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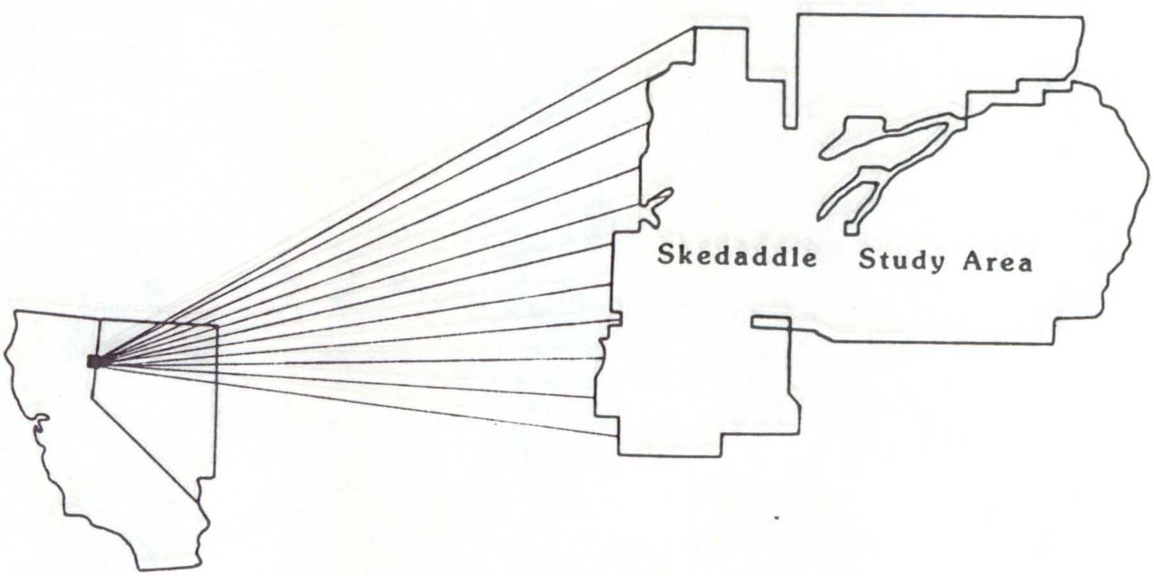
Open File Report

Mineral Resources of the Skedaddle Study Area, Lassen County, California and Washoe County, Nevada



BUREAU OF MINES

UNITED STATES DEPARTMENT OF THE INTERIOR

MINERAL RESOURCES OF THE SKEDADDLE STUDY AREA, LASSEN COUNTY, CALIFORNIA, AND WASHOE COUNTY, NEVADA

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UNITED STATES DEPARTMENT OF THE INTERIOR
Donald P. Hodel, Secretary

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PREFACE

The Federal Land Policy and Management Act (Public Law 94-579, October 21, 1976) requires the U.S. Geological Survey and U.S. Bureau of Mines to conduct mineral surveys on U.S. Bureau of Land Management administered land designated as Wilderness Study Areas ". . . to determine the mineral values, if any, that may be present . . . ." Results must be made available to the public and submitted to the President and the Congress. This report presents the results of a Bureau of Mines mineral survey of part of the Skedaddle Mountains Wilderness Study Area (CA-020-0612), Lassen County, CA, and Washoe County, NV.

This open-file report will be summarized in a joint report published by the U.S. Geological Survey. The data were gathered and interpreted by Bureau of Mines personnel from Western Field Operations Center, East 360 Third Avenue, Spokane, WA 99202. The report has been edited by members of the Branch of Mineral Land Assessment at the field center and reviewed at the Division of Mineral Land Assessment, Washington, DC.

