

UNITED STATES DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY

MINERAL RESOURCE POTENTIAL OF THE SCODIES  
ROADLESS AREA,  
KERN COUNTY, CALIFORNIA

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Open-File Report 83-510

1983

## 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 surveys 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 Scodies Roadless Area, Sequoia National Forest, Kern County, California. Scodies Roadless Area (5212) was classified as a further planning area during the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January 1979.

### SUMMARY

On the basis of the geological and geochemical surveys conducted by the U.S. Geological Survey (USGS), and investigations of the mines, prospects, claims, and deposits in the area by the U.S. Bureau of Mines (USBM), the Scodies Roadless Area is considered to have low potential for any type of metallic mineral deposit. Studies revealed no evidence of a potential for coal, oil, gas, or geothermal energy resources.

### INTRODUCTION

The Scodies Roadless Area is located in the southern Sierra Nevada, about 60 mi east-northeast of Bakersfield, 20 mi east of Lake Isabella, and immediately southwest of Walker Pass in Kern County, California (fig. 1). The roadless area encompasses 48,000 acres in Sequoia National Forest, with elevations ranging from 3,500 to 7,155 ft above sea level. Access into the area is by unpaved roads out of the communities of Onyx and Weldon, and from California State Highways 178 and 14.

Field studies of the Scodies Roadless Area included a geologic study and geochemical sampling conducted in 1980 and 1982 by the USGS, and an investigation of the mines, claims, prospects, and mineralized areas by the USBM in 1982.

### GEOGRAPHIC SETTING

The Scodies Roadless Area is roughly coincident with Scodies Mountain, formerly known as the Kiavah Mountains. The area is an elevated block consisting of a dissected southwestward-sloping plateau at an average elevation of 6,000 ft. The terrain is steep, rocky, and cut by a few interior drainages and canyons. On the margins of the area are steep walled canyons as deep as 2,500 ft with ridges 3 to 4 mi long on the west, north, and east sides. Scattered forests of pinyon and digger pines, and sagebrush cover the higher elevations. Joshua trees and a mixed desert flora occur at lower elevations, chiefly on the south and east sides. To the northwest the

