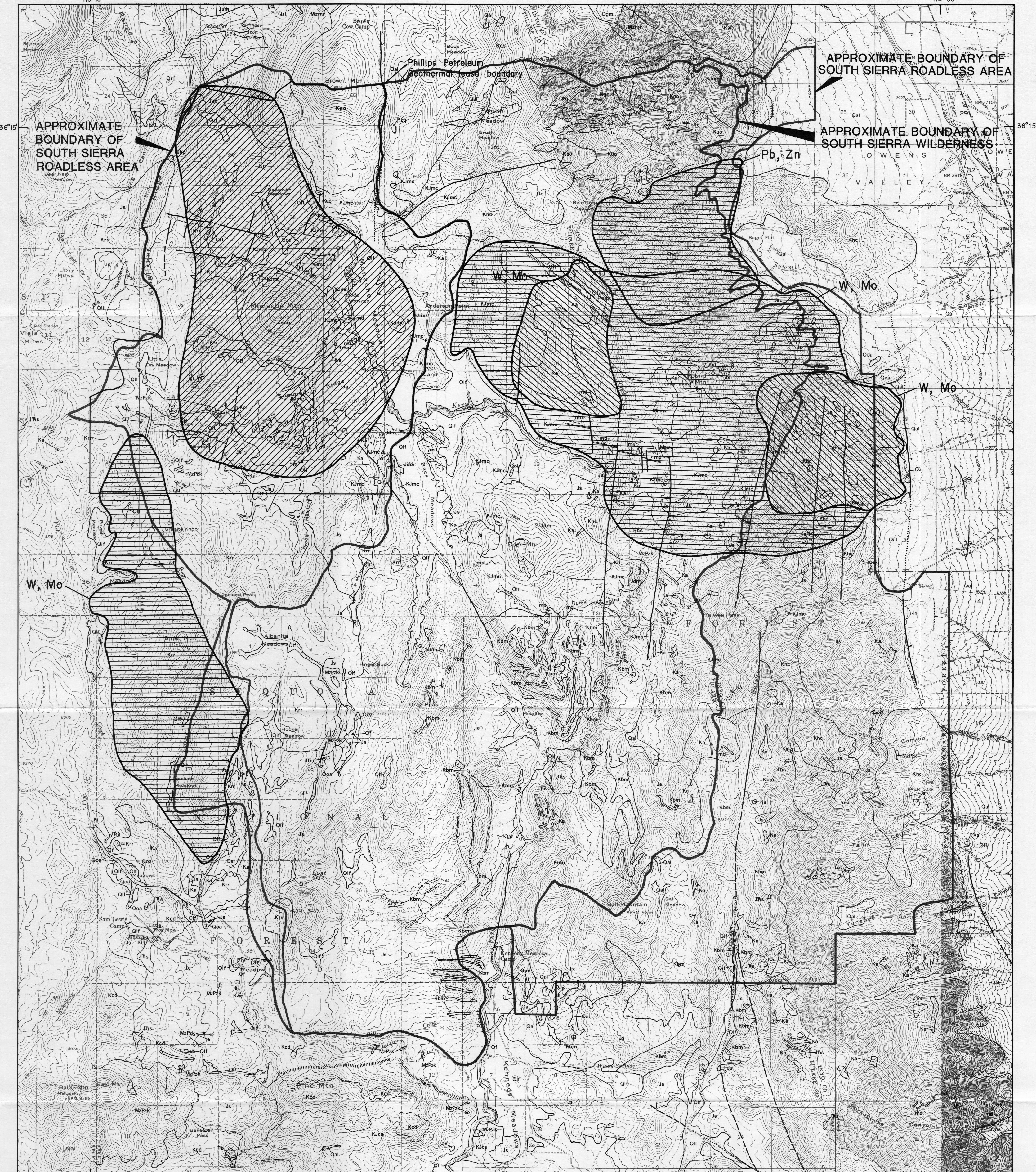
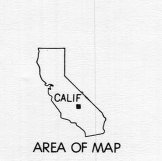



Base from U.S. Geological Survey 1:62,500 Haiwee Reservoir and Kessler, 1951; Hockett Peak and Kern Peak, 1956; Monache Mountain, 1956; and Olancha, 1956

APPROXIMATE MEAN DECLINATION, 1987

SCALE 1:48 000

CONTOUR INTERVALS 40 AND 80 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929