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UNIT OF MEASURE ABBREVIATIONS USED IN THIS REPORT

@	at
ft^3	cubic foot
yd^3	cubic yard
o	degree
ft	foot
in.	inch
mi	mile
mm	millimeter
m	meter
ppm	part per million
/	per
lb	pound
st	short ton
in^2	square inch
mi^2	square mile
oz	troy ounce
oz/st	troy ounce per short ton

SUMMARY

In 1985, at the request of the U.S. Bureau of Land Management, the U.S. Bureau of Mines studied 39,420 acres of the 60,960-acre Skedaddle Wilderness Study Area in order to evaluate its identified mineral resources. There are no known mines or mining operations in the study area. None of the prospects or claims in or within a 1 mile peripheral zone around the study area have recorded production. At least 276 recorded lode, 6 unrecorded lode, and 29 placer claims have been located in and within about 1 mile of the study area. Approximately 191 of the claims are in the study area. Four of these were current in 1985; all four are wholly or partly inside the study area. None of the study area was being explored by private industry in 1985.

Metallic and nonmetallic commodities present in the study area consist of gold, mercury, perlite, basalt, pozzolan, stone, and sand and gravel. Perlite is represented by a single deposit which contains 184,000 tons of subeconomic resources in and adjacent to the study area. No other sites contained identified resources. There are no other identified nonmetallic resources in the study area. Occurrences in and near the study area contain small amounts of gold and mercury in vein-type deposits and show characteristics similar to bulk-tonnage, low-grade gold deposits. No base-metal resources were identified. The gold and mercury mineralization and perlite deposit are spatially related to a volcanic center located in the Skedaddle Mountains. Prospects in the Skedaddle Mountains may contain both precious metals and perlite resources, but additional work is required to adequately delineate these areas.

INTRODUCTION

This report describes the USBM (U.S. Bureau of Mines) portion of a cooperative study with the USGS (U.S Geological Survey) to evaluate mineral resources and potential of the Skedaddle study area at the request of the BLM (U.S. Bureau of Land Management). The USBM examines individual mines, prospects, claims, and mineralized zones, and evaluates identified mineral and energy resources. The USGS evaluates potential for undiscovered resources based on areal geological, geochemical, and geophysical surveys. Results of the investigations will be used to help determine the suitability of the study area for inclusion into the National Wilderness Preservation System. Although the immediate goal of this and other USBM mineral surveys is to provide data for the President, Congress, government agencies, and the public for land-use decisions, the long-term objective is to ensure the Nation has an adequate and dependable supply of minerals at a reasonable cost.

Setting

The study area is mostly in southeastern Lassen County, CA, with a small portion in western Washoe County, NV, (fig. 1) and is part of the southern Modoc Plateau. The study area, consisting of 39,420 acres, includes all of the Skedaddle Mountains and all of the Amedee Mountains, and is northeast of Honey Lake. The nearest community, Wendel, CA, is 3 mi to the west. Susanville, CA, is 25 mi west of the study area. Elevations range from 4,100 ft on the southwest edge of the study area to 7,680 ft at the top of Hot Springs Peak in the Skedaddle Mountains. The study area is in a semiarid, high-desert environment; sagebrush is the dominant ground cover vegetation, although native grasses are also present, especially near creeks and in some valleys.

Principal vehicle access to the vicinity of the study area is by U.S. Highway 395 and Lassen County Road 320 east from Susanville, CA, or northwest from Nevada along Honey Lake by Lassen County Road 320. Primitive desert roads provide limited access to the study area.

Previous Studies

Although the Skedaddle Mountains area has been discussed by various authors, no single mineral study has included the study area. One of the earliest studies covering this general area was by Gilbert (1875). The same general area was included in another early study of Lake Lahontan by Russell (1885). In 1895 Diller described some of the volcanic geology of the Lassen Peak area northwest of the study area. Descriptions of the general geology have been updated by the California State Mineral Information Service (1959), and Lydon and others (1960). Structural features of the area have been discussed by several authors including Russell (1928), MacDonald (1966), MacDonald and Gay (1966), Thompson and Burke (1974), and Eaton (1982).

Numerous reports directly or indirectly pertaining to geothermal resources in and near the study area included those by Waring (1915), Tucker (1917), Anderson and Axtell (1972), Norris and Webb (1976), Bowen (1979), Rinehart (1980), McNitt and Wilde (1980), Benson (1982), Juncal and others (1982), Pilkington (1981), Majmundar (1983), Lassen County (1983), Purdy (1983), Zeisloft and others (1984), and Parmentier (1985).

