MINERAL RESOURCE POTENTIAL OF THE CUCAMONGA ROADLESS AREAS, SAN BERNARDINO COUNTY, CALIFORNIA

SUMMARY REPORT

By

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STUDIES RELATED TO WILDERNESS

Under the provisions of the Wilderness Act (Public Law 88-577, September 3, 1964) and related acts, the U.S. Geological Survey and the U.S. Bureau of Mines have been conducting mineral surveys of wilderness and primitive areas. Areas officially designated as "wilderness," "wild," or "canoe" when the act was passed were incorporated into the National Wilderness Preservation System, and some of them are presently being studied. The act provided that areas under consideration for wilderness designation should be studied for suitability for incorporation into the Wilderness System. The mineral surveys constitute one aspect of the suitability studies. The act directs that the results of such studies are to be made available to the public and be submitted to the President and the Congress. This report discusses the results of a mineral survey of the Cucamonga Roadless Areas, Angeles and San Bernardino National Forests, San Bernardino County, Calif. Area A (A5-174) was classified as a recommended wilderness, and areas B and C (B5-174 and C5-174) as further planning areas during the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January 1979. For the purpose of this report, these areas will be referred to collectively as the study area.

SUMMARY

Geologic, geochemical, and geophysical evidence, together with a review of historical mining and prospecting activities, suggests that most of the Cucamonga Roadless Areas has a low potential for all types of mineral and energy resources—including precious and base metals, building stone and aggregate, fossil fuels, radioactive-mineral resources, and geothermal resources. A subeconomic tungsten occurrence located in the northern part of area B is currently being explored. It contains 16,000 tons of identified resources averaging 0.16 percent tungsten trioxide (WO_3); there is a high potential for the occurrence of additional tungsten resources. An area of moderate potential for the occurrence of silver, lead, and zinc resources is located near the head of the South Fork of Lytle Creek in the southwestern part of area B.

INTRODUCTION

The Cucamonga Roadless Areas are located about 10 mi northwest of San Bernardino and about 10 mi northeast of Pomona, Calif. (fig. 1). The study area comprises approximately 37.5 mi^2 (24,000 acres) that surround the existing Cucamonga Wilderness in the Angeles and San Bernardino National Forests in the southeastern San Gabriel Mountains. The area consists of rugged mountainous terrain including Telegraph and Cucamonga Peaks and is chiefly drained by San Antonio Canyon, Cucamonga Creek, and several forks of Lytle Creek. Access to the study area is by U.S. Forest Service gravel roads leading from the foothill communities to the south and paved roads that border the study area on the east and west.

GEOLOGIC SETTING

The Cucamonga Roadless Areas are situated at the east end of the San Gabriel Mountains in the central part of the Transverse Ranges province of southern California. This geomorphic-geologic province is west oriented, contrasting with the prominent northwest orientation of the other geologic-geomorphic provinces in California. A number of major faults occur within and adjacent to the study area, which is underlain by a wide variety of metamorphic and plutonic rock types.

Along the south margin of the study area is an east-northeast-oriented belt of metamorphic rocks generally considered to be of Precambrian age. The rocks have had a complex metamorphic and structural history that has produced a variety of textures and structures. The earliest recognizable event was metamorphism to upper amphibolite and granulite metamorphic facies, accompanied by intense deformation. The resulting rocks are gneisses having mineral assemblages of high temperature and pressure, including orthopyroxene, clinopyroxene, garnet, sillimanite, olivine, and spinel. Charnockitic rocks occur within the gneiss as tabular to irregular lenticular masses as much as 1.2 mi in length. A second metamorphism at amphibolite or lower metamorphic facies destroyed most of the olivine, orthopyroxene, and garnet and generated widespread amphibole. This second metamorphism involved cataclastic deformation which produced well-layered rocks having a variety of cataclastic textures. The predominant strike of the cataclastic layering is east-northeast; most layering dips northward at low to moderate angles.

North of the granulitic-cataclastic belt, and separated from it by quartz diorite, is a second complex of metamorphic rocks. Predominantly metasedimentary, it consists of thick sections of amphibolite-grade biotite-bearing schist and gneiss, graphitic schist, marble, calc-silicate rock, and quartzite. Most workers have considered the protolith of this assemblage to be of Paleozoic age based on the relatively large amount of marble and quartzite. These rocks, which are tightly folded with a general west-striking foliation, are best preserved and exposed on the east side of San Antonio Canyon. Eastward from San Antonio Canyon, they are progressively and complexely intruded by quartz diorite and related plutonic rocks. Near the confluence of the South and Middle Forks of Lytle Creek they are represented by gneiss septa in plutonic rocks.

North of Icehouse Canyon and the Middle Fork of Lytle Creek is a metamorphic complex consisting largely of gneiss that has been affected to varying degrees by cataclasis. The varied lithologies include major amounts of biotite-bearing quartzo-feldspathic schist and gneiss, pods of leucocratic granitic gneiss, and discontinuous masses of quartzite and marble. Foliation within this unit is highly variable with seemingly no pattern throughout most of its extent. However, in the vicinity of the Middle Fork of Lytle Creek, the foliation is more regular with a west-oriented strike and northward dip. Near the Vincent thrust, the metamorphic complex is thoroughly cataclastically deformed and recrystallized to a separately mappable mylonite unit. The mylonite probably formed as the result of movement within the Vincent thrust zone. In gneiss west of the San Antonio Canyon fault, migmatitic and hornblende-bearing gneiss is more predominant than to the east.