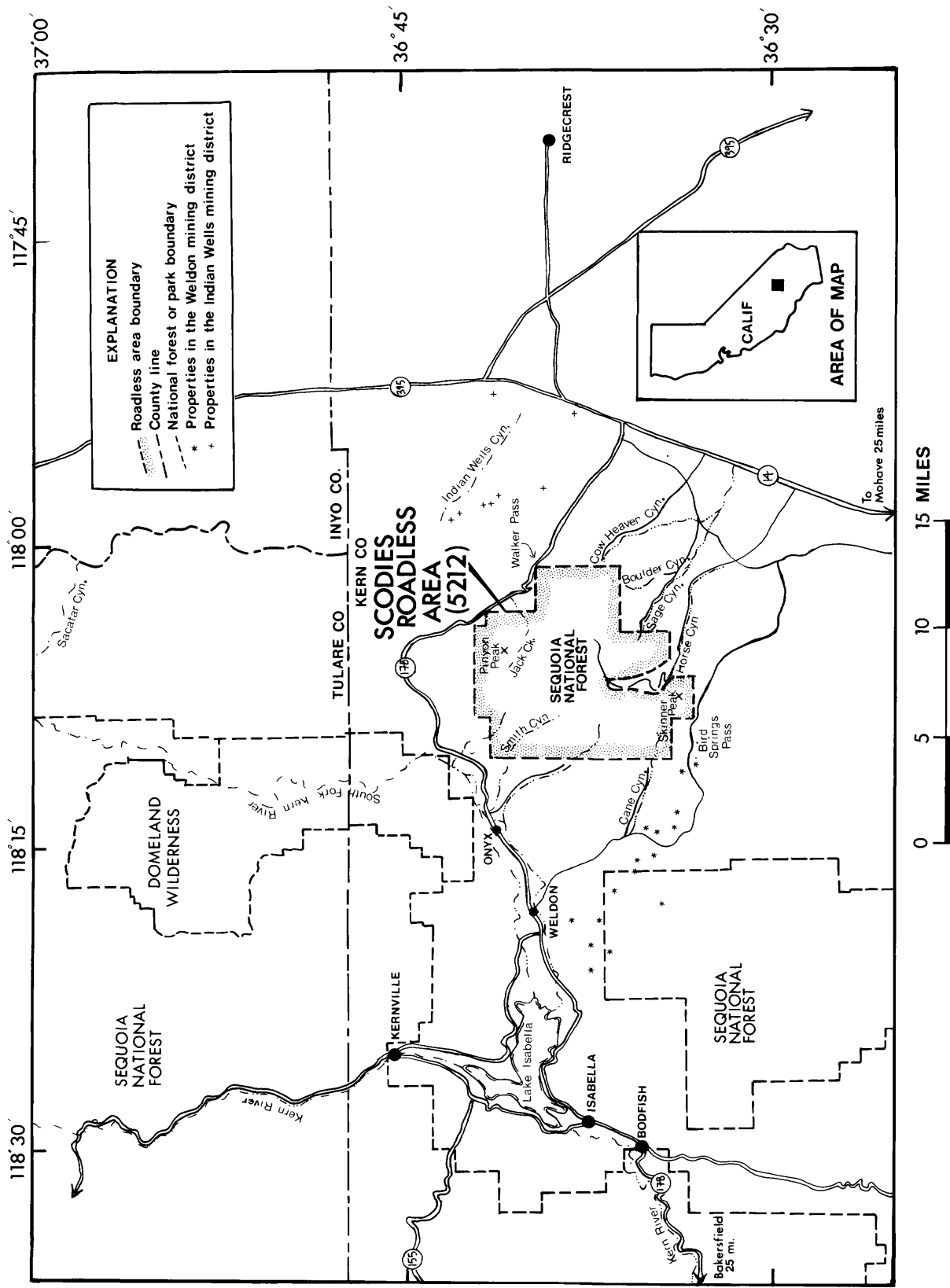


Figure 1.--Location of the Scodies Roadless Area in the southern Sierra Nevada, Kern County, California.

bordering South Fork valley supports pasture land and sparse desert vegetation.

The U.S. Forest Service surveyed the Scodies area in the spring of 1980 for archeological sites where obsidian chipping and pinyon pine nut grinding had occurred. Mortar holes and sites of abundant obsidian chips were observed on the plateau and in Boulder Canyon. Part of the Pacific Crest Trail runs through the southern part of the roadless area, north of Skinner Peak.

#### GEOLOGIC SETTING

The Scodies Roadless Area is located in the southern end of the Sierra Nevada physiographic province where Upper Permian(?) to Lower Jurassic metasedimentary roof pendant rocks are intruded by Mesozoic (chiefly Upper Cretaceous) granitic plutons (Miller and Webb, 1940). The latter form about 70 percent of the total outcrops in the Sierra Nevada. Major faults near the study area include the Kern River fault, 20 mi to the west; the Sierra Nevada fault, approximately 10 mi to the east; and the Garlock fault zone, 25 mi to the south. Two faults cut through the roadless area (fig 2.): the Pinyon Peak fault in the northern part of the area, and an unnamed inferred fault in the southern part near Skinner Peak (Jennings, 1975).

Previous geologic studies of Scodies Mountain and surrounding area include studies of the mineral resources and of production from local mines (Tucker and Sampson, 1940; Troxel and Morton, 1962); reports dealing with possible dam sites on the Kern River in the Isabella Lake area (Louderback, 1920; Forbes, 1931; Marliave, 1938); and geologic mapping, cross sections, and descriptions of the southern Sierra Nevada (Miller, 1931; Miller and Webb, 1940; Saleeby and others, 1978; Bergquist and Nitkiewicz, 1982).

The oldest rock unit in the roadless area is the Upper Permian(?) to Lower Jurassic Kernville Series of Miller (1931). The Kernville Series occurs as roof pendants throughout the southern Sierra Nevada and includes well foliated, locally tightly folded, northeast-southwest trending, laterally continuous metasedimentary rocks consisting mostly of interbedded quartzite, mica schist, phyllite, and marble with subordinate amounts of slate and metavolcanic rocks. The Kernville Series within the Scodies Roadless Area is sporadically distributed, and crops out chiefly in the northern and the eastern parts. Some of the marble has been metamorphosed to calc-silicate hornfels and tectite that contains coarse-grained epidote, garnet, and wollastonite. Outcrops of metamorphic rocks within the roadless area are no larger than 330 ft long by 33 ft wide. There are no fossils in the metasedimentary rocks within the Scodies Mountain area. Saleeby and others (1978) reported Late Triassic to Early Jurassic bivalves from a roof pendant, which may be correlative with the rock unit mapped herein, approximately 8 mi west of the roadless area.

The roadless area is underlain predominantly by two major plutonic rock units, a diorite that is here presumed to be equivalent to the Sacatar Quartz Diorite of Miller and Webb (1940) (fig. 2), and the Isabella Granodiorite of Miller (1931).