Present Study

This study included prefield, field, and report preparation phases that spanned parts of years 1985 and 1986 and involved about 1 employee-year of work. The prefield phase included library research and perusal of pertinent literature, county claim records, USBM MILS (Mineral Industry Location System), and BLM mining and mineral lease records. USBM, state, and other production records were searched and pertinent data compiled. Claim owners and lessees were contacted, when possible, for permission to examine properties and publish the results. The field phase conducted during June 1985 included a search for all prospects and

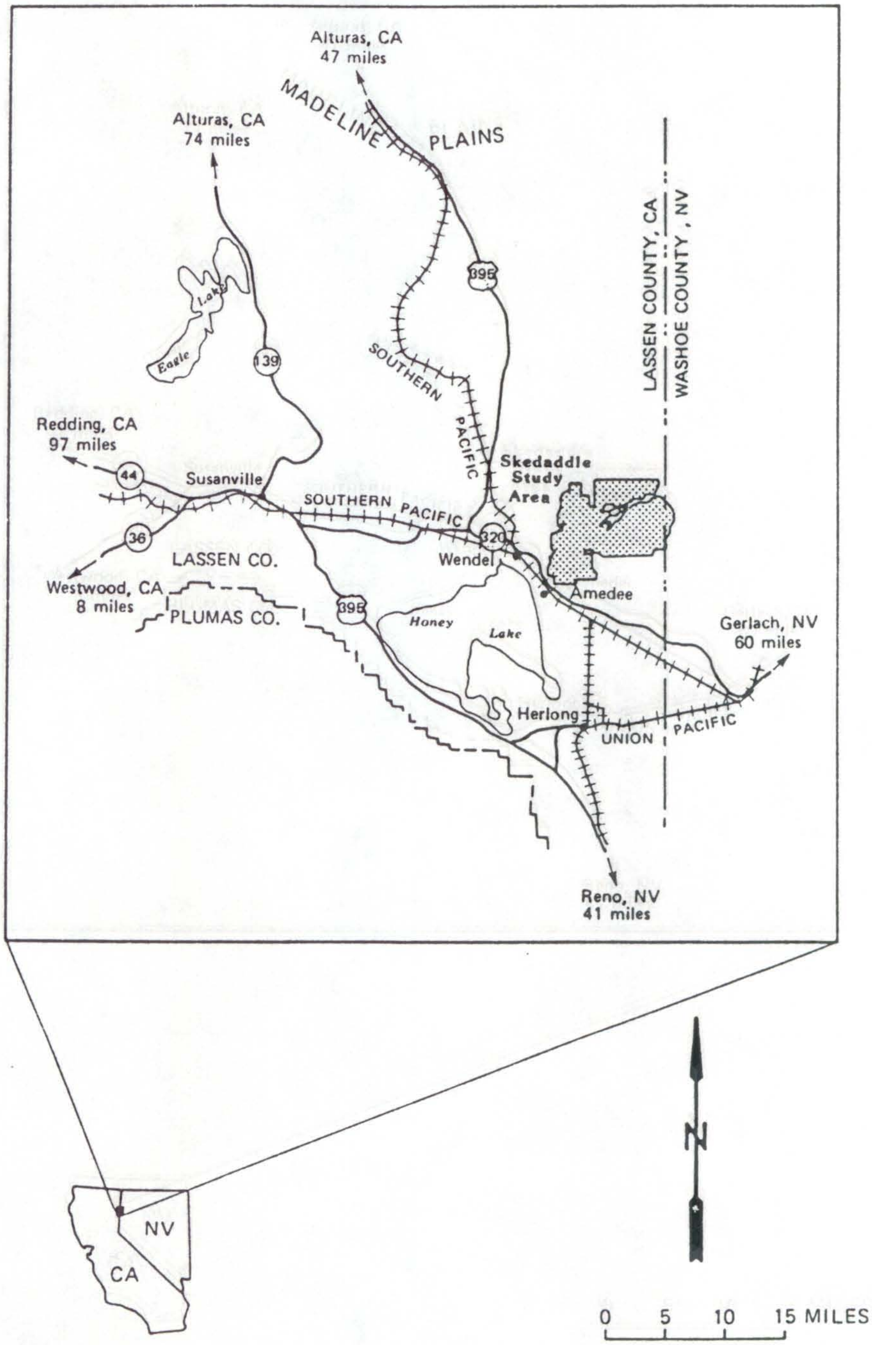

FIGURE 1.-- Location of the Skedaddle study area, California and Nevada

mining claims indicated by the prefield phase to be near or within the study area. Those found were examined, and where warranted, were mapped and sampled. Prospects outside but near the study area were also examined to determine whether mineralized zones might extend into the study area, and to establish guides to mineral deposits in the region. In addition, ground and air reconnaissance was conducted in areas of obvious rock alteration.

Two hundred and one rock, and 28 alluvial and placer samples were collected. Of these, 141 rock samples were collected at prospects and mining claims. Thirty of the remaining 60 were collected at mineralized sites, and 30 were collected as reference samples at unmineralized rock sites. Five of the 28 alluvial samples were collected on placer claims. Rock samples were collected by the following methods: chip, a regular series of rock chips taken in a continuous line across a mineralized zone or other exposure; random chip, an unsystematic series of chips taken from an exposure of apparently homogenous rock; grab, rock pieces taken unsystematically from a dump, stockpile, or of float (loose rock lying on the ground); and select, pieces of rock generally chosen from the apparently best mineralized parts of a pile or exposure, or of any particular fraction (for example, quartz, or host rock). Only chip samples were used for quantitative estimates of resource tonnage and average grade. Grab samples of alluvium, generally one or two level-full 16-in. gold pans of surfical sand and gravel were screened to minus 1/4 in. and concentrated to check for presence of gold or other heavy minerals in placers.