Geology by M.F. Diggles, J.E. Conrad, D.A. Dellinger, K.E. Carter, D.F. Bedell, P.D. Hartzell, D.E. Clemens, and L.D. Batatian, 1982–86, and from Bergquist and Nitkiewicz (1982) and du Bray and Moore (1985)

# MINERAL RESOURCE POTENTIAL MAP OF THE SOUTH SIERRA WILDERNESS AND THE SOUTH SIERRA ROADLESS AREA, INYO AND TULARE COUNTIES, CALIFORNIA

By

Michael F. Diggles

1987

## EXPLANATION

Geologic terrane having high geothermal energy resource potential

Geologic terrane having moderate mineral resource potential for tungsten and molybdenum

Geologic terrane having low mineral resource potential—Commodity indicated

See text for definition of levels of mineral resource potential

Commodities

- W Tungsten
- Mo Molybdenum
- Pb Lead
- Zn Zinc

## CORRELATION OF MAP UNITS

SURFICIAL DEPOSITS

Qal, Qf, Qc, Qt, Qlf, Qrg, Qoa, Qgm — QUATERNARY

VOLCANIC ROCKS

Qrl — QUATERNARY

Tmm, Tb — TERTIARY

GRANITIC ROCKS

Kcd, Kw, Khc, Kao, Krr, Kbm, Ka — CRETACEOUS

KJcs, KJmc — CRETACEOUS OR JURASSIC

md — TERTIARY TO JURASSIC

Js, Jsm, Jkp, Jdm, Jfc, Jrm — JURASSIC

JTs — JURASSIC AND (OR) TRIASSIC

METAMORPHIC ROCKS

Mz mv — MESOZOIC

Mz Pz k — MESOZOIC AND PALEOZOIC(?)

## DESCRIPTION OF MAP UNITS

### SURFICIAL DEPOSITS

Qal **Alluvium (Quaternary)** – Alluvial fan deposits, mostly at range front

Qf **Fluvial deposits (Quaternary)** – Stream-channel deposits

Qc **Colluvium (Quaternary)** – Weathered deposits at bases of cliffs and in gullies

Qt **Talus (Quaternary)** – Accumulations formed by downslope movement of rock and soil along range front

Qlf **Lacustrine and fluviatile deposits (Quaternary)** – Siltstone and mudstone underlying meadows adjacent to streams

Qrg **Rock glacier (Quaternary)** – Poorly sorted angular boulders and fine material cemented in core with ice. Exhibits slow down-slope motion

Qoa **Older alluvium (Quaternary)** – Dissected stream-channel deposits present on terraces

Qgm **Glacial moraine (Quaternary)**

### VOLCANIC ROCKS

Qrl **Rhyolite of Long Canyon (Quaternary)** – Porphyritic pumiceous rhyolite dome with associated pyroclastic-flow lobes at head of Long Canyon. Bacon and Duffield (1979) reported a potassium-argon age of 0.185 ± 0.15 Ma

Tmm **Rhyolite of Monache Mountain (Tertiary)** – Fine-grained, medium-grey, biotite-bearing rhyolite forming Monache Mountain. K-Ar age of 2.42 ± 0.12 Ma (Bacon, 1978)

Tb **Basalt (Tertiary)** – Dark gray to black, medium gray weathering, massive to blocky, and locally banded vessicular to scoriaceous olivine basalt 2 mi SW of Pine Mountain. K-Ar age of 3.9 ± 0.2 Ma (Bergquist and Diggles, 1986)

### GRANITIC ROCKS

md **Mafic dikes (Tertiary and Jurassic)** – Subvertical dikes of fine grained diorite, granodiorite, and quartz diorite. Includes undeformed Tertiary and Late Cretaceous dikes and the Jurassic Independence dike swarm of Moore and Hobson (1961) with a Pb-U age of 148 Ma (Chen and Moore, 1979)

Kcd **Granodiorite of Church Dome (Cretaceous)** – Leucocratic, medium- to coarse-grained seriate to porphyritic granite and granodiorite. K-Ar age of 81.1 Ma (Tosdal in Bergquist and Nitkiewicz, 1982)

Kw **Whitney Granodiorite (Cretaceous)** – Porphyritic granodiorite and granite with large (4-8 cm) phenocrysts of potassium feldspar. K-Ar age of 83 Ma (Evernden and Kistler, 1970). Unit age is Late Cretaceous