The Sacatar Quartz Diorite of Miller and Webb (1940), with its type locality in Sacatar Canyon (fig. 1), occurs throughout the roadless area as small inclusions, to areas several miles across within all the facies of the Isabella Granodiorite. The age of the quartz diorite has been determined by potassium-argon methods to be 145.4 m.y. (Bergquist and Nitkiewicz, 1982). The quartz diorite is the oldest plutonic rock in the roadless area and has been intruded by the Isabella Granodiorite. The rock types of the Sacatar in

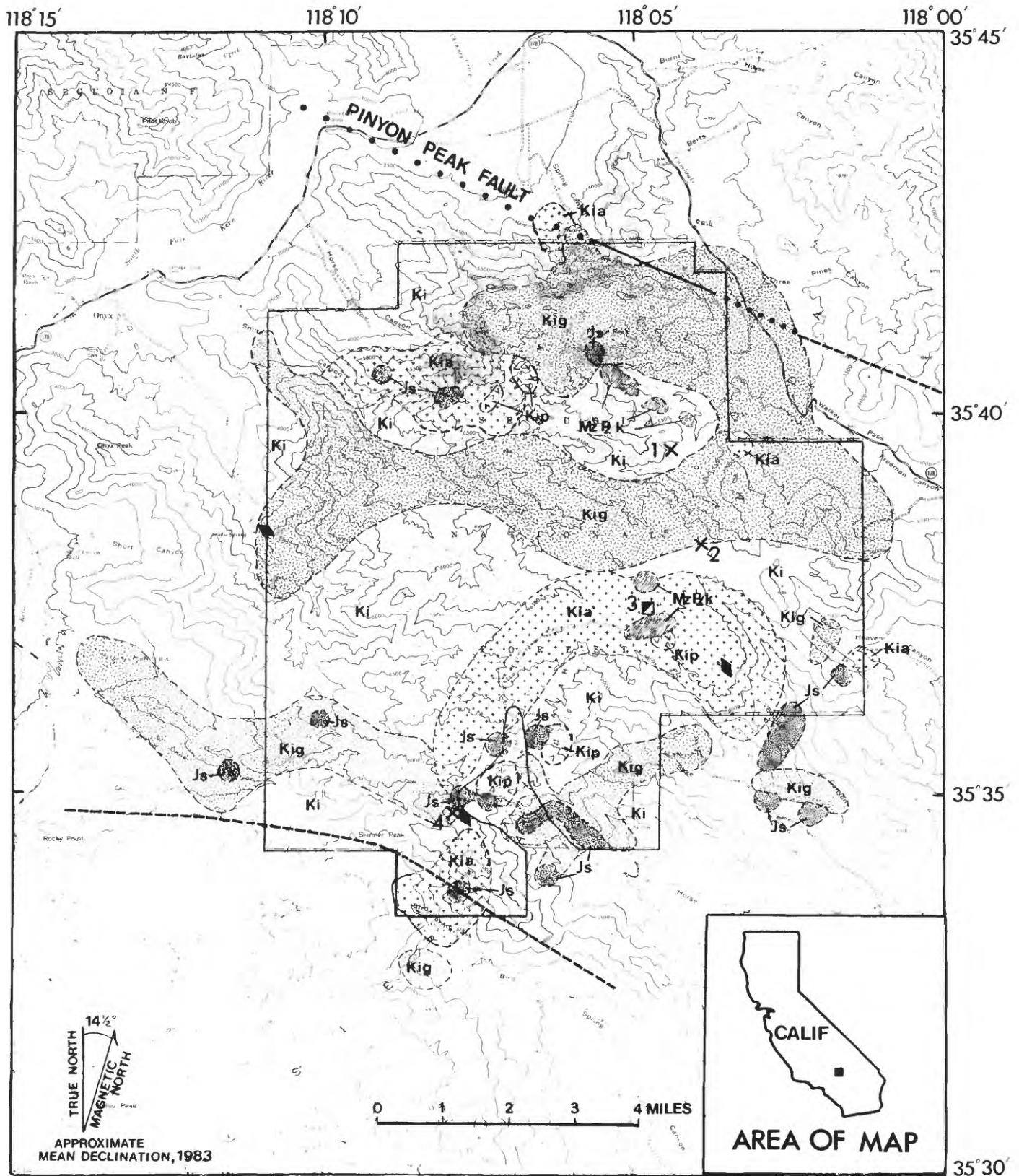


Figure 2.--Geologic map of the Scodies Roadless Area (5212), Kern County, California. See explanation on following page.