The Pelona Schist is widespread in the northern part of the study area where it occurs in several fault-bounded blocks structurally beneath the Vincent thrust. The Pelona Schist is a well-layered schist of greenschist metamorphic facies; north of the Punchbowl fault it is of uppermost greenschist to lower amphibolite facies. Most of the schist is a monotonous and homoclinal-appearing sequence of well-foliated gray schist, with less common greenstone. The greenstone is common adjacent to the Vincent thrust where it constitutes thick sections. Less common than greenstone are widespread discontinuous layers of metachert, siliceous schist, and interlayered marble and quartzite. The metachert is commonly in contact with or interlayered with greenstone. Sparse pods of talc-actinolite rock and serpentine occur at widely separated localities. The protolith of the Pelona Schist is of probable Mesozoic age and consisted mainly of clay-rich sandstone with lesser quartz-rich sandstone, basalt or andesitic basalt, minor chert, limestone, and serpentine.

Cretaceous plutonic rocks, mainly quartz diorite, intrude all the major metamorphic units except the Pelona Schist. The major plutonic rock belt is a west-trending foliated to cataclastic-textured complex that extends across the southern part of the area. Primarily it is a biotite-hornblende quartz diorite in its southern extent. Northward, it grades into a heterogeneous assemblage of quartz diorite and granodiorite. Foliation is mainly east- to northeast-striking and north-dipping. Most of the rocks are incipiently deformed by cataclasis with the degree of cataclasis increasing southward. At and near its southern extent, the quartz diorite consists of thick homogeneous sections of thoroughly mylonitized rocks which form a mappable unit in the southeasternmost part of the exposed quartz diorite. Most of the mylonitic foliation strikes west and dips northward. Discontinuous masses of diorite occur along or near the southern part of the quartz diorite belt. Irregular- to tabular-shaped dikes of biotite granodiorite and quartz monzonite of Cretaceous age, oriented east to northeast, are common in the southern part of the quartz diorite. Unlike the quartz diorite, most of the granodiorite and quartz monzonite is unfoliated.

Between the North and Middle Forks of Lytle Creek a biotite-granodiorite pluton and associated dikes intrude the Pelona Schist and cataclastic gneiss of the upper plate of the Vincent thrust. This pluton is Miocene in age (approximately 14 m.y. B.P.; Miller and Morton, 1977). The pluton was offset into two separate parts by displacement on branches of the San Jacinto fault. The granitoid rock is a distinctive, compositionally uniform, unfoliated biotite granodiorite that locally is porphyritic, especially along its intrusive margins. A wide variety of fine-grained to porphyritic andesitic to basaltic dikes cuts both the Miocene granodiorite and other basement-rock units.

Landslides occur throughout the eastern San Gabriel Mountains. Young landslide deposits with readily identifiable landslide morphology occur on many hillslopes. Several old landslides, lacking readily identifiable landslide morphology, occur in the western part of the area in the vicinity of San Antonio Canyon. Surficial deposits of unconsolidated bouldery alluvium occur along all major drainages. Older alluvial deposits occur as elevated masses perched at various heights above the modern stream base. These are most notable along the lower reaches of Lytle Creek where they include some parts of an alluviated old channel of Lytle Creek. Locally thick accumulations of talus and colluvium are widespread and consist of unconsolidated angular rock debris.

Faults

The oldest recognized fault in the area is the Vincent thrust (Noble, 1954; Ehlig, 1958). It occurs as three segments, once continuous, but now offset by younger high-angle faults. The Vincent thrust, a major zone of dislocation, juxtaposes the older gneissic rocks over the Pelona Schist. The rocks above the Vincent thrust are intensely cataclastically deformed. The cataclasis is generally considered to be the result of movement associated with the thrust, probably during Late Cretaceous time (Ehlig, 1968, 1975; Evans, 1982a). The thrust is intruded by Miocene granodiorite.

Northwest-striking branches of the active San Jacinto fault occur in the eastern part of the area. These branches of the San Jacinto fault connect with a number of east- to northeast-striking faults in the interior of the mountains and rejoin, in part, along the western part of the area. In the vicinity of San Antonio Canyon, these faults interact in a complex fashion with the eastern extension of the San Gabriel fault and the San Antonio Canyon fault. This complex of faults and three northwest-striking faults along the southern part of the area divide the eastern San Gabriel Mountains into a series of structural blocks (Morton, 1975).

GEOLOGY, GEOCHEMISTRY, AND GEOPHYSICS PERTAINING TO MINERAL RESOURCE ASSESSMENT

Geology

Geologic evidence suggests that the Cucamonga Roadless Areas generally have a low potential for the occurrence of mineral resources. During our geologic field studies we observed localized zones of mineralized rocks, but we did not observe any extensive mineralized zones.

Within the existing Cucamonga Wilderness, a small area is underlain by quartz diorite containing copper and silver (Zilka and Schmauch, 1982, p. 89). No similar mineralized rocks were noted in the quartz diorite elsewhere in the study area.

