UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

MINERAL RESOURCE POTENTIAL OF PART OF THE SAN JOAQUIN ROADLESS AREA, MADERA COUNTY, CALIFORNIA

By

Edwin H. McKee
U.S. Geological Survey

and

Donald O. Capstick
U.S. Bureau of Mines

U.S. Geological Survey
Open-File Report 82-993
1982

Table of Contents

List of Figures

List of Tables

STUDIES RELATED TO WILDERNESS

Under the provisions of the Wilderness Act (Public Law 88-577, September 3, 1964 and the Joint Conference Report on Senate Bill 4, 88th Congress, 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 central part of the San Joaquin Roadless Area (F5047), Inyo National Forest, Madera County, California. San Joaquin Roadless Area was classified as recommended wilderness (A5047) and nonwilderness (B5047) during the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January 1979. The central part of the area (B5047) was reclassified as a further planning area (F5047) on April 16, 1979.

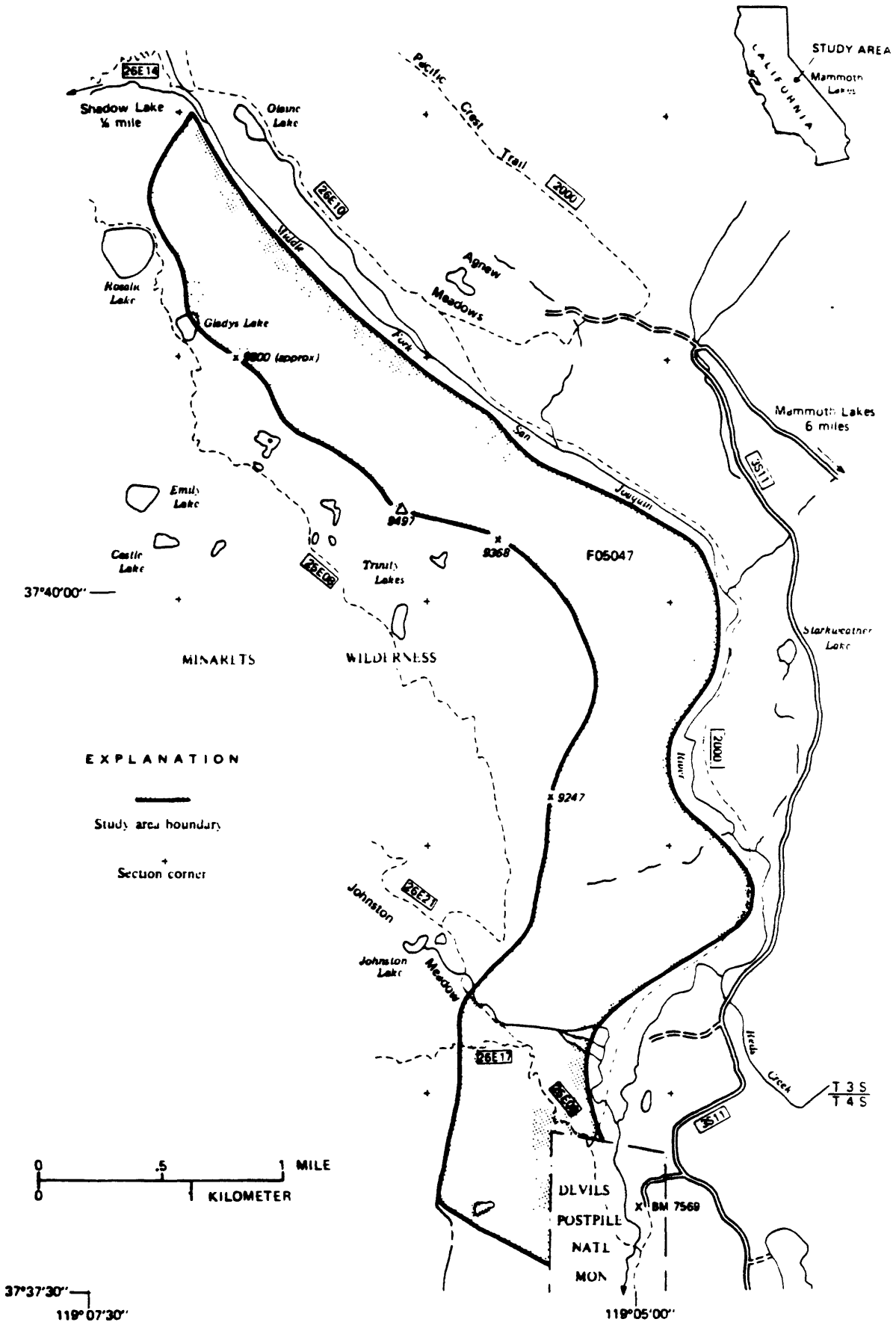
SUMMARY

The results of geologic, geochemical, and mining-activity and production surveys in the central part of the San Joaquin Roadless Area indicate little potential for metallic or energy resources in the area. Nonmetallic deposits of sand, gravel, and pumice exist in the area, but they are small and isolated and could not compete economically with similar deposits closer to major markets. The area consists mostly of exposures of unaltered and nonmineralized granitic and metavolcanic rock along the steep western wall of the glacially carved valley of the Middle Fork of the San Joaquin River. Drainage in the area consists of seeps along fractures in the cliff or small cascading streams and there is no potential for placer deposits in this hydraulic setting. No mines or prospects are in the roadless area. Public records provide only vague descriptions of claim locations that may be in the area, and no mineral-related workings were found. Alteration zones within the granitic and metamorphic rocks that crop out within the area are small and isolated and consist only of limonitic staining and bleached quartzose rock.

INTRODUCTION