Rock samples were analyzed for gold and silver by fire-assay or fire-assay-ICP (inductively coupled plasma) methods. Quantitative analyses of identified or suspected elements of possible economic significance were determined by atomic absorption, colorimetric, radiometric, x-ray fluorescence, or other quantitative method. This quantitative data is listed in the appendix. At least one sample from each locality was analyzed for 40 elements 1/ by semiquantitative spectroscopy to detect unsuspected elements of possible significance. In this report (unless otherwise stated), the term "anomalous" is defined as a value of two or more times the average crustal abundance for a given element in a given rock type. Information on specific detection limits, major oxide data, spectrographic data, and analytical results for miscellaneous elements 1/ for each sample is available at the WFOC (Western Field Operations Center), Spokane, WA.

1/ Aluminum, antimony, arsenic, barium, beryllium, bismuth, boron, cadmium, calcium, chromium, cobalt, copper, gallium, gold, iron, lanthanum, lead, lithium, magnesium, manganese, molybdenum, nickel, niobium, palladium, phosphorus, potassium, platinum, scandium, silicon, silver, sodium, strontium, tantalum, tellurium, tin, titanium, vanadium, yttrium, zinc, and zirconium.

Various rock samples were examined to identify rock types, alteration suites, and mineral assemblages. Alluvial samples were further concentrated on a laboratory-size Wilfley table. Resultant heavy mineral fractions were scanned with a binocular microscope to determine heavy mineral content. When gold was detected, large particles were hand-picked and weighed; fine gold particles were recovered by amalgamation, weighed, and the two weights totaled. Concentrates were also checked for radioactivity and fluorescence.

Gamma-ray scintillometer surveys were conducted at selected locations to determine if any radioactive minerals were present. None were found.

Tuffaceous material was screened for pozzolan 2/ suitability by analyzing major oxide content for whole rock composition (ICP method) and loss on ignition (wet chemical method).

Resource definitions used in this report are based on U.S. Bureau of Mines and U.S. Geological Survey (1980) published definitions.

ACKNOWLEDGEMENTS

The USBM gratefully acknowledges the help of BLM staff members Stan Bates, Rex Cleary, Vic Dunn, Russ Elam, Frank Hilfer, Rick Morse, Bob Sherva, Larry Teter, and Rick Tscherra at the BLM district and area offices in Susanville, CA. They provided general information about logistics and property owners, which was valuable to this study.