Cataclastic rocks above the Vincent thrust appear to have potential for the occurrence of both low-grade tungsten and lode gold. The Blue Diamond prospect in the northern part of area B is within highly deformed rocks above the Vincent thrust.

Garnet-epidote tactite (skarn) occurs locally where carbonate metamorphic rocks are engulfed, or partly so, by quartz diorite. The Blew Jordam and the California-Hercules prospects, which consist of silver-lead-zinc mineralized rocks associated with calc-silicate rock and tactite, are located near the head of the South Fork of Lytle Creek. Other calc-silicate and tactite rocks contain pods of sulfide minerals. No significant tungsten mineralization was noted within the calc-silicate rocks and tactite.

Barite and manganese-bearing garnet (spessartite) occur locally as accessory minerals in metachert in the Pelona Schist. The chromium-bearing mica, fuchsite, occurs as scattered isolated pods in some parts of the Pelona Schist. Minor amounts of talc intermixed with actinolitic amphibole locally occur in the most mafic parts of the Pelona Schist.

Graphite occurs locally as minor pods and disseminated crystals within the marble on the east side of San Antonio Canyon and as local thin layers within some of the associated schist. In Cascade Canyon, a metasomatized part of the marble contains a small amount of lazurite (lapis lazuli). Also in Cascade Canyon, leucocratic granitic rocks that intruded carbonate rocks have locally been enriched in aluminum, giving rise to minor occurrences of nongem-quality pink corundum.

Lower parts of some perched and elevated alluvial deposits in San Antonio Canyon, Cucamonga Canyon, and

Lytle Creek drainages have been prospected and a few mined on a small scale for placer gold.

Geochemistry

A reconnaissance stream-sediment geochemical survey was conducted in the Cucamonga Roadless Areas for 31 major, minor, and trace elements in order to determine spatial variations in stream-sediment chemistry that might reflect concentrations of potentially economic minerals. The locations of 48 geochemical sample localities and the analytical results for stream sediments and panned concentrates are shown in tables 1 and 2 on the geochemical map sheet (Rodriguez and Morton, 1984). Location of anomalous values, relative to other samples, are shown on figure 2. Additional geochemical values within the study area and the existing Cucamonga Wilderness are shown by Evans (1982b, p. 33-51).

Stream-sediment geochemistry can be a useful tool in reconnaissance mineral resource evaluation because anomalously high concentrations of a specific element or group of elements in an alluvial deposit can reflect mineral concentration upstream in the drainage basin. However, the chemical composition of alluvium is influenced by numerous factors in addition to the mineral content of the source rocks (Rose and others, 1979, p. 383-427), and local geochemical anomalies are commonly unrelated to economic mineral concentration. Therefore, the stream-sediment geochemistry survey is strictly a reconnaissance technique producing results that must be evaluated within the context of geologic and geophysical data and follow-up geochemical studies.

Within and near the Cucamonga Roadless Areas, the chemical composition of stream-sediment samples indicates no significant systematic anomalous element concentrations. Most of the analyses fall within ranges that are reasonable for nonmineralized crystalline rocks and derivative stream sediments; few values exceed this geochemical background. Moreover, except for a few isolated samples, the maxiumum concentrations of all elements that were measured are low in comparison to values that have been reported in geochemical studies of stream sediment in districts where significant mineral deposits are present.

Anomalous gold values in the Barrett and Cascade Canyon areas are spatially associated with metamorphosed carbonate rocks and quartzite, as is the case for upper Day Canyon, the South Fork of Lytle Creek, and Falling Rock Canyon. Gold values on the north side of Icehouse Canyon are spatially associated with cataclastic gneiss.

In Coldwater Canyon, anomalous gold and tungsten values probably are related to cataclastic rocks in the vicinity of the Vincent thrust, which appears to be the site of gold and tungsten mineralization further to the west in the San Gabriel Mountains (see Evans, 1982b).

Isolated chromium and nickel values near the mouth of the South Fork of Lytle Creek and chromium values in Icehouse Canyon may both be related to pyroxene or other mafic minerals occurring in the metamorphic rocks.

Geochemical samples taken from the Cascade, Barrett, Kerkhoff, and Icehouse Canyon areas may be contaminated. These areas have long been the sites of human activity. Lead contamination is possible in all major drainages of the eastern San Gabriel Mountains.

The results of the geochemical survey are compatible with the geologic evidence: they suggest a generally low mineral resource potential for the Cucamonga Roadless Areas, with a local moderate to high resource potential for tungsten, silver, lead, zinc, and low-grade gold.

Geophysical surveys

An aeromagnetic survey of the Cucamonga Roadless Areas was flown in 1980 (U.S. Geological Survey, 1981). Anomalies and patterns on magnetic maps are caused by variations in the amount of magnetic minerals (commonly magnetite) in rock units, and are often closely related to geologic contacts and structures. The magnetic-intensity contours potentially can indicate concentrations of iron-rich minerals as well as terranes where these minerals are deficient, as within zones of altered rocks.

The most prominent feature on the aeromagnetic map of the study area is a west-trending elongate high that coincides with the mapped exposure of quartz diorite south of the South Fork Lytle Creek fault. The steep gradient on the south side of this magnetic high follows closely the mapped contact between the quartz diorite and the Precambrian(?) granulite gneiss and cataclasite terrane to the south, which suggests that these Precambrian(?) rocks are nonmagnetic relative to the quartz diorite. The elongate high is broken into a series of more circular magnetic culminations which lie between northwest-trending fault-controlled canyons. This segmentation of the anomaly probably reflects the extremely rugged topography in the area and the difficulty of maintaining the airplane at the nominal constant elevation of 1,000 ft above ground level.