The San Joaquin Roadless Area (A and B5047) is composed of three contiguous areas on the eastern side of the Sierra Nevada in Madera County, Calif. The central part (F5047), classified as a further planning area, is located about 5 mi (8 km) northwest of Mammoth Lakes, Calif. (fig. 1). It is contiguous with Devils Postpile National Monument on the south and Minarets Wilderness on the west. The roadless area comprises about 1,770 acres (716 ha) along the western side of the Middle Fork of the San Joaquin River canyon. Elevations range from about 7,560 ft above sea level along the river, to about 9,800 ft on the western crest of the area. Access to within 1 mi (1.6 km) of the eastern edge of the area is provided by the road from Mammoth Lakes to Devils Postpile National Monument.

Figure 1.--Index map showing location of the central part of the San Joaquin Roadless Area (F5047), eastern Sierra Nevada, Madera County, Calif.


STUDY AREA
CALIFORNIA
Mammoth Lakes
Pacific Crest Trail
2000
26E14
Shadow Lake
¼ mile
Ottoni Lake
26E10
Vidlie
Agnew Meadows
Rosalie Lake
Gladys Lake
x 9800 (approx)
Fork
San Joaquin
Mammoth Lakes
6 miles
3S11
Emily Lake
9497
x 9368
F05047
Castle Lake
26E08
Trinity Lakes
37°40'00"
MINARETS
WILDERNESS
Starkweather Lake
EXPLANATION
Study area boundary
Section corner
x 9247
Johnston
26E21
Johnston Lake
Meadow
26E17
Heath Creek
T 3 S
T 4 S
0 .5 1 MILE
0 1 KILOMETER
DEVILS
POSTPILE
NATL
MON
x BM 7569
37°37'30"
119°07'30"
119°05'00"

The geology of the roadless areas is shown on the geologic map of the Devils Postpile 15-minute quadrangle, mapped by Huber and Rinehart (1965). No additional mapping was done for this study except for field checking and geochemical stream-sediment sampling in July 1981 by the U.S. Geological Survey. The U.S. Bureau of Mines, Western Field Operations Center, searched county mining-claim records and other sources of data for information on mineral deposits, claims, leases, production, and mining activity in the area. The U.S. Bureau of Mines conducted fieldwork in June 1981, searching for mines, prospects, and claim locations as well as for areas of rock alteration. Rock samples were taken at suspected claim locations and where metallic minerals were observed. The samples were checked for radioactivity and fluorescence and subjected to spectrographic analyses. Two samples were analyzed by more accurate methods for determining the amount of gold, silver, copper, lead, zinc, tungsten, and uranium. A scintillometer was used for a reconnaissance survey to check for anomalous radioactivity.