EXPLANATION FOR FIGURE 2

Ki	ISABELLA GRANODIORITE OF MILLER (1931), UNDIVIDED (CRETACEOUS)--Divided into:
Kip	Pegmatite facies
Kia	Alaskite facies
Kig	Granodiorite facies
Js	SACATAR QUARTZ DIORITE OF MILLER AND WEBB (1940) (JURASSIC)
Mz Pz k	KERNVILLE SERIES OF MILLER (1931) (MESOZOIC AND (OR) PALEOZOIC)--Metamorphic rocks
-----	FAULT--Dashed where inferred; dotted where concealed
-----	CONTACT--Approximately located
◆	QUARTZ VEIN
1 X	VALENTINE PROSPECT
2 X	PROSPECT, UNKNOWN NAME
3 ■	PROSPECT WITH SHAFT, UNKNOWN NAME
4 X	GREAT WHITE WAY PROSPECT
—	APPROXIMATE BOUNDARY OF ROADLESS AREA

the roadless area consist of quartz diorite, hornblende diorite, and quartz monzodiorite. Hornblende is the most abundant mafic mineral. In the Domeland Wilderness to the north (fig. 1), granodiorite was the most felsic rock type in the Sacatar and was difficult to distinguish from the more mafic parts of the Isabella Granodiorite (Bergquist and Nitkiewicz, 1982). Due to the irregular distribution of the Sacatar unit in the roadless area, the contacts shown on the map in figure 2 are generalized.

The Isabella Granodiorite is the most widespread unit in the roadless area and is comprised of granodiorite, alaskite, and pegmatite facies. The granodiorite is the predominant facies of the Isabella Granodiorite in this area. The contacts between it and the Sacatar Quartz Diorite are generally sharp, whereas contacts with the alaskite and pegmatite facies range from sharp to transitional. In the southern part of the roadless area much of the granodiorite facies is compositionally a tonalite. A sample of the granodiorite facies collected along the northern boundary of the roadless area near Walker Pass and dated by K-Ar techniques has yielded an age of 74.5 m.y. (Evernden and Kistler, 1970). The alaskite facies is randomly mixed with the granodiorite and pegmatite facies throughout the roadless area. It occurs predominantly in masses, and less commonly in dikes and veins. The alaskite facies appears in many places to have intruded the granodiorite facies, therefore it may represent a later intrusion as a separate body. The pegmatite facies is exposed throughout the roadless area, pervasive as dikes and veins, and locally in masses. The dikes are up to 3 ft thick and occur in parallel and random orientations with respect to each other. In the southeast area just outside the study area on the ridge between Boulder and Sage Canyons the dikes are parallel in 100 to 300 ft intervals for an estimated 1 mi, and average approximately 20 in. thick. The masses of pegmatite occur chiefly in the southern half of the roadless area and appear to be associated with the diorite bodies there. The pegmatite in most cases intrudes both the granodiorite and the alaskite facies and is therefore presumed to be the youngest facies of the Isabella Granodiorite. In some cases the pegmatite and the granodiorite facies appear to be contemporaneous, where dikes have pegmatite borders and granodiorite interiors, and where rock textures grade from one into the other with no distinct contact. Due to the extreme irregularity of the contacts and generally intermixed relationship of the three facies types, it was not feasible to map them in detail. Instead, figure 2 depicts areas where each facies predominates.

Dikes of two different rock types and ages are abundant throughout the roadless area. Aplite dikes transect all the major rock units. They are similar in appearance and composition to the alaskite and may be derived, at least in part, from this body. Conspicuous coarse-grained pegmatite dikes also transect all the rocks in the area, including the aplite dikes. Although the age of neither is known, both are younger than the Isabella Granodiorite.

#### GEOCHEMISTRY

The geochemical investigation of the Scodies Roadless Area was based on the analysis of 24 rock samples, 35 minus-60-mesh stream-sediment samples, and 35 nonmagnetic heavy-mineral-concentrate samples derived from stream sediment. All samples were collected by the USGS during 1980 and 1982 and analyzed for 31 elements (silver, arsenic, gold, boron, barium, beryllium, bismuth, calcium, cadmium, cobalt, chromium, copper, iron, lanthanum, magnesium, manganese, molybdenum, niobium, nickel, lead, antimony, scandium, tin, strontium, thorium, titanium, vanadium, tungsten, yttrium, zinc, and

Table 1.--Geochemical values for anomalous drainage basins,  
 Scodies Roadless Area, California  
 [Drainage basin numbers refer to locations on fig. 3; SS, stream sediment;  
 KN, heavy mineral concentrate; RK, rock; ppm, parts per million]

Drainage basin number	Sample type	Element	Value (ppm)
1	SS	uranium (U)	15.5
2	KN	silver (Ag)	<1
3	SS	zinc (Zn)	100
3	KN	gold (Au)	<20
3	KN	molybdenum (Mo)	50
4	SS	zinc (Zn)	100
4	SS	gold (Au)	0.008
4	KN	molybdenum (Mo)	50
5	SS	zinc (Zn)	120
6	SS	gold (Au)	0.005
6	KN	molybdenum (Mo)	50
7	KN	bismuth (Bi)	150
8	RK	gold (Au)	0.004
8	SS	antimony (Sn)	10
8	KN	tungsten (W)	200
9	SS	tin (Sn)	10
9	KN	bismuth (Bi)	30
10	SS	tin (Sn)	50
11	SS	tin (Sn)	10
12	RK	silver (Ag)	<0.5
12	KN	lead (Pb)	300
13	RK	gold (Au)	0.003
13	SS	silver (Ag)	<0.5
13	SS	uranium (U)	18.7
14	RK	lead (Pb)	100
15	SS	gold (Au)	0.042
16	KN	lead (Pb)	2,000
17	KN	lead (Pb)	1,000
17	KN	beryllium (Be)	7
18	SS	silver (Ag)	<0.5
19	KN	lead (Pb)	300