The area that underlies the aeromagnetic high has few mines or prospects and relatively few anomalous geochemical values. More geochemical anomalies occur in the plutonic-metamorphic complex immediately to the north of the magnetic high, raising the possibility that alteration of rocks in this area was responsible for both the geochemical anomalies and the destruction of magnetite, thus making these rocks less magnetic. It appears more likely, however, that the lower magnetic anomaly values in this plutonic-metamorphic complex are caused by less mafic, less magnetic igneous rocks and by a higher proportion of metasedimentary units relative to igneous rocks than in the quartz diorite belt just to the south.

A poorly defined gradient in the aeromagnetic values, complicated perhaps by data collection problems owing to the very steep topography, roughly follows the fault boundary between the igneous-metamorphic complex and the nonmagnetic terrane to the north consisting of the Pelona Schist and gneiss and schist. The smooth, gentle aeromagnetic gradient which rises to the north-northeast across this nonmagnetic terrane toward the San Andreas fault is probably caused by magnetic basement on the north side of the San Andreas fault (Andrew Griscom, oral commun., 1982).

In summary, it appears that the largest aeromagnetic anomalies within the study area can be attributed to relatively mafic igneous rocks exposed at the surface, and that the aeromagnetic gradients mark igneous and fault contacts and do not indicate mineralization or a potential for mineral occurrences.

MINING DISTRICTS AND MINERALIZATION

Methods and previous studies

The resource evaluation of the roadless areas by the U.S. Bureau of Mines was carried out in 1980. Office preparations for field work included library research into pertinent mining and geologic literature and a search of San Bernardino County mining records for claims located in the area. Owners of mineral properties were contacted if possible, and U.S. Bureau of Land Management and U.S. Bureau of Mines statistics on active properties and past mineral production were consulted.

Field studies included a search for all mines, prospects, and claims. Prospects were examined, sampled, and mapped if warranted; a total of 77 lode samples and 16 placer samples were taken.

History of mining activity

Based on San Bernardino County mining records, approximately 130 mining claims have been located within roadless areas B and C since passage of the 1872 Mining Act, including 100 lode claims and 30 placer claims. Most were located in area B; three lode and 12 placer claims were within area C. Descriptions of most claims are vague, and exact locations were impossible to determine in most cases; many claims were relocations of older ones. In 1980, the Blue Diamond tungsten and Sierra de Oro gold prospects (fig. 2, nos. 1 and 11) were being actively explored. Four patented lode claims and one patented placer claim are located in area B (fig. 2). There are no mineral leases in the study area.

Three gold mining districts, primarily placer districts, are peripheral to the study area: the San Antonio district lies to the northwest, the Lytle Creek district borders the area on the east, and the Fairview district lies near the southwest corner.

The San Antonio district, also known as the Baldy and Hocumac districts, was discovered in the summer of 1882. It is along the north side of the pass between Mount San Antonio and Telegraph Peak at an elevation of 8,140 ft (Cloudman and others, 1917, p. 794; Thrall, 1950, p. 5). The main deposit was a perched gravel placer approximately 250 ft wide and 4,500 ft long. It was developed by three companies, each owning 1,500 ft of channel. Lode claims located for gold at several small quartz veins near the head of San Antonio Canyon have no recorded production. The district has been idle since World War I, and is now the site of the Mount Baldy ski resort.

In the Lytle Creek district, gold was found in placers in about 1860 (DeGroot, 1888, p. 519). The main gold placer activity extended from the mouth of Lytle Creek canyon to the village of Lytle Creek. Most gold came from an abandoned channel of Lytle Creek and other channel deposits perched 150 ft or more above the present-day channel (Cloudman and others, 1917, p. 793). Mining was by hydraulicking, sluicing, and rocking. The most important placer mine in the district, and the first successful hydraulic mine in southern California, was a buried channel of Lytle Creek at Texas Hill (fig. 2). At one time, it was the most important mining operation in San Bernardino County. About $80,000 worth of gold has been produced there since 1876 (Cloudman and others, 1917, p. 793).

The Fairview district apparently was a small area at the mouth of Cucamonga Canyon active about the turn of the century. Only limited information is reported on courthouse mining claim records for this district.

Within the study area, the Blew Jordam (fig. 2, no. 4) and California-Hercules (fig. 2, no. 5) prospects were discovered in the early 1920's and explored prior to World War II. Both are tactite-type occurrences bearing silver, lead, and zinc. The Blue Diamond tungsten prospect (fig. 2, no. 1) was discovered in 1977.

Prospects and mineral occurrences

Mineral data from mines and prospects in the vicinity of the Cucamonga Roadless Areas (Peters, 1983, p. 13) are summarized in table 1.