Khc **Granite of Haiwee Creek (Cretaceous)** – Leucocratic, medium- to coarse-grained, locally potassium feldspar porphyritic granite; biotite more abundant than hornblende. May correlate with biotite-hornblende granite from drill hole east of Haiwee Reservoir dated at 88.8 ± 2.7 Ma (Hall, in Berry and others, 1976)

Kao **Alaskite of Olancha Peak (Cretaceous)** – Leucocratic, fine- to coarse-grained, equigranular alaskite

Krr **Granodiorite of Redrock Meadow (Cretaceous)** – Leucocratic, medium-grained, equigranular to porphyritic granodiorite. As mapped, locally includes alaskite pods of the alaskite of Kern Peak

Kbm **Granite of Ball Mountain (Cretaceous)** – Leucocratic, medium- to coarse-grained potassium feldspar porphyritic granite containing biotite and minor hornblende. Includes some ummapped pods of alaskite

Ka **Alaskite (Cretaceous)** – Medium- to coarse-grained, leucocratic granite, alkali feldspar granite and associated small pods of aplite and pegmatite and highly leucocratic border phases of nearby plutons

KJcs **Granodiorite of Church Dome (Cretaceous) and Sacatar Quartz Diorite of Miller and Webb (1940) (Jurassic), undivided** – Complex zone of mixed plutonic rocks

KJmc **Granodiorite of Monache Creek (Cretaceous and (or) Jurassic)** – Leucocratic, medium-grained, equigranular, locally porphyritic, biotite hornblende granodiorite

Js **Sacatar Quartz Diorite of Miller and Webb (1940) (Jurassic)** – Mesocratic, medium-grained, equigranular to seriate, locally potassium feldspar porphyritic biotite-hornblende quartz diorite and granodiorite. Contains inclusions of diorite (5 to 50 cm in diameter), locally 1 to 5 per square meter. Color index ranges from 20 to 60 (Diggles and others, 1987). Most of this rock unit near the Sierra Nevada crest is the granodioritic phase of the Sacatar Quartz Diorite of Miller and Webb (1940). K-Ar dates of 144 and 146 Ma (Tosdal in Bergquist and Nitkiewicz, 1982)

Jsm **Granodiorite of Schaeffer Meadow (Jurassic)** – Strongly sheared mafic granodiorite; hornblende is subhedral to euhedral

Jkp **Alaskite of Kern Peak (Jurassic)** – Leucocratic, fine- to coarse-grained alaskite

Jdm **Gabbro of Deer Mountain (Jurassic)** – Mesocratic, coarse-grained hornblende gabbro

Jfc **Tonalite of Falls Creek (Jurassic)** – Mesocratic, medium- to coarse-grained, equigranular biotite hornblende tonalite with dark grey quartz

Jrm **Quartz diorite of Round Mountain (Jurassic)** – Mesocratic to melanocratic, coarse- to medium-grained hornblende-porphyritic quartz diorite

JT s **Summit Gabbro of Miller and Webb (1940) (Jurassic and (or) Triassic)** –Coarse-grained, inequigranular to porphyritic, mesocratic to melanocratic, poikilitic hornblende gabbro. Named for exposures along the Sierra Nevada Crest

### METAMORPHIC ROCKS

M mv **Metavolcanic rocks (Mesozoic)** – Chiefly fine-grained metamorphosed dacite and andesite tuff and flows with minor basalt. Includes some rhyolitic tuff and ash deposits

Mz Pz k **Kernville Series of Miller (1931) (Mesozoic and Paleozoic(?))** – Metamorphic rocks, including quartz-biotite schist, phyllite, quartzite, marble, calc-silicate hornfels, and metadacite

**Contact** – Hachured where gradational, dashed where approximately located; dotted where concealed

**Fault** – Dashed where inferred; dotted where concealed. ball and bar on downthrown side

## 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 the 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 South Sierra Wilderness and the South Sierra Roadless Area, Inyo and Sequoia National Forests, Inyo and Tulare Counties, California. The South Sierra Wilderness was established as a Wilderness by Public Law (98-425, September 28, 1984). The South Sierra Roadless Area was classified as a further planning area during the Second Roadless Area Review and Evaluation (RARE II) by the Forest Service, January 1979.

## SUMMARY

### Abstract

There are five areas with mineral resource potential and one area with geothermal energy potential in the South Sierra Wilderness and the South Sierra Roadless Area. The area south of Summit Meadows and the area south of Hogback Creek have moderate resource potential for tungsten and molybdenum in small skarn deposits. The area between Summit meadow and Hogback Creek and the area from south of Jackass Meadows to northwest of Granite Knob have low mineral resource potential for tungsten and molybdenum. The area south of and including Walker Creek has low mineral resource potential for lead and zinc. The area including and surrounding Monache Mountain has high geothermal energy resource potential.