GEOLOGIC SETTING

The roadless area can be divided into three major bedrock types (fig. 2) and a thin discontinuous veneer of Quaternary alluvium, including ash and pumice from nearby volcanoes. Most of the area is underlain by Mesozoic granitic rock that intrudes regionally metamorphosed older Mesozoic volcanic rocks. A small amount of Pleistocene andesite similar to that of the Devils Postpile crops out in the area.

Metavolcanic rocks.--The northern third of the area contains a metavolcanic sequence comprised of crystal-lithic tuff, tuff breccia, tuffaceous sandstone, and lava flows. These dominantly pyroclastic rocks are mostly rhyolite to dacite in composition, but some basalts and andesites are present. Primary sedimentary or volcanic textures and structures are present but are poorly preserved, and recrystallized fabric is clearly imprinted on all these rocks. This fabric ranges from schistose and phyllitic to hornfelsic. Minerals formed by recrystallization include andalusite, corundum, and piedmontite. Triassic or Jurassic fossils have been found about midway in the stratigraphic sequence (Huber and Rinehart, 1965). The lower part of the sequence may be Permian or older (Huber and Rinehart, 1965).

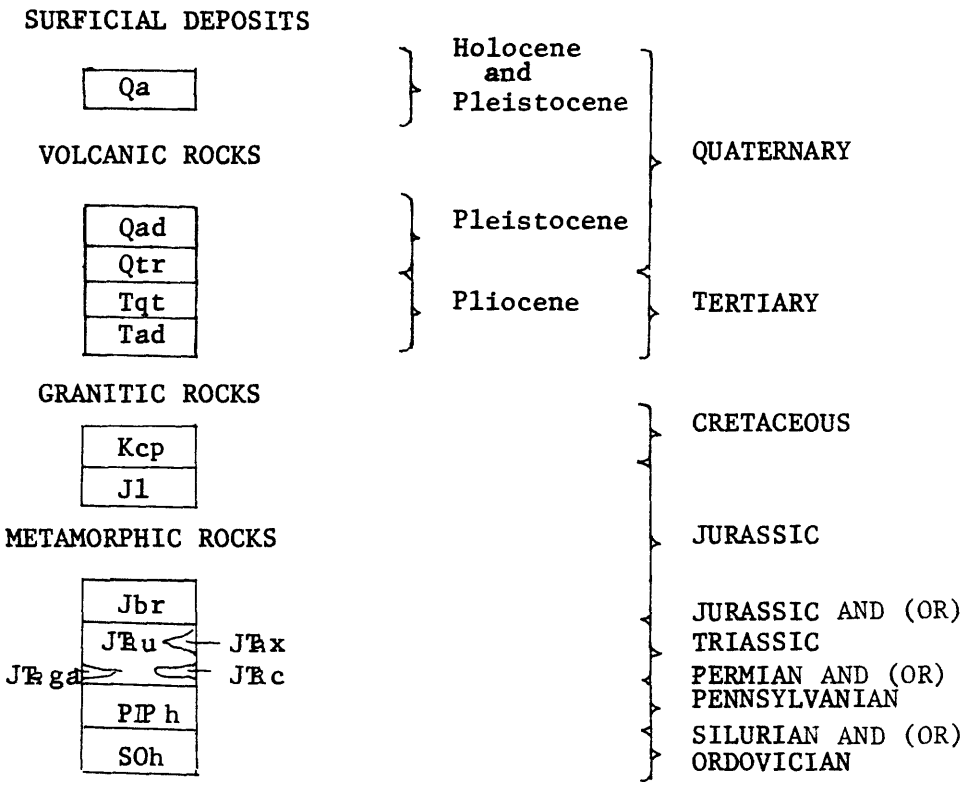
Granitic rocks.--The southern two-thirds of the area is composed of granitic rock informally called rocks similar to the Cathedral Peak Granodiorite (Huber and Rinehart, 1965). These rocks range in composition from granodiorite to alaskite but have an average composition of quartz monzonite. The rock is coarse grained and porphyritic, with phenocrysts of potassium feldspar as much as 2 in. (5 cm) in length. Potassium-argon age determinations on biotite from this unit yielded ages of about 85 m.y. (Cretaceous) (Huber and Rinehart, 1965).