Metallic mineralization

The Blue Diamond prospect (fig. 2, no. 1) is located within a tabular-shaped carbonate-bearing gneissic unit containing lenses of quartz with scheelite. The unit is in a zone of highly deformed rocks above the Vincent thrust. The mineralized zone appears to be coplanar with lithology and foliation and may extend along strike and downdip of the surface occurrence. Discontinuous surface exposures of the scheelite-bearing gneiss were traced over a strike length of 600 ft. The mineralized zone contains an estimated 16,000 tons of indicated and inferred subeconomic tungsten resources averaging 0.16 percent tungsten trioxide (WO_3).

Occurrences of silver, lead, and zinc, and lesser amounts of tungsten and cadmium are found in small tactite masses at the Blew Jordam (fig. 2, no. 4) and California-Hercules (fig. 2, no. 5) prospects. Poor exposure of mineralized rocks prevents a complete delineation of the occurrences. The Blew Jordam contains at least 100 tons of tactite within several small pod outcrops which occur over a distance of 1,200 ft. Chip samples averaged 10 oz silver per ton, 3.75 percent zinc, and 2.3 percent lead. At the California-Hercules, resources of at least 1,000 tons of tactite averaging 1.3 oz silver per ton, 0.71 percent lead, and 0.75 percent zinc were estimated.

Three lode gold prospects are apparently located on geologic structures parallel to the San Andreas fault, which lies northeast of the roadless areas. The Williams prospect (fig. 2, no. 3) was inaccessible at the time of this study. No mineralized structures were found at the Sierra de Oro (fig. 2, no. 11) or Martin quartz prospects (fig. 2, no. 14). These prospects have no record of production.

Placer occurrences

In roadless area B, two fluvial sand and gravel deposits (fig. 2, nos. 9 and 10) perched 20 ft above the Lytle Creek flood plain just inside the study area, locally contain as much as $1.17 (at $450.00 per troy oz gold price) gold per yd^3. These deposits are small and discontinuous and contain an average gold value of less than 45 cents per yd^3. Small placer prospects are also found along intermittent tributaries to Lytle Creek (fig. 2 and table 1, nos. 12 and 13). Gravel is limited to the stream beds and small perched bars, and volume is less than 2,000 yd^3 per mi of stream channel. There has been no significant placer mining of the boulder-covered flood plain along the North Fork of Lytle Creek; any gold probably would be limited to the underlying bedrock surface.

Roadless area C has minor placer deposits, but no known lode gold deposits. Seven placer gold prospects were examined along Cucamonga Creek and its tributaries (fig. 2, no. 15-21). One reconnaissance pan sample had a gold value of $1.23 per yd^3. Other samples had no more than 5 cents gold value per yd^3. Gravel deposits are limited to present stream channels, and also probably do not exceed 2,000 yd^3 per mi of channel.

Construction materials

Sand, gravel, and stone suitable for construction materials occur in limited amounts in both roadless areas B and C. However, larger deposits of equal or better quality are available closer to major markets in southern California.

Hydrocarbon, radioactive, and geothermal occurrences

No hydrocarbon or radioactive-mineral occurrences are known in the study area. A sulfurous hot spring located just outside the roadless areas on the north bank of Lytle Creek (fig. 2) formerly was used for warm baths. The spring was buried by the flood of 1938 (Gertrude Becker, U.S. Forest Service, Lytle Creek Ranger Station, oral commun., 1981); geothermal potential could not be fully determined, but the temperature was not high enough to produce steam.

ASSESSMENT OF MINERAL RESOURCE POTENTIAL

Geologic, geochemical, and geophysical evidence, together with a review of prospecting and mining activities, indicates that the Cucamonga Roadless Areas generally have a low potential for the occurrence of large metallic mineral deposits, industrial mineral resources, and energy resources. There is a high potential for the occurrence of additional low-grade tungsten resources at the Blue Diamond prospect and a moderate potential for localized occurrences of silver, lead, and zinc in the vicinity of two small zones in area B (fig. 2). This mineral resource assessment is based on the following considerations:

(1) Geologic mapping indicates that geologic environments favorable for the occurrence of mineral deposits have not produced extensive mineralized zones within the study area.

(2) Generally low concentrations of specific elements as determined by chemical analyses of stream-sediment and panned-concentrate samples from 48 localities indicate that elemental abundances generally fall within expected background ranges.

(3) Aeromagnetic patterns seem to be caused by fault and igneous contacts with mafic igneous rocks and do not suggest concentrations of iron-rich minerals or large areas of alteration.

(4) Historic prospecting activities within the areas have identified localized occurrences of base and precious metals in some rock units, but have not led to the discovery of large deposits.

Two areas of low mineral resource potential are associated with three prospects in area B. One area is at the Blue Diamond prospect (fig. 2, no. 1) which is located above the Vincent thrust in a layer of carbonate-bearing gneiss containing lenses of quartz with scheelite. The Blue Diamond prospect has demonstrated subeconomic resources of tungsten, and the areas in the vicinity have a high potential for additional resources.

The second area includes two prospects, the Blew Jordam and California-Hercules, that contain occurrences of silver, lead, and zinc, and lesser amounts of tungsten and cadmium (fig. 2, nos. 4 and 5). The metals are associated with poorly exposed and probably small tactite pods. The prospects contain identified subeconomic tactite resources estimated at 100 and 1,000 tons, respectively. Areas in the vicinity of these two prospects have moderate potential for silver, lead, and zinc resources; however, any undiscovered resources probably will be small. This conclusion is supported by geologic mapping that did not reveal extensive or large tactite pods or belts in this vicinity and by the absence of significant geochemical anomalies from sediment in streams surrounding the two prospects.