GEOLOGIC SETTING

The Skedaddle Mountain area is in the Modoc Plateau province, a transition zone between the Cascade Range and the Basin and Range provinces. As such, the Modoc Plateau is a highland region capped by extensive late Tertiary to Quaternary basalt flows. These flows form plains with numerous volcanic shield cones that appear to overlap older basin-range structures (MacDonald and Gay, Jr., 1966, p. 46-47; Norris and Webb, 1976, p. 86). Alternatively, this plateau may be an extension of the Basin and Range province which has been filled with Cascade-like volcanism (MacDonald, 1966, p. 46) The basin-range structures are typically represented by fault-block mountains of Tertiary volcanic rock,

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2/ Pozzolan is defined as any "Siliceous material such as diatomaceous earth, opaline chert, and certain tuffs, which can be finely ground and combined with portland cement (in a proportion of 15 to 40 percent by weight)" (Bates and Jackson, 1980, p. 495) to improve economics or mechanical and chemical properties in certain applications.

with intervening basin-like grabens. These grabens commonly contain sedimentary rocks deposited in large Pliocene and Quaternary lakes that were formed by the interruption of drainage systems by faulting or volcanism. Although faults (to the east) and Cascade-type volcanism (to the west) help define the boundaries of the plateau, both boundaries are indefinite (MacDonald and Gay, Jr., 1966, p 46; Duffield and McKee, 1986, p. 142).

Lithology

The oldest known rock types in the Modoc Plateau region are a series of interbedded lava flows, pyroclastic rocks, and lake deposits forming some of the block-faulted ranges. These rocks are mainly andesites, but some are basaltic to rhyolitic in composition and range in age from late Oligocene to late Miocene (MacDonald and Gay, Jr., 1966, p. 46). Younger rocks range in age from Pliocene to Recent and are composed of volcanic and lake sediment deposits. Mid- to late-Pliocene units are composed, in part, of volcanic rocks which form small shield volcanoes between Honey Lake and the Madeline Plains. Luedke and Smith (1981, 1984) included the Skedaddle Mountains in their maps of late-Cenozoic volcanic centers. They concluded that, in general, the Skedaddle Mountain area is part of a volcanic center composed of 5 to 10 m.y. (million year) old basalt and andesite.

Lydon and others (1960) described the Skedaddle Mountain geology in more detail and defined eight geologic units; six of these units are volcanic. These eight units comprise all of the rocks exposed in the study area and include Pliocene basalt, andesite, pyroclastic rocks, and rhyolite; Pleistocene basalt and pyroclastic rocks; and Quaternary nonmarine terrace deposits and alluvium (fig. 2). In plan view, Skedaddle Mountain appears to be composed primarily of basal Pliocene basalt overlain by Pliocene andesite with a core of Pliocene pyroclastic and rhyolite units. Pleistocene basalt flows occur along the eastern edge and the north-central part of the study area. Quaternary terrace deposits occur only along the southern and southwestern border of the study area, and Quaternary alluvium is locally present in stream drainages, primarily Wendel Creek.

The Pliocene volcanics predominate in the study area. Black-to-gray flows of aphanitic to medium-grained olivine basalt with varying thickness crop out, as do andesitic basalt, pyroxene basalt, andesite, and local thin mudflows. The andesites are light to dark gray flows of varying thickness composed of medium- to coarse-grained hornblende, pyroxene, and ferromagnesian-poor rock. The pyroclastic unit varies in composition but is generally composed of basaltic and andesitic volcanic breccia, mudflows, tuff, tuff-breccia, welded-tuffs, and rhyolites (Lydon and others, 1960). The rhyolite unit is generally composed of thick flows of light gray, coarse-grained, biotite-hornblende rhyolite and dark-gray, banded, porphyritic glassy rhyolite. "Thin flows of obsidian; local accumulations of perlite and abundant fine fragments of obsidian" (Lydon and others, 1960) are also present. A perlitic rhyolite occurs near the western edge of the study area and is discussed in more detail later (see Dude Claim).