Andesite.--Andesite flows almost contiguous with the flows that form Devils Postpile crop out on the eastern edge of the roadless area (fig. 2). The andesite is medium gray, aphanitic, and locally contains plagioclase and olivine phenocrysts. Well-developed platy and columner joints characterize the unit.

Alluvial deposits.--The thickest accumulation of alluvium is on the valley floor adjacent to the Middle Fork of the San Joaquin River. About 10 ft (3 m) of eroded material containing a large component of ash and pumice, fills the valley bottom. Elsewhere in the roadless area only discontinuous patches of unconsolidated alluvium cap the bedrock or fill small topographic depressions. Much of the area is a bold cliff on the west side of the Middle Fork of the San Joaquin and is devoid of any alluvial deposits.

Figure 2.--Geologic map of part of the Devils Postpile 15-minute quadrangle modified in part from Huber and Rinehart (1965), showing location of roadless area (F5047) and geochemical sample sites.

CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

SURFICIAL DEPOSITS

Qa ALLUVIUM AND COLLUVIUM (HOLOCENE AND PLEISTOCENE)

VOLCANIC ROCKS

Qad ANDESITE OF THE DEVILS POSTPILE (PLEISTOCENE)

Qtr RHYOLITIC TUFF OF REDS MEADOW (PLEISTOCENE)

Tqt QUARTZ LATITE OF TWO TEATS (PLIOCENE)

Tad ANDESITE OF DEADMAN PASS (PLIOCENE)

GRANITIC ROCKS

Kcp ROCKS SIMILAR TO THE CATHEDRAL PEAK GRANODIORITE (CRETACEOUS)

Jl QUARTZ MONZONITE OF LEE VINING CANYON (JURASSIC)

METAMORPHIC ROCKS

Jbr VOLCANIC ROCKS OF THE RITTER RANGE (JURASSIC)

JTR u VOLCANIC ROCKS OF SHADOW CREEK AND MAMMOTH CREST (JURASSIC AND (OR) TRIASSIC)--Locally divided into:

JTR x Crystal tuff

JTR c Calcareous sedimentary rocks

JTR qa Quartz-andalusite-corundum rocks

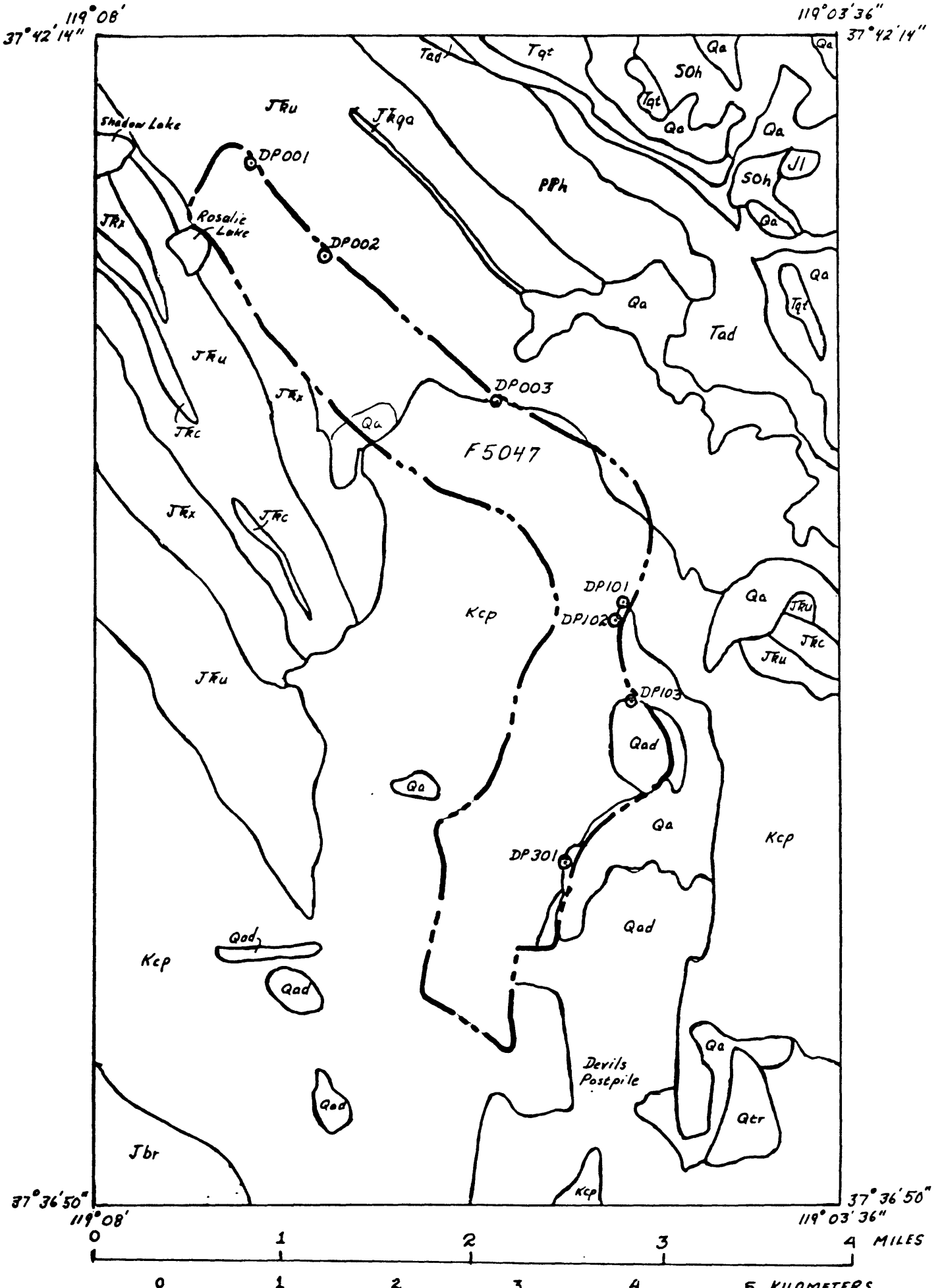
PP h FINE-GRAINED PELITIC AND SILICEOUS HORNFELS (PERMIAN AND (OR) PENNSYLVANIAN)

SOH DENSE HORNFELS AND SILICIFIED MARBLE (SILURIAN AND (OR) ORDOVICIAN)

 APPROXIMATE BOUNDARY OF ROADLESS AREA (F5047)

 CONTACT

DP101 GEOCHEMICAL SAMPLE SITE--Number refers to table 1


119°08'
37°42'14"
119°03'36"
37°42'14"
Shadow Lake
Rosalie Lake
DP001
DP002
DP003
DP101
DP102
DP103
DP301
F5047
Devils Postpile
Tad
Tqt
Qa
SOh
Jl
PPh
JTRu
JTRqa
JTRx
JTRc
Kcp
Qad
Qaa
Jbr
Qtr
37°36'50"
119°08'
119°03'36"
37°36'50"
0 1 2 3 4 MILES
0 1 2 3 4 5 KILOMETERS

GEOCHEMISTRY

The only drainage of significance in the area that is actively eroding bedrock and transporting sediment is the Middle Fork of the San Joaquin River, along the eastern boundary of the area. Virtually all of the eroded material carried by the Middle Fork that can be considered representative of eroded rock and indicative of the geochemical make up of the drainage basin is from outside the study area. Sediment added to the Middle Fork from the study area is negligible. Streams that cross the area are short and intermittent, forming waterfalls or disappearing into deep crevices; most flow only for a short time after the snow melts. Consequently, geochemical sampling of stream sediment is of limited value in defining anomalous elements in transported material from erosion basins in this study area.

Seven samples of minus-60-mesh stream sediments, seven nonmagnetic heavy-mineral panned concentrates, and five rock samples from near the stream-sediment sites were collected and analyzed for 31 elements using six-step semiquantitative emission spectroscopy. Two additional elements (gold and zinc) were analyzed using atomic-absorption spectroscopy on colorimetry. The results of these analyses (table 1) show no anomalous amounts of any metallic element.