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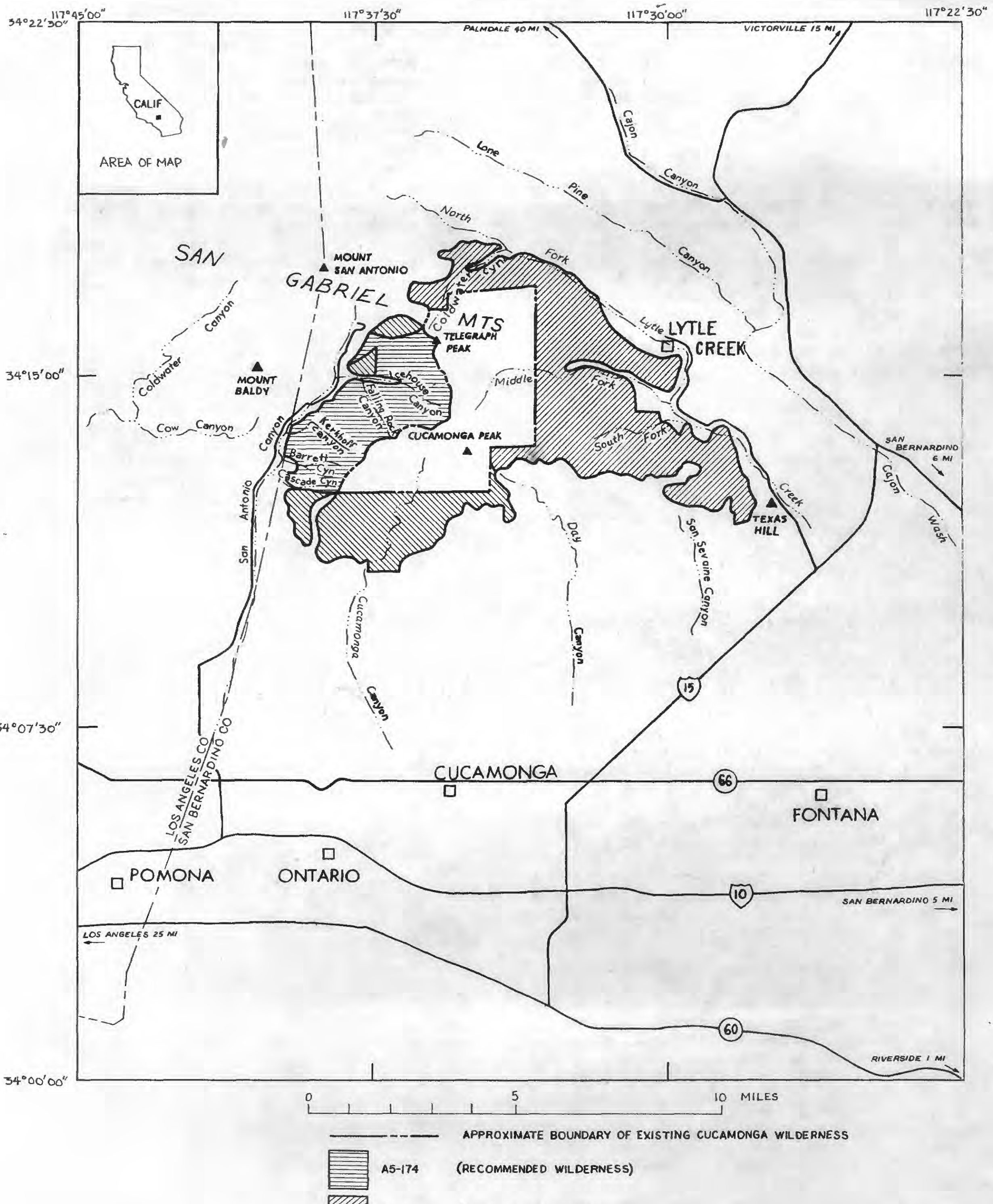

Figure 1.--Index map showing location of the Cucamonga Roadless Areas (A5-174, B5-174, C5-174), San Bernardino County, Calif.