### Location and Physiography

The South Sierra Wilderness and the South Sierra Roadless Area are located in the area of Monache Mountain along the crest of the southern Sierra Nevada. The South Sierra Wilderness covers about 63,000 acres and the South Sierra Roadless Area covers about 45,000 acres. Road access to the area is by county road J41 from the south, from spurs off of U.S. Highway 395 from the east, and the Monache jeep trail from the west. Unpaved roads are subject to periodic washout during storms. Snow is common in winter, especially above 5,000 ft. The terrane is steep and rugged in most places with elevations ranging from about 4,500 ft along the east range front up to 12,183 ft at the summit of Olancha Peak in the north. Vegetation in the foothills is in the Digger Pine-Chaparrel Belt (Storer and Usinger, 1963) and includes digger pine, live oak, ceanothus, manzanita, and chinquapin. Vegetation of the Yellow Pine Belt below 7,000 ft consists of piñon, juniper, incense cedar, black oak, and ceanothus. There are Jeffrey pine and sugar pine on the west side of the Sierra Nevada crest. The elevations between about 7,000 and 10,000 ft host the Lodgepole Pine-Red Fir Belt which also includes chinquapin, snowbrush, and manzanita. The higher elevations (Subalpine and Alpine Belt) in the Olancha Peak area host Lodgepole pine, hemlock, and alpine willow.

### Procedures and Sources of Data

In the summers of 1983, 1984, and 1985, the U.S. Geological Survey conducted geologic studies of the South Sierra Wilderness and the South Sierra Roadless Area including detailed mapping of the area. Stream-sediment sampling for geochemical studies was done in 1983. The general geology of the area west of the Sierra Nevada crest was described by Miller (1931; 1946) and Miller and Webb (1940). The geology of the Sierra Nevada range front, which includes the east edge of the study area, was detailed by Stinson (1977). The geology of the young volcanic rocks in the Coso Range was described by Duffield and Bacon (1981) and Rinehart and Smith (1982), and geothermal resources in that area were studied by Higgins (1981) and Rockwell International (1980). There are several references on the structural geology of the range front and Owens Valley including Pakiser and others (1964) and U.S. Geological Survey (1982a, b). Mineral resources of the Owens Peak and Little Lake Canyon Wilderness Study Areas, which adjoin this study area to the southeast, were described by Diggles and others (1985). The geology of the Domeland Wilderness, immediately southwest of the study area, was mapped by Bergquist and Nitkiewicz (1982), and its mineral resource potential was described by Bergquist (1983). A number of publications deal with the geology and mineral resources of the Golden Trout Wilderness north and northwest of the study area. These include a geologic map (du Bray and Dellinger, 1981), a mineral resource potential report (Dellinger and others, 1983), aeromagnetic studies (Jachens and Elder, 1983), and geochemical studies (Leach and others, 1983a, b). Du Bray and Moore (1985) mapped the geology of the Olancha quadrangle, and Moore and Sisson (1985) described the geology of the Kern Peak quadrangle northwest of the study area.

### Acknowledgements

James E. Conrad, David A Dellinger, Karen E. Carter, Susan S. Page-Bedell, Peter D. Hartzell, Diane E. Clemens, and J. Donald Landells helped do the geologic mapping and geochemical sampling. Fieldwork was done with the help of students selected based on recommendations of the National Association of Geology Teachers (NAGT). Geologists employed through the program were Karen E. Carter and Diane E. Clemens. Robert E. Tucker helped design the geochemical sampling program prior to field work and did the sample preparation. Robert C. Jachens provided geophysical information that helped in mapping the tonalite south of Olancha Peak.

## ASSESSMENT OF MINERAL RESOURCE POTENTIAL

### Geology

The South Sierra Wilderness and the South Sierra Roadless Area are underlain mostly by granitic rocks of the Sierra Nevada batholith that were emplaced during at least three major periods of intrusive activity (Evernden and Kistler, 1970). These include Cretaceous leucocratic, nonfoliated rocks of granitic to granodiorite composition and an older set of slightly more mafic granodiorite to tonalite rocks of Jurassic age that often have stromatic to schlieric textures. The oldest intrusive rocks of the batholith in the area are probably of Triassic and (or) Jurassic age. They are gabbroic to dioritic rocks with schistose to gneissic textures. The granitic rocks intruded and metamorphosed Paleozoic and Mesozoic sedimentary and volcanic rocks to quartz-mica schist, quartzite, marble, and minor greenschist. Zones of garnet-epidote-wollastonite calc-silicate hornfels developed near contacts with granitic rocks. Monache Mountain is a Tertiary rhyolitic volcanic dome that was erupted in the northwestern part of the study area.