MINING ACTIVITY

The roadless area lies within the Minarets mining district (Bradley, 1926), organized in 1878 as the North Fork mining district (Preston, 1893); it had little development and virtually no production (Erwin, 1934). The Lake, or Mammoth, mining district (Caldwell, 1981) is about 4 mi (6 km) east-southeast of the study area and possibly adjoins the Minarets district.

The Minarets and Lake districts were apparently explored primarily for gold and silver, but base metals also occur. The Lake district produced only small amounts of gold and silver. A large iron occurrence near Iron Mountain in the Minarets district is located a few miles southwest of the roadless area. The deposit was discovered during the late 1800's and considerable early exploration took place, but iron resources are not considered significant (McLaughlin and Bradley, 1916; U.S. Geol. Survey and U.S. Bur. Mines, 1979).

No mining-claim monuments or definite signs of mining or prospecting activities were found within the study area. Mining-claim records did not reveal any claim locations definitely within the area; three are possibly within the boundaries but are so vaguely described that they cannot now be found.

MINERAL RESOURCE POTENTIAL

A geologic survey of the San Joaquin Roadless Area (F5047) and geochemical analyses of rock and sediment samples failed to reveal any indication of metallic mineral resources. No mining claims or signs of mining or prospecting were found. Deposits of sand, gravel, and pumice exist, but they are small and isolated and could not compete economically with similar and larger deposits with easier access closer to major markets. The area consists mainly of the steep western face of the Middle Fork of the San Joaquin River canyon and is composed of unaltered and nonmineralized granitic and metavolcanic rock. Placer deposits in the unconsolidated alluvium of the Middle Fork river valley are not known, although the river has undoubtedly been prospected many times by pan techniques.

Table 1.--Geochemical data from the central part of the San Joaquin Roadless Area

[Values shown are midpoints of class intervals whose boundaries are: 12, 18, 26, 38, 56, and 83 or appropriate powers of 10 of these values; s, semiquantitative emission spectroscopy; aa, atomic-absorption spectrophotometry; INST, fluorimetry; ppm, parts per million; pct, percent; N, not detected at the lower limit of determination shown in parentheses under column headings; >, detected at a level greater than the upper limit of determination shown; <detected at a level less than the lower limit of detection shown]

Sample number	Latitude (N.)	Longitude (W.)	UTM Easting	UTM Northing	Ca (percent) s	Fe (percent) s	Mg (percent) s	Ti (percent) s	Ag (ppm) s (0.5)	B (ppm) s	Ba (ppm) s	Be (ppm) s
Analytical data for stream-sediment samples												
DP001SS	37°41'37"	119°07"00	313,370	4,173,750	1.0	5	0.5	0.5	N	20	500	1.0
DP002SS	37°41'11"	110°05'53"	314,990	4,172,890	.7	7	.5	.3	N	30	500	1.5
DP003SS	37°40'34"	119°05'38"	315,340	4,171,740	.7	7	.3	.3	.7	20	700	1.5
DP101SS	37°39'38"	119°04'52"	316,420	4,170,000	.7	3	.3	.5	N	15	700	1.5
DP102SS	37°39'33"	119°04'53"	316,390	4,169,860	.5	10	.5	.5	N	15	500	1.5
DP103SS	37°39'07"	119°04'39"	316,730	4,169,050	1.0	7	.7	.5	N	20	700	1.0
DP310SS	37°38'25"	110°05'10"	315,940	4,167,770	.7	2	.3	.2	N	20	700	2.0