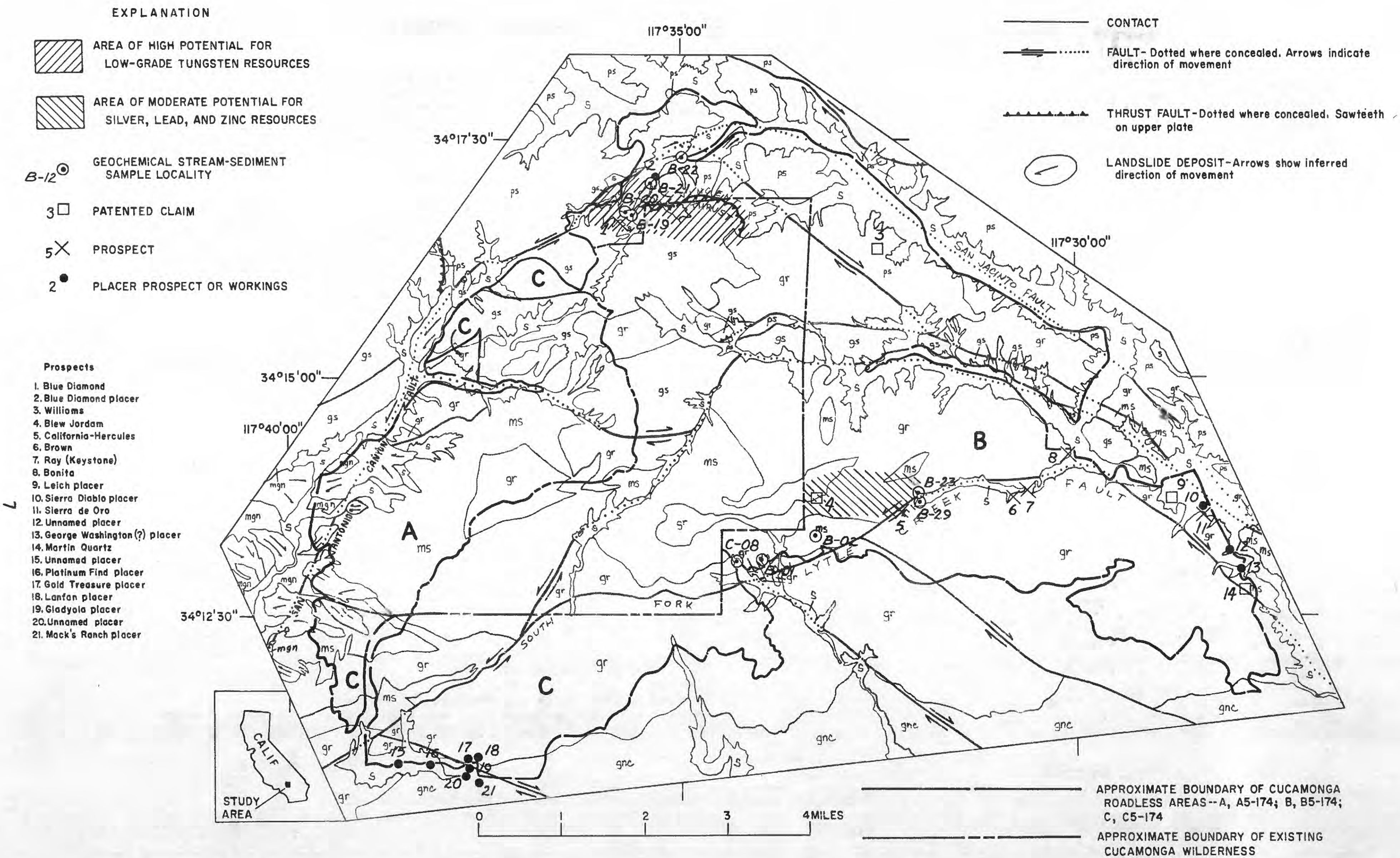

Figure 2.--Cucamonga Roadless Areas showing zones with mineral resource potential and locations of prospects. Geology simplified from accompanying mineral resource potential map. s, Quaternary surficial sedimentary deposits; gr, Cretaceous and Tertiary granitic rocks including granodiorite, quartz monzonite, and quartz diorite; ps, Pelona Schist (Paleocene and (or) older); gs, gneiss and schist (Cretaceous and older); ms, undifferentiated metasedimentary rocks (Paleozoic? or older) and minor granite; mgn, migmatitic gneiss (Paleozoic? or older); gnc, granulite gneiss and cataclasite (Precambrian?).

Table 1.--Prospects and mineralized areas in the Cucamonga Roadless Areas (B and C)

[Underlined names refer to properties with mineral resources or potential mineral resources; those not underlined have no potential or are poorly exposed and a determination cannot be made. Gold value is calculated at $450 per troy oz]