#### Metamorphic Rocks

Metamorphic rocks are present in roof pendants mainly in the southwest corner of the study area, west of Hooker Meadow and in Bitter Creek. There are small pods and xenoliths of metamorphic rocks throughout the granitic terrane of the study area. The rock types present consist of quartz-biotite schist, phyllite, quartzite, marble, calc-silicate hornfels, and metadacite. Skarns may have formed where carbonate rocks were intruded by plutonic rocks, although none were found during this study.

#### Triassic and (or) Jurassic Plutonic Rocks

The Triassic and (or) Jurassic plutons usually have schistose to gneissic textures. In general, these older rocks are mesocratic while the Cretaceous rocks are leucocratic. There are seven rock units within the Triassic and (or) Jurassic rocks. The Summit Gabbro of Miller and Webb (1940) is a dark-colored, coarse-grained, rock characterized by subhedral phenocrysts of hornblende. It is exposed throughout the study area in small bodies rarely exceeding 0.7 mi² in area. The Sacatar Quartz Diorite of Miller and Webb (1940) is a medium-dark-colored, medium-grained, stromatic to schlieric rock exposed over much of the southern part of the study area. Its composition is granodiorite in places, particularly east of the Sierra Nevada crest near the base of the range front. Locally, the Sacatar Quartz Diorite is porphyritic. In places it is rich in mafic inclusions that have been assimilated to varying degrees. Two units described by du Bray and Moore (1985) and present in this study area are the granodiorite of Schaeffer Meadow and the alaskite of Kern Peak. The former is a strongly sheared mafic granodiorite. The latter is a leucocratic, fine- to coarse-grained alaskite. Three additional units were mapped during this study. The gabbro of Deer Mountain is a mesocratic, coarse-grained hornblende gabbro. The tonalite of Falls Creek is a mesocratic, medium- to coarse-grained, equigranular biotite hornblende tonalite with dark quartz. The quartz diorite of Round Mountain is a mesocratic to melanocratic, coarse- to medium-grained hornblende-porphyritic quartz diorite.

#### Jurassic and (or) Cretaceous Plutonic Rocks

Two units that are probably younger than Triassic are the granodiorite of Monache Creek and an area south of the study area mapped by Bergquist and Nitkiewicz (1982) as a complex zone of mixed plutonic rocks. The granodiorite of Monache Creek is a leucocratic, medium-grained, equigranular, locally porphyritic biotite hornblende granodiorite. The mixed zone is an area consisting of Sacatar Quartz Diorite and a leucocratic, potassium-feldspar granodiorite informally referred to as the granodiorite of Church Dome (M.F. Diggles and J.R. Bergquist, unpub. data, 1986).

#### Cretaceous Granites and Granodiorites

Cretaceous rocks in the study area are generally leucocratic, medium- to coarse-grained, and seriate to porphyritic. They consist of seven defined units. The Whitney Granodiorite (Moore, 1981) consists of a porphyritic granodiorite and granite with large (4-8 cm) phenocrysts of potassium feldspar. The granodiorite of Church Dome (M.F. Diggles and J.R. Bergquist, unpub. data, 1986) is a leucocratic medium- to coarse-grained seriate to porphyritic granite and granodiorite. The alaskite of Olancha Peak (du Bray and Moore, 1985) is a leucocratic, fine- to coarse-grained, equigranular alaskite. The granodiorite of Redrock Meadow (du Bray and Moore, 1985) is a leucocratic, medium-grained, equigranular to porphyritic granodiorite that includes pods of the alaskite of Kern Peak. The granite of Ball Mountain (M.F. Diggles, unpub data, 1986) is a leucocratic, medium- to coarse-grained, potassium-feldspar porphyritic granite with biotite and minor hornblende. It includes abundant pods of alaskite. The granite of Haiwee Creek is a leucocratic, medium- to coarse-grained, locally potassium-feldspar porphyritic granite with biotite and minor hornblende. There are abundant local pods of alaskite throughout the study area that consist of medium- to coarse-grained, leucocratic granite, alkali-feldspar granite and associated aplite and pegmatite bodies occurring as small pods and highly leucocratic border phases of nearby plutons.