Sample number	Latitude (N.)	Longitude (W.)	UTM Easting	UTM Northing	Ca (percent) s	Fe (percent) s	Mg (percent) s	Ti (percent) s	Ag (ppm) s (1.0)	As (ppm) s (500)	Au (ppm) s (20)	B (ppm) s
Analytical data for panned-concentrate samples												
DP001PC	37°41'37"	119°07'00"	313,370	4,173,750	10	.5	.5	>2	N	N	N	20
DP002PC	37°41'11"	119°05'53"	314,990	4,172,890	7	.5	.5	>2	N	N	N	30
DP003PC	37°40'34"	119°05'38"	315,340	4,171,740	7	1.0	2.0	>2	N	N	N	70
DP101PC	37°39'38"	119°04'52"	316,420	4,170,000	7	.7	.7	>2	N	N	N	50
DP102PC	37°39'33"	119°04'53"	316,290	4,169,860	5	.5	.1	2	N	N	N	50
DP103PC	37°39'07"	119°04'39"	316,730	4,169,050	5	2.0	.7	>2	N	N	N	70
DP301PC	37°38'25"	119°05'10"	315,940	4,167,770	7	1.0	.5	>2	N	N	N	50

Sample number	Latitude (N.)	Longitude (W.)	UTM Easting	UTM Northing	Ca (percent) s	Fe (percent) s	Mg (percent) s	Ti (percent) s	Ag (ppm) s (0.5)	B (ppm) s	Ba (ppm) s
Analytical data for rock samples											
DP001RK	37°41'37"	119°07'00"	313,370	4,173,750	2.00	3.0	1.50	.3	N	15	1,000
DP002RK	37°41'11"	119°05'53"	314,990	4,172,890	1.50	3.0	1.00	.3	N	100	1,500
DP003RK	37°40'34"	119°05'38"	315,340	4,171,740	.07	2.0	.50	.3	N	10	2,000
DP101RK	37°39'38"	119°04'52"	316,420	4,170,000	.70	.7	.15	.1	N	<10	1,500
DP301RK	37°38'25"	119°05'10"	315,940	4,167,770	1.00	.7	.10	.1	N	10	2,000

Table 1.--Geochemical data from the central part of the San Joaquin Roadless Area--(Continued)

Analytical data for stream-sediment samples

Sample number	Sn (ppm) s (10)	Sr (ppm) s	Th (ppm) s (100)	V (ppm) s	W (ppm) s (50)	Y (ppm) s	Zn (ppm) s (200)	Zr (ppm) s	Au (ppm) aa (0.002)	Zn (ppm) aa	U-INST
DP001SS	N	300	N	100	N	20	N	200	0.002	25	1.2
DP002SS	N	200	<100	150	N	30	N	200	N	40	1.4
DP003SS	N	200	N	100	<50	20	N	200	.004	60	1.2
DP101SS	N	300	N	70	N	20	N	300	.004	30	1.6
DP102SS	N	200	N	200	N	30	<200	>1,000	.003	30	8.5
DP103SS	N	300	N	150	N	20	N	100	.005	70	1.2
DP301SS	N	300	N	50	N	15	N	150	.008	120	1.8

Analytical data for panned-concentrate samples

Sample number	Pb (ppm) s	Sb (ppm) s (200)	Sc (ppm) s (10)	Sn (ppm) s	Sr (ppm) s (200)	Th (ppm) s	V (ppm) s	W (ppm) s (100)	Y (ppm) s	Zn (ppm) s (500)	Zr (ppm) s
DP001PC	<20	N	10	100	N	<*200	500	500	700	N	>2,000
DP002PC	<20	N	10	70	N	<200	300	<100	700	N	>2,000
DP003PC	20	N	10	100	N	500	200	700	700	N	>2,000
DP101PC	30	N	10	70	N	200	300	100	700	N	>2,000
DP102PC	30	N	N	<20	<200	500	100	150	200	N	2,000
DP103PC	20	N	50	20	N	300	200	300	300	N	>2,000
DP301PC	20	N	10	70	N	300	300	N	500	N	>2,000

Analytical data for rock samples

Sample number	Sc (ppm) s	Sn (ppm) s (10)	Sr (ppm) s	Th (ppm) s (100)	V (ppm) s	W (ppm) s (50)	Y (ppm) s	Zn (ppm) s (200)	Zr (ppm) s	Au (ppm) aa (0.002)	Zn (ppm) aa	U-INST
DP001RK	20	N	300	N	100	N	20	N	100	N	45	0.63
DP002RK	20	N	300	N	150	N	15	N	100	N	40	.21
DP003RK	15	N	500	N	100	N	15	N	100	N	25	.55
DP101RK	<5	N	500	N	20	N	10	N	100	N	35	.42
DP301RK	5	N	500	N	15	N	10	N	150	N	90	.06