zirconium) using a six-step semiquantitative emission spectrographic method (Grimes and Marranzino, 1968). In addition, rock and stream-sediment samples were analyzed for gold and zinc by atomic-absorption spectrometry (Meier, 1980; Ward and others, 1969), and for uranium by a fluorometric method (Centanni and others, 1956).

Based on the analyses obtained for this study and for other roadless areas in the Sierra Nevada range and on known mineralization in these areas, a suite of elements was selected as possibly being related to mineralization. Silver, gold, and lead in rock samples; silver, gold, tin, uranium, and zinc in stream-sediment samples; and silver, gold, beryllium, bismuth, molybdenum, lead and tungsten in concentrate samples were used to help interpret the mineral resource potential.

Rock samples were collected by the USGS that were thought to be representative of each sample site. Only 4 of the 24 rock samples contained anomalous concentrations of any of the selected elements. The anomalous samples are from the northern part of the roadless area. Two samples contained weakly anomalous amounts of gold, one contained weakly anomalous silver, and one contained weakly anomalous lead (table 1). The concentration levels of these metals probably represent only higher than expected background values, and thus are not indicative of mineralization.

A number of anomalies, most of which are weak, were identified in the samples of stream sediment and concentrate (table 1). Most of the anomalies are from drainage basins along the west side of the roadless area between Smith Canyon and Cane Canyon (fig. 3). Two concentrate samples with anomalous lead concentrations were collected from the southeastern part of the roadless area, in Sage Canyon and Cow Heaven Canyon. No other elements commonly associated with hydrothermal lead deposits are anomalous in either of these two drainage basins; therefore, the anomalies are probably not related to any potential mineral deposit. The weak anomalies throughout the roadless area for elements in both stream-sediment and concentrate samples suggest low potential for lode-mineral deposits in the Scodies Roadless Area.

#### MINING ACTIVITY

The Scodies Roadless Area was investigated by the USBM in 1982. About 25 lode and 25 placer mining claims, primarily in the southeastern part of the roadless area, are described in the literature, and in county, Forest Service, and BLM records. Very little published geologic literature on mineral deposits is available for the roadless area. No mineral production is recorded from the area, and no mines are being developed. A field search was made for all mines, prospects, mining claims, and mineralized outcrops in the roadless area. Scintillometer reconnaissance surveys were made to check for anomalous radioactivity. Seven rock samples were collected at two quartz vein occurrences. Each was fire assayed for gold and silver. Other analyses for suspected minerals were by atomic absorption, colorimetric, or x-ray fluorescence methods. Semiquantitative spectrographic analyses of some samples was done to detect any unsuspected concentrations of minerals.

Three large quartz veins and pods were found in the roadless area; two have been prospected (fig. 2). The largest of these is at the Great White Way prospect (Silica Hill) and was mapped and sampled by the USBM. Troxel and Morton (1962) briefly describe this deposit, where considerable quartz without visible mineralization was explored in the late 1950's by means of a pit. The quartz is massive, milky white, and in contact with diorite and granodiorite. There is an estimated 22,000 tons of quartz; minor silver