Map no. (fig. 2)	Prospect name (commodity)	Summary	Number and type of workings	Assessment of deposit
1	Blue Diamond (tungsten)	Scheelite in quartz stringers parallel to gneissic foliation within chlorite gneiss along contact with biotite gneiss. Contact strikes north to northeast, dips to west.	Three pits and a 65-ft adit. A pilot mill with jaw crusher, rod mill, three-deck vibrating screen, and table concentrator currently under development.	Twenty-nine chip samples. About 16,000 tons of indicated and inferred subeconomic resources averaging 0.16 percent tungsten trioxide (WO_3).
1, 2	Blue Diamond placer (gold, tungsten)	Placer claims located downstream from Blue Diamond lode along western tributary to Coldwater Creek (fig. 2, no. 1) and Coldwater Creek (fig. 2, no. 2). No significant sand and gravel bars are in the drainage.	None.	Three reconnaissance pan samples. Sample from western tributary (fig. 2, no. 1) contained 5 cents gold per yd^3 and trace of scheelite. Samples from Coldwater Creek (fig. 2, no. 2) above and below road ford contained a trace of scheelite in one sample and 19 cents gold per yd^3 with 1 percent scheelite in another.
3	Williams lode (gold, silver)	Five-foot-wide vein of quartz and calcite laminae strikes west-northwest (parallel to the San Andreas and San Jacinto faults) and dips to the southwest. Gold and silver reportedly occur in associated sulfide minerals.	A 229-ft adit and a small prospect pit. The adit portal is buried beneath a debris slide (W. Miggs, oral commun., 1980).	Access to the property was not possible because of a public target-shooting area.
4	Blew Jordam (silver, zinc, lead)	Tactite zone along contact between buff-colored marble and gneissic quartz diorite. Zone strikes north-northwest; dip is steep and variable. Possible by-products include cadmium, copper, and tungsten. Resources may be present.	Three pits, 12 small trenches, and a 13-ft-long deep shaft.	Twenty-two samples (15 chip samples). About 100 tons of tactite averaging 10 oz silver per ton, 3.75 percent zinc, and 2.3 percent lead.
5	California-Hercules (silver, zinc, lead)	Tactite zone developed along contact between buff-colored marble and gneissic quartz diorite. Zone strikes north-northeast, dips vertically to steeply west. Possible by-products include cadmium, copper, and tungsten. Most of the prospect is poorly exposed and heavily overgrown with brush.	A 40-ft adit and at least three adits buried under debris; one is over 700 ft long. Foundations of cabin and mill.	Thirteen chip samples. About 1,000 tons of tactite averaging 1.3 oz silver per ton, 0.75 percent zinc, and 0.71 percent lead.
6	Brown prospect	Adits driven southeast along strike of iron-stained hornfels and slate (strike is N. 80° W., dip is 60-80° NE.). The 53-ft adit follows a 3-ft-thick white marble bed which is cut by a thrust fault (strike N. 86° W., dip 66-85° SW.).	Three adits on east bank of small drainage entering South Fork of Lytle Creek from the south. They are 12 ft, 21 ft, and 53 ft long.	Eight samples: no significant mineral values.
7	Ray lode (copper)	Adit driven on a 0.5-ft-thick malachite-stained shear which pinches out after only a few feet. Outside the adit is a tactite lens (strikes N. 80° W., dip 50° NE.) which extends 25 ft east-northeast from the north side of the portal.	A 30-ft-long adit driven west-northwest; 7-ft-long drift off of south wall.	Three samples: one sample of 0.5-ft-thick shear contained 0.34 percent copper. Two 4-ft-long chip samples across tactite lense 7 ft and 20 ft from portal contained 0.15 percent copper, and 0.34 percent copper respectively.

Table 1.--Prospects and mineralized areas in the Cucamonga Roadless Areas (B and C)--Continued

Map no. (fig. 2)	Prospect name (commodity)	Summary	Number and type of workings	Assessment of deposit
8	Bonita prospect	Adit driven into quartz diorite cut by several northwest-striking shear zones. Moderate saussuritization.	A 108-ft adit driven west-northwest curving to north-northwest; 26-ft drift off of north wall.	Seven samples: no significant mineral values.
9	Leich placer mine (gold)	Placer on Lytle Creek dates from 1879. Louis Abadie, who later operated Texas Point, reportedly took $60,000 in gold out of a drift mine here. It has been a home site for many years.	Five drift mine (placer) adits. Reportedly, they range from 140 to 400 ft long.	Two reconnaissance pan samples: sample over portal of caved drift mine contained $1.17 gold per yd^3. Sample of Lytle Creek bank escarpment contained 5 cents gold per yd^3.
10	Sierra Diablo placer (gold)	Placer is on the sand and gravel flood plain of Lytle Creek; was probably hydraulically mined in the 19th century	One caved drift mine adit of unknown length.	A reconnaissance pan sample from Lytle Creek bank escarpment showed 11 cents gold per yd^3.
11	Sierra de Oro lode	Light-gray marble overlain by iron-stained micaceous quartzite.	Two pits.	Three samples: no significant mineral values.
12	Unnamed placer (gold)	Stream drainage had minor 19th century operations.	None.	One reconnaissance pan sample showed 4 cents gold per yd^3.
13	George Washington(?) placer (gold)	Stream drainage had minor 19th century operations.	None.	One reconnaissance pan sample: no gold.
14	Martin Quartz "mine"	Dates from 1887. Biotite gneiss and quartzite strike N. 75° to 85° W. and dip 85° SW. Intruded by a dike of deeply weathered white granite with similar northwest trend.	A reported 175-ft adit was not found.	Samples of iron-stained biotite gneiss, quartzite, and granite, contained no precious or base-metal concentrations. Reconnaissance pan sample contained a trace of gold.
15	Unnamed placer (gold)	Banks of tributary to west branch of Cucamonga Creek.	None.	One reconnaissance pan sample showed $1.23 gold per yd^3.
16	Platinum Find placer (gold)	Banks of west branch of Cucamonga Creek.	None.	One reconnaissance pan sample showed a trace of gold.
17	Gold Treasure placer	Banks of small drainage, enters Cucamonga Creek from west.	None.	One reconnaissance pan sample showed no gold.
18	Lanfan placer (gold)	Banks of Cucamonga Creek.	None.	One reconnaissance pan sample showed 5 cents gold per yd^3.
19	Gladyola placer (gold)	Banks of Cucamonga Creek.	None.	One reconnaissance pan sample showed a trace of gold.
20	Unnamed placer (gold)	Banks of Cucamonga Creek below mouth of west branch.	None.	One reconnaissance pan sample showed 3 cents gold per yd^3.
21	Mack's Ranch placer	Banks of small drainage enters Cucamonga Creek from east.	None.	One reconnaissance pan sample showed no gold.