Table 1.--Geochemical data from the central part of the San Joaquin Roadless Area--(Continued)

Analytical data for stream-sediment samples--(Continued)

Sample number	Bi (ppm) s (10)	Cd (ppm) s (20)	Co (ppm) s	Cr (ppm) s	Cu (ppm) s	La (ppm) s	Mn (ppm) s	Mo (ppm) s	Nb (ppm) s (20)	Ni (ppm) s	Pb (ppm) s	Sc (ppm) s
DP001SS	N	N	15	50	10	100	1,000	5	<20	10	30	10
DP002SS	N	N	15	50	7	70	1,500	7	<20	15	30	15
DP003SS	N	N	10	30	10	100	1,000	7	<20	10	50	10
DP101SS	N	N	10	20	5	100	1,000	7	<20	10	30	10
DP103SS	N	N	15	50	5	200	2,000	10	20	10	20	7
DP301SS	N	N	10	15	10	50	1,500	10	20	5	30	10

Analytical data for panned-concentrate samples

Sample number	Ba (ppm) s	Be (ppm) s (2)	Bi (ppm) s (20)	Cd (ppm) s (50)	Co (ppm) s (10)	Cr (ppm) s	Cu (ppm) s (10)	La (ppm) s	Mn (ppm) s	Mo (ppm) s	Nb (ppm) s	Ni (ppm) s (10)
DP001PC	300	N	500	N	20	70	N	2,000	1,500	50	150	N
DP002PC	200	N	N	N	<10	70	N	1,500	1,000	50	10	N
DP003PC	700	N	N	N	N	150	N	1,500	1,000	50	10	50
DP101PC	500	N	N	N	N	100	N	2,000	1,500	30	150	N
DP102PC	1,000	<2	N	N	N	30	N	1,000	300	20	70	N
DP103PC	1,000	N	N	N	N	100	N	700	5,000	50	200	N
DP301PC	300	N	N	N	N	700	N	2,000	1,500	50	200	N

Analytical data for rock samples

Sample number	Be (ppm) s	Cd (ppm) s (20)	Co (ppm) s (5)	Cr (ppm) s (10)	Cu (ppm) s (5)	La (ppm) s	Mn (ppm) s	Mo (ppm) s (5)	Nb (ppm) s (20)	Ni (ppm) s	Pb (ppm) s
DP001RK	<1.0	N	15	15	30	50	1,500	N	N	7	20
DP002RK	1.0	N	20	N	5	30	1,000	N	N	10	10
DP003RK	1.0	N	7	N	<5	30	200	N	N	5	20
DP101RK	1.5	N	N	N	N	20	500	N	N	<5	20
DP301RK	1.5	N	N	N	<5	<20	500	N	N	<5	50

REFERENCES

Bradley, W. W., 1926, The Minarets district, Madera County: California State Mining Bureau Report of the State Mineralogist, v. 22, no. 4, p. 538-557.

Caldwell, Gary, 1981, Mammoth gold, ghost towns of Lake district: 1877-1898: Los Angeles, Alan Hensher-Brooks, 32 p.

Erwin, H. D., 1934, Geology and mineral resources of northeastern Madera County, California: California Journal of Mines and Geology, v. 30, no. 1, p. 7-78.

Huber, N. K., and Rinehart, C. D., 1965, Geologic map of the Devils Postpile quadrangle, Sierra Nevada, California: U.S. Geological Survey Geologic Quadrangle Map GQ-437, scale 1:62,500.

McLaughlin, R. P., and Bradley, W. W., 1916, Madera County: California State Mining Bureau Report of the State Mineralogist, v. 14, p. 531-568.

Preston, E. B., 1893, North Fork mining district of Fresno [Madera] County: California State Mining Bureau Report of the State Mineralogist, v. 11, p. 218-223.

U.S. Geological Survey and U.S. Bureau of Mines, 1979, Mineral resources of the Minarets Wilderness and adjacent areas, Madera and Mono Counties, California: U.S. Geological Survey Open-File Report 79-1472, 183 p.