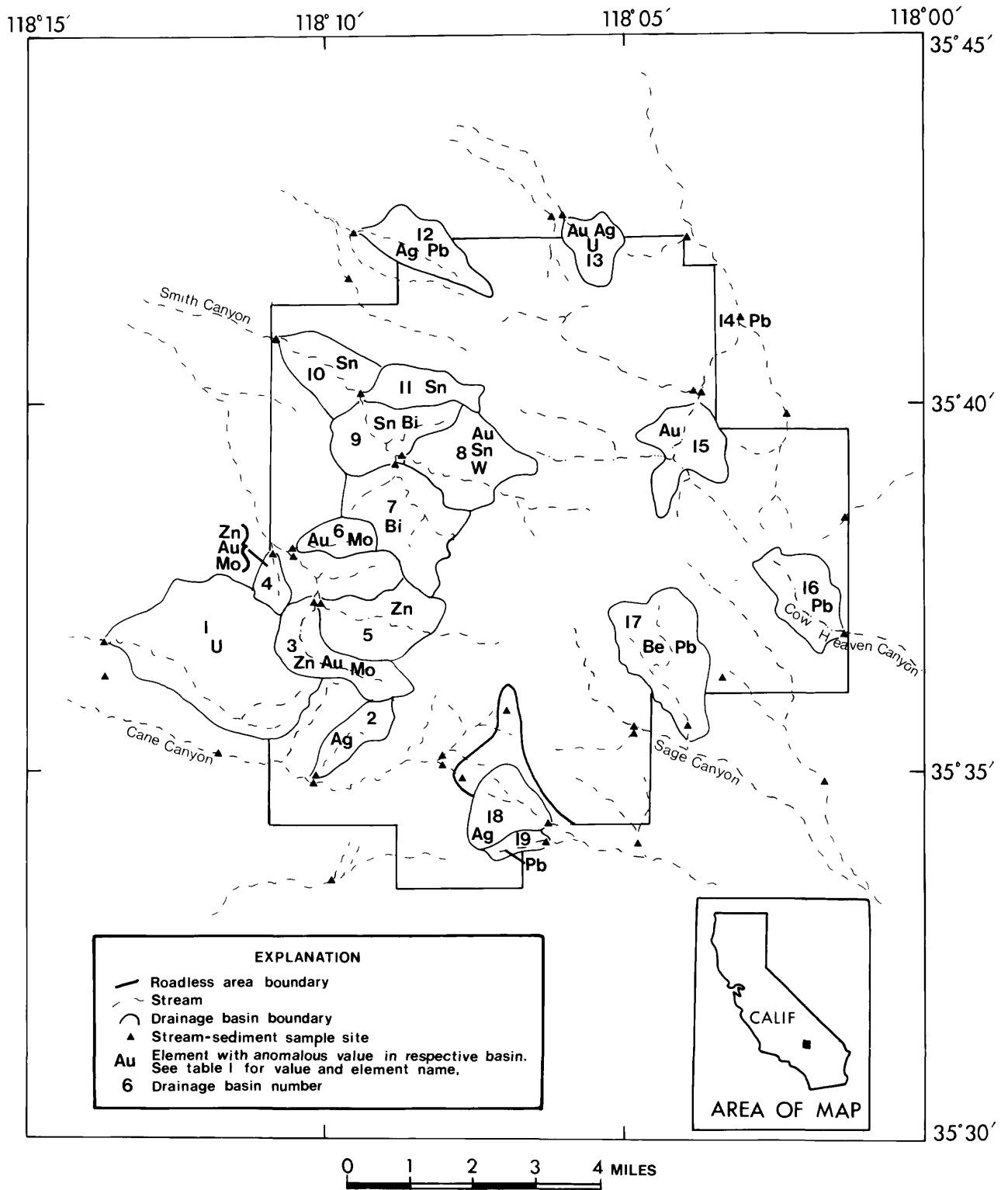


Figure 3.--Geochemical map showing anomalous drainage basins, Scodies Roadless Area, California.

values and trace amounts of other metals limit use to aggregate or possibly decorative stone. The quartz appears to be younger than the Sacatar Quartz Diorite and older than the Isabella Granodiorite.

Prospects identified previously, but not found during this study include a shaft (loc. 3, fig. 2) shown on the Walker Pass 7.5-minute topographic quadrangle, and the Valentine prospect (loc. 1, fig. 2), a small, low-grade tungsten occurrence described by Weibelt (1943a, b), and Krauskopf and Stopper (1943). Minor amounts of scattered scheelite are reported in a tactite zone, approximately 1.5 ft thick, associated with metasedimentary roof pendant rocks (fig. 2).

The Copper Boy #2 claim, located in 1956 by Mr. Comer Bessford, was found by the USGS just outside the roadless area on the ridge north of Cane Canyon. A green mineral (malachite?) coats the contact between granodiorite and a quartz vein at this location.

The Scodies Roadless Area does not lie within any of the Kern County mining districts described by Troxel and Morton (1962). The nearest mining districts are the Weldon tungsten district a few miles to the west, and the Indian Wells Canyon district to the northeast (fig. 1).

In the Weldon district, scheelite is present in garnet-epidote tactites that are part of pre-Cretaceous roof pendant rocks. Most of the mining has occurred since 1941, yielding probably several tens of short ton units<sup>1</sup> of WO<sub>3</sub>.

In the Indian Wells Canyon district, scheelite and small amounts of gold have been mined. The gold is in northwest-trending quartz veins in both the metamorphic and granitic rocks and is not abundant. The scheelite is in the tactite, part of the pre-Cretaceous metasedimentary rocks, mainly in discontinuous layers and lenses, ranging from a few inches to several feet in length. Scheelite content of the tactite typically ranges from trace to 1 percent, but some ore with 5 percent or more scheelite has been mined.