#### Tertiary and Quaternary Volcanic Rocks

There are two volcanic units in the study area. The rhyolite of Long Canyon (du Bray and Moore, 1985) is Quaternary in age and is a porphyritic pumiceous rhyolite dome with associated pyroclastic-flow lobes at head of Long Canyon. Bacon and Duffield (1979) reported a potassium-argon age of 0.185 ± 0.15 Ma. The rhyolite of Monache Mountain is Tertiary in age and consists of fine-grained, medium-grey, sanidine- biotite- and garnet-bearing rhyolite forming Monache Mountain. Bacon (1978) reported a $^{40}Ar/^{39}Ar$ total fusion age of 2.42 ± 0.12 Ma age on biotite from the unit.

#### Quaternary Surface Deposits

Quaternary surface deposits have been divided into eight types. Alluvium consists of alluvial-fan deposits, mostly at range front. Fluvium consists of stream-channel deposits. Colluvium consists of accumulations formed by downslope movement of rock and soil along range front. Talus consists of weathered deposits at bases of cliffs and in gullies. Lacustrine and fluviatile deposits consist of sedimentary deposits in meadows adjacent to streams. Rock glacier material is located in the northern part of the area and consists of poorly-sorted angular boulders with a core of fine material cemented with ice. Rock-glacier material exhibits slow down-slope motion. Older alluvium consists of dissected stream-channel deposits present on terraces. Glacial moraine near Olancha Peak consists of unsorted boulder to sand-sized particles deposited by Pleistocene glaciers.

#### Structure

The metamorphic rocks have a strong foliation that trends generally northwest-southeast. These rocks underwent at least two periods of uplift following major intrusive events (Nokleberg and Kistler, 1980). Sierra Nevada front fault zone extends along the east edge of the study area and is the structure along which the range was uplifted. Parts of the front-faults can be seen in saddles from the base of the range to the crest. Bacon (1978) suggests that the rhyolite of Monache Mountain may have been erupted during a particularly intense period of east-west extensional deformation which allowed silicic magma to reach the surface through the Sierra Nevada batholith.

### Geochemistry

#### Methods

In the summer of 1983, the U.S. Geological Survey collected samples of rock, stream sediment, and nonmagnetic heavy-mineral concentrates from 61 sites within the South Sierra Wilderness and the South Sierra Roadless Area. Four sets of replicate samples were collected upon which replicate analyses were performed on multiple splits. This procedure provides an indicator of analytical variance and variance within sampling sites. The sampling procedures were similar to those employed by Tucker and others (1981, 1982).

Chemical analyses of the minus-80-mesh and the panned-concentrate fractions of stream-sediment samples can be used to identify areas of mineralization (Theobald and Thompson, 1959; Miller and others, 1980; Tucker and others, 1981, 1982; Diggles, 1983). The panned-concentrate fraction selectively concentrates many minerals related to metallization processes (Rose and others, 1979).

Samples were analyzed for 30 elements (Ag, As, Au, B, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, La, Mg, Mn, Mo, Nb, Ni, Pb, Sb, Sn, Sr, Th, Ti, V, W, Y, Zn, and Zr) using a six-step semiquantitative emission spectrographic method (Grimes and Marranzino, 1968). The stream-sediment and rock samples were also analysed for arsenic, gold, and zinc by atomic-absorption spectrometry methods described by Ward and others (1969), and for tungsten by colorimetric analysis, as described by Welsch (1983). The data are included in Diggles and others (1986). The geochemical interpretation is based on data from the heavy-mineral concentrate samples. For the sediment and concentrate samples, the anomalously high concentrations for each selected element were assigned to concentration-range categories in order to better identify weakly, moderately, or strongly anomalous samples. In general, the more anomalous the results from a sampling site, the more significant is that site (or drainage basin) in terms of mineral resource potential.

