fault east of the study area. Tucker and Sampson (1945) and Rice (1957) reported that slip-fibre tremolite asbestos occurs as thin layers, a few inches to two feet wide, in veins 200 ft wide and 1,500 ft long. About 800 tons of ore were produced in 1930 for automobile battery boxes (Tucker and Sampson, 1945).

The Bautista Formation is a possible source of sand and gravel for construction use. These deposits are thin and limited in areal extent. Larger more accessible sand and gravel deposits are available east of Palm Springs and Palm Desert.

ASSESSMENT OF MINERAL RESOURCE POTENTIAL

Geologic and geochemical data indicate that the pre-Cretaceous Desert Divide Group and the Palm Canyon Complex has high potential for marble resources that may be used for for Portland cement and for construction applications such as riprap and roofing granules at certainty level C. At least two claims cover the large (greater than 140 million tons) marble resources within the study area.

Quartz veins and pegmatites in the Desert Divide Group have moderate resource potential for epithermal gold deposits at certainty level C. Several mines and active claims in the mid-Cretaceous Penrod Quartz Monzonite are located along iron-stained quartz veins that contain no visible sulfide minerals. Similar veins occur in the Desert Divide Group. Miller (written commun., 1986) reported up to 0.24 oz/ton gold and anomalous concentrations of antimony and arsenic in quartz veins that cut the Penrod Quartz Monzonite. Antimony and arsenic are pathfinder elements associated with epithermal gold deposits (Mosier and others, 1986).

Skarns along the contact between the Desert Divide Group and the granodiorite of Palm Canyon have moderate resource potential for tungsten resources at certainty level C. Matti and others (1983) reported scheelite in thin marble beds south of the study area. Miller (written commun, 1986) reported that skarns north of Ribbonwood contain 0.13 percent tungsten trioxide (WO_3) and anomalous concentrations of arsenic and beryllium. These elements are associated with tungsten skarns (Cox, 1986).

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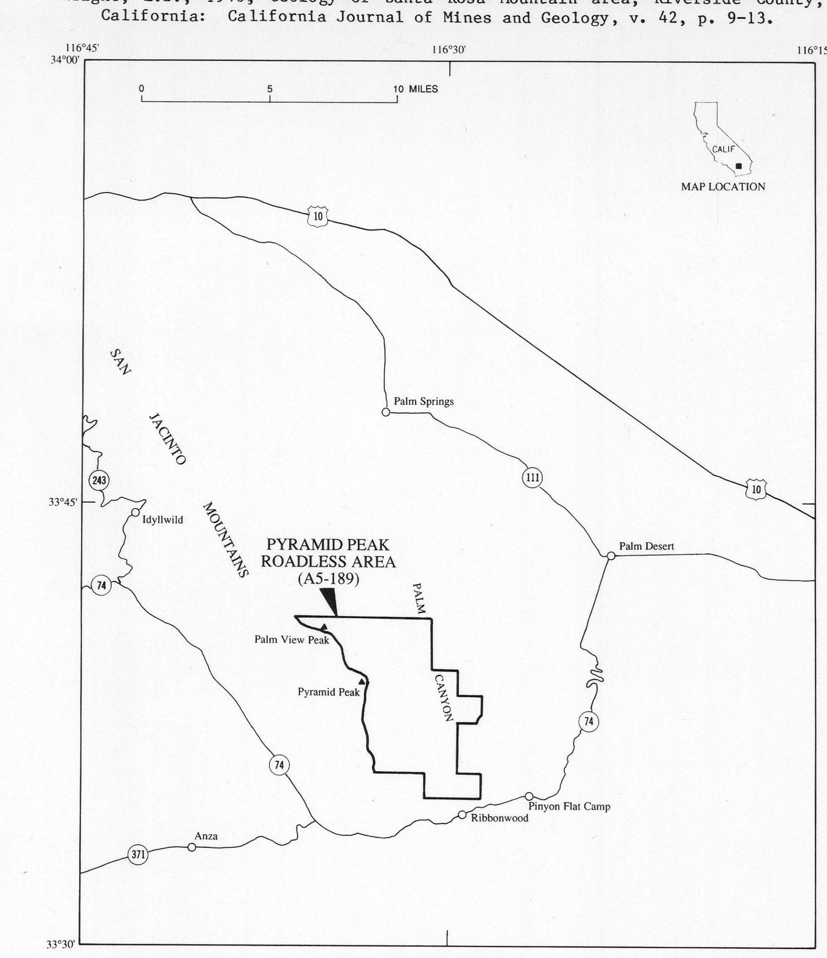

INDEX MAP

MINERAL RESOURCES AND RESOURCE POTENTIAL MAP OF THE PYRAMID PEAK ROADLESS AREA, RIVERSIDE COUNTY, CALIFORNIA

By
James P. Calzia
1988

Interior—Geological Survey, Reston, Va.—1988

For sale by U.S. Geological Survey, Map Distribution, Box 25286, Federal Center, Denver, CO 80225