#### MINERAL RESOURCE POTENTIAL

Examination of the Scodies Roadless Area and an evaluation of the analyses of rock, stream-sediment, and nonmagnetic heavy-mineral concentrate samples and a survey of mines and prospects indicate low potential for mineral resources. The surveys show weakly anomalous gold, silver, and lead that only indicate higher than expected background values rather than mineralization. Metamorphic rocks that are favorable hosts for gold and tungsten mineralization are of small extent in the Scodies Roadless Area. The quartz vein of the Great White Way prospect is too small and too far from markets to be of commercial value.

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<sup>1</sup>A short ton unit contains 20 lb of tungsten trioxide (WO<sub>3</sub>).

## DESCRIPTION OF MAP UNITS

- Ki ISABELLA GRANODIORITE OF MILLER (1931), UNDIVIDED (CRETACEOUS)-- mapped, consists predominantly of the granodiorite facies of the unit with varying amounts of the alaskite and pegmatite facies. Age of the Isabella Granodiorite is Late Cretaceous on basis of 74.5 m.y. date (K-Ar) on sample collected just north of the roadless area (Evernden and Kistler, 1970). Locally, divided into:
- Kip Pegmatite facies--The pegmatite is composed chiefly of quartz and potassium feldspar, with biotite in 3-in. books, hornblende, plagioclase, and minor garnet, muscovite, and zircon. The quartz in places occurs in crystalline masses up to 5 in. in diameter. The potassium feldspar is typically pink in color and occurs in crystals up to 2 in. long. Graphic granite textures are common. Some dikes are banded and zoned. Perthitic veins, micrographic textures, and myrmekite are common
- Kia Alaskite facies--The composition of the alaskite, with mineral assemblage range and mean percentages, is as follows: quartz, 23-65 percent, 43 percent; potassium feldspar, 15-65 percent, 33 percent, including perthite and microcline; plagioclase, 4 to 59 percent, 22 percent; biotite, nil to 3 percent; garnet, locally abundant; and trace amounts of hornblende, muscovite, zircon, sphene (anhedral), opaques (magnetite or pyrite), chlorite, and sericite. Textures are generally hypidiomorphic, with myrmekite and micropegmatite common, medium to coarse grained, rarely fine grained, with gradational or sharp contacts between zones of different grain sizes. Textures vary locally from equigranular to porphyritic. The rock is generally gray, pink, or white. In places it has a banded appearance where medium-grained phases crosscut the fine-grained phases
- Kig Granodiorite facies--Petrographic determination shows the general composition of the granodiorite facies to be as follows, in mineral assemblage range and mean percentages: quartz, 20-40 percent, 34 percent; potassium feldspar, An<sub>12</sub>-An<sub>42</sub>, zoned, 15 to 40 percent, 28 percent; biotite, 5 to 15 percent, 7 percent; hornblende, 1 to 5 percent; and trace amounts of sphene (euhedral), zircon, apatite, muscovite, opaque minerals, chlorite, epidote, and garnet. The texture is mostly coarse grained and equigranular, but many variations occur. A porphyritic phase, with potassium feldspar phenocrysts up to 2 in. long, dominates in the northern part of the area. In places a foliation is evident, marked by flow banding, gneissic structures, and parallel alinement of biotite, hornblende, and inclusions. There are numerous inclusions of diorite, gabbro, and gneissic rock in the granodiorite facies; these inclusions range from a few inches to 2 ft in diameter. Inclusion shapes range from round to elongate and orientation varies from random to parallel

In the southern part of the roadless area the Isabella Granodiorite is compositionally a tonalite with the following mineral assemblage range and mean percentages: quartz, 25 to 50 percent, 34 percent; potassium feldspar, 0 to 1 percent, 0 percent; plagioclase, 35 to 50 percent, 42 percent; biotite, 3 to 17 percent, 10 percent; hornblende, 0 to 25 percent, 11 percent; and epidote in variable percentages

Js SACATAR QUARTZ DIORITE OF MILLER AND WEBB (1940) (JURASSIC)--The composition of the Sacatar rock type in the Scodies Mountain area is as follows, in mineral assemblage range and mean percentages: quartz, 5 to 20 percent, 16 percent; potassium feldspar, 0 to 7 percent, 2 percent; plagioclase, 20 to 60 percent, 45 percent; biotite, 0 to 25 percent, 14 percent; hornblende, 10 to 75 percent, 22 percent; sphene, 3 percent; and trace amounts of chlorite, apatite, sericite, and opaque minerals. Typically medium to fine grained with rare patches of coarse-grained texture, equigranular to porphyritic, locally foliated with swirled gneissic structure near the contacts with the metamorphic rocks