#### Results and Interpretation

The data in Diggles and others (1986) were interpreted in detail for this study (M.F. Diggles, unpub. data, 1986). The elements most useful in this study are silver, arsenic, barium, bismuth, copper, gold, lead, molybdenum tin, thorium, tungsten, zinc, and nonmagnetic iron, because these elements are commonly associated with mineralized areas and altered zones in this part of the Sierra Nevada. For example, anomalous concentrations of tungsten, bismuth, and molybdenum might indicate areas of tungsten skarn-type mineralization. Many drainage basins in the South Sierra Wilderness and the South Sierra Roadless Area contain anomalous concentrations of one or more elements in heavy-mineral concentrate samples. The elements and the anomalous threshold, in parts per million (ppm) are: tungsten (100 ppm), bismuth (20 ppm), and molybdenum (50 ppm). Isolated drainages contain one or more anomalous concentrations of lead (70 ppm) and zinc (5 ppm) in stream-sediment samples and anomalous concentrations of nonmagnetic iron (2,000 ppm) in concentrate samples. One isolated sample contained 10 ppm gold and four samples from widely scattered sites contained silver at the limit of detection of 0.5 ppm. These point anomalies are not considered indicative of mineral resource potential for these metals.

Areas of highest mineral resource potential are those that contain adjacent basins with clusters of anomalous metal concentrations. Eighteen basins with clustered anomalies define three main areas of resource potential.

The geochemical interpretation shows two areas with tungsten and molybdenum mineralization and a third area with lead and zinc mineralization. The area with the highest tungsten, molybdenum, and bismuth anomalies is between Summit Meadow and Hogback Creek. Another set of drainages yielded samples with lower anomalous values of the same group elements. These drainages are located south of Smith Mountain and northwest of Granite Knob in the granodiorite of Redrock Meadow. Samples from a pair of adjacent drainages on the east side of the Sierra Nevada crest south of Walker Creek showed slightly anomalous concentrations of lead, zinc, and nonmagnetic iron. The nonmagnetic iron is probably due to the presence of pyrite, which may indicate that sulfide lead-zinc mineralization has occurred.

### Conclusions

There are five areas with mineral resource potential and one area with geothermal energy potential in the South Sierra Wilderness and the South Sierra Roadless Area. There are no known mines or mineral claims in the study area. A geothermal energy lease is located around Monache Mountain.

The area south of Summit Meadows is geochemically anomalous in tungsten, molybdenum, and bismuth. It is underlain by a rusty-weathering bleached alaskite and possibly contains pods of calcareous metasedimentary rocks. It has moderate resource potential for tungsten and molybdenum in small skarn deposits.

The area south of Hogback Creek also contains anomalous concentrations of tungsten, molybdenum, and bismuth but with fewer clusters at lower values. This area is underlain by the Sacatar Quartz Diorite and may contain pods of calcareous metasedimentary rocks, although none were seen in the field. It has moderate mineral resource potential for tungsten and molybdenum in small skarn deposits.

The area between Summit meadow and Hogback Creek, centering on Round Mountain, contains single-element anomalies and no groupings of anomalous samples. Because of its location between two more highly anomalous areas, this area has low mineral resource potential for tungsten and molybdenum.

The area south of Walker Creek, extending south into the Round Mountain area of resource potential, contains a lead and zinc anomaly. The presence of anomalous values of nonmagnetic iron in concentrate samples indicates that the lead and zinc occur as sulfides. The mineralization was probably caused by the intrusion of diabase dikes that are present within the areas. This area has low mineral resource potential for lead and zinc.

The area from south of Jackass Meadows to northwest of Granite Knob yielded heavy-mineral concentrate samples with anomalous concentrations of tungsten, molybdenum, and bismuth. This area is underlain by the granodiorite of Redrock Meadow and is west of mapped metamorphic rocks at Hooker Meadow. Small pods of calcareous metasedimentary rocks containing skarns may be present locally in this area. The area from south of Jackass Meadows to northwest of Granite Knob has low mineral resource potential for tungsten and molybdenum.

Monache Mountain is a peraluminous rhyolite that is about 2.4 Ma old and is located roughly 25 mi northwest of the contemporaneous Coso volcanic field (Bacon, 1978). There are visible hot springs on the flank of the mountain. There is also a 0.185-Ma-old rhyolite of Long Canyon on Kingfisher Ridge. The area is the site of geothermal leases from the U.S. Forest Service to Phillips Petroleum. The area including and surrounding Monache Mountain has high geothermal energy resource potential.

Volcanic cinders are commonly mined for use in construction but are from deposits that are products of more explosive volcanism than occurred at Monache Mountain. The rhyolite at Monache Mountain is of too high of a density to meet construction needs. Resources of low-density pumice are present in the Coso volcanic field 5 mi east of the study area (Chesterman, 1956).

### Definition of levels of mineral resource potential (from Goudarzi, 1984)

Mineral resource potential is defined as the likelihood of the presence of the mineral resources in a defined area; it is not a measure of the amount of resources or their profitability.