M P k KERNVILLE SERIES OF MILLER (1931) (MESOZOIC AND (OR) PALEOZOIC)--Consists of quartzite and amphibolite schists with quartz, epidote, plagioclase, hornblende, chlorite, pyrite, apatite, zircon, and sphene occurring in varying percentages and in alternating bands with thinly foliated textures. Vividly colored calc-silicate rocks with coarse-grained epidote, garnet, and wollastonite, and pale-green quartzites were observed in float along Jack Creek in the northeast corner of the area but were not observed in outcrops

## REFERENCES CITED

- Bergquist, J. R., and Nitkiewicz, A. M., 1982, Geologic map of the Domeland Wilderness and contiguous roadless area, Kern and Tulare Counties, California, with Geochronology by R. M. Tosdal: U.S. Geological Survey Miscellaneous Field Studies Map MF-1395-A, scale 1:48,000.
- Centanni, F. A., Ross, A. M., and DeSesa, M. A., 1956, Fluorometric determination of uranium: *Analytical Chemistry*, v. 28, no. 11, p. 1651-1657.
- Evernden, J. F., and Kistler, R. W., 1970, Chronology of emplacement of Mesozoic batholithic complexes in California and western Nevada: U.S. Geological Survey Professional Paper 623, 42 p.
- Forbes, Hyde, 1931, Geologic reports on dam sites in the San Joaquin River basin: Isabella, Borel, and Bakersfield dam sites on the Kern River: California Department of Public Works, Division of Water Resources Bulletin 29, Appendix C, p. 598-606.
- Grimes, D. J., and Marranzino, A. P., 1968, Direct-current arc and alternating-current spark emission spectrographic field methods for the semiquantitative analysis of geologic materials: U.S. Geological Survey Circular 591, 6 p.
- Jennings, C. W., compiler, 1975, Fault map of California with location of volcanoes, thermal springs and thermal wells: California Division of Mines and Geology, Geologic Data Map 1, scale 1:750,000.
- Krauskopf, K. B., and Stopper, R., 1943, Valentine Claims, Kern County, California: Unpublished U.S. Geological Survey report, 1 p.
- Louderback, G. D., 1920, Report on geologic conditions in Hot Springs Valley in connection with the Isabella Reservoir site, in Water resources of Kern River and adjacent streams and their utilization: California State Department of Engineering Bulletin 9, p. 134-137.
- Marliave, Chester, 1938, Geologic reconnaissance report on Isabella dam sites situated on Kern River in Kern County: California Department of Public Works, Division of Water Resources Bulletin, 23 p.
- Meier, A. L., 1980, Flameless atomic-absorption determination of gold in geological materials: *Journal of Geochemical Exploration*, v. 13, no. 1, p. 77-85.
- Miller, W. J., 1931, Geologic sections across the southern Sierra Nevada of California: University of California Publications, Bulletin of the Department of Geological Sciences, v. 20, no. 9, p. 331-360.
- Miller, W. J., and Webb, R. W., 1940, Descriptive geology of the Kernville quadrangle, California: *California Journal of Mines and Geology*, v. 36, no. 4, p. 343-378.
- Saleeby, J. B., Goodwin, S. E., Sharp, W. D., and Busby, C. J., 1978, Early Mesozoic paleotectonic-paleogeographic reconstruction of the southern Sierra Nevada region, in Howell, D. G., and MacDougall, K. A., eds., Mesozoic paleogeography of the western United States: Society of Economic Paleontologists and Mineralogists, Pacific Section, Pacific Coast Paleogeography Symposium 2, Los Angeles, p. 311-336.
- Smith, A. R., compiler, 1965, Geologic map of California, Olaf P. Jenkins edition, Bakersfield sheet: California Division of Mines and Geology, Geologic Atlas of California, scale 1:250,000.
- Streckeisen, A. L., 1976, To each plutonic rock its proper name: *Earth Science Review*, v. 12, p. 1-33.

- Troxel, B. W., and Morton, P. K., 1962, Mines and mineral resources of Kern County, California: California Division of Mines and Geology County Report 1, 370 p.
- Tucker, W. B., and Sampson, R. J., 1940, Mineral resources of the Kernville quadrangle: California Journal of Mines and Geology, v. 36, no. 4, p. 322-333.
- Ward, F. N., Nakagawa, H. M., Harms, T. F., and VanSickle, G. H., 1969, Atomic-absorption methods of analysis useful in geochemical exploration: U.S. Geological Survey Bulletin 1280, 45 p.
- Weibelt, F. J., 1943a, Preliminary report on Valentine Claims, Kern County, California: unpublished U.S. Bureau of Mines War Minerals Memorandum, 2 p. On file at Western Field Operations Center, Spokane, Washington.
- \_\_\_\_\_ 1943b, Unpublished U.S. Bureau of Mines file memorandum, Valentine Claims, Kern County, California, 3 p.