Mineral resources are concentrations of naturally occurring solid, liquid, or gaseous materials in such form and amount that economic extraction of a commodity from the concentration is currently or potentially feasible.

Low mineral resource potential is assigned to areas where geologic, geochemical, and geophysical characteristics indicate a geologic environment where the existence of resources is permissive. This level of potential embraces areas of dispersed mineralized rock as well as areas having few or no indications of mineralization. Assignment of low potential requires specific positive knowledge; it is not to be used as a catchall for areas where adequate data are lacking.

Moderate mineral resource potential is assigned to areas where geologic, geochemical, and geophysical characteristics indicate a geologic environment favorable for resource occurrence, where interpretations of data indicate a reasonable chance for resource accumulation, and where an application of genetic and (or) occurrence models indicates favorable ground.

High mineral resource potential is assigned to areas where geologic, geochemical, and geophysical characteristics indicate a geologic environment favorable for resources, where interpretations of data indicate a high likelihood for resource accumulation, where data support occurrence and (or) genetic models indicating presence of resources, and where evidence indicates that mineral concentration has taken place. Assignment of high resource potential requires positive knowledge that resource-forming processes have been active in at least part of the area; it does not require that occurrences or deposits be identified.

Unknown mineral resource potential is assigned to areas where the level of knowledge is so inadequate that classification of the area as high, moderate, or low would be misleading. The phrase "no mineral resource potential" applies only to a specific resource type in a well defined area. This phrase should not be used if there is the slightest possibility of resource occurrence; it is not appropriate as the summary rating for any area.

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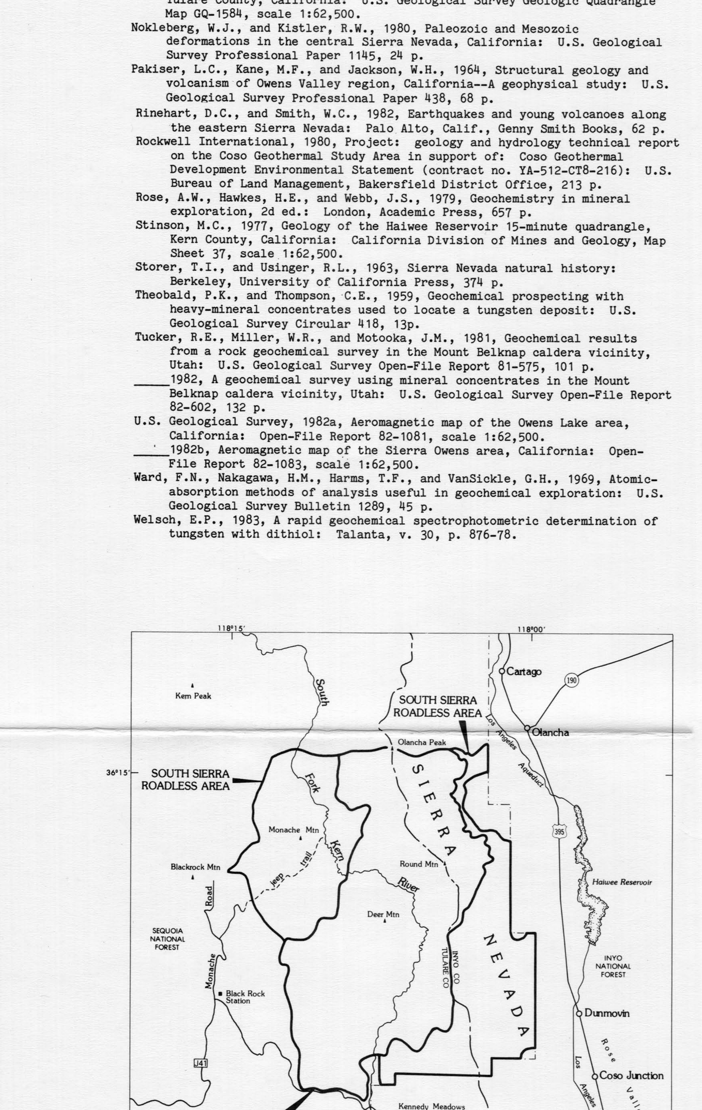


INDEX MAP SHOWING LOCATION OF THE SOUTH SIERRA WILDERNESS AND THE SOUTH SIERRA ROADLESS AREA, SOUTHERN SIERRA NEVADA, CALIFORNIA

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