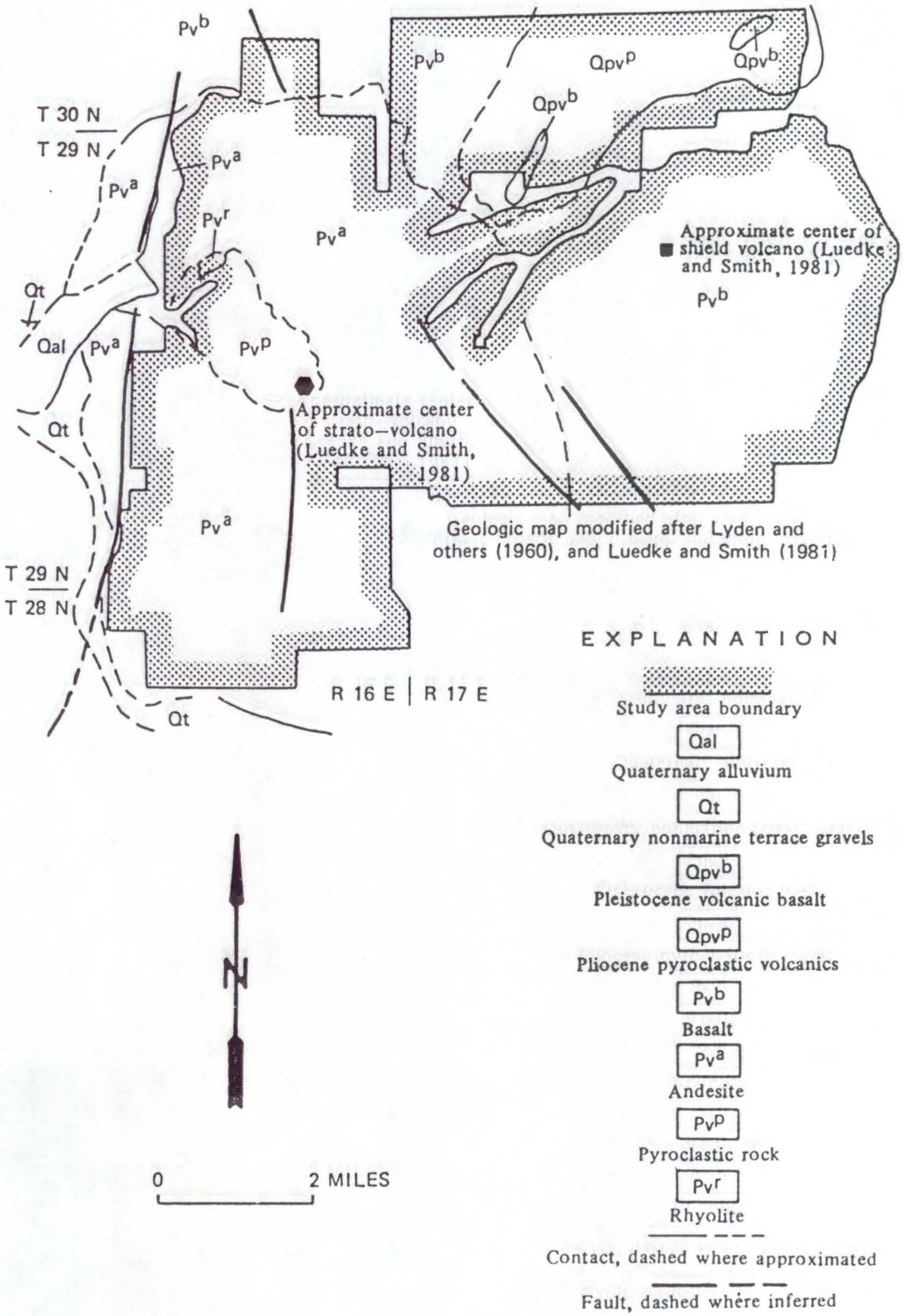

FIGURE 2–Geologic map of the Skedaddle study area, California and Nevada

The Pleistocene volcanics are basalt to rhyolite flows and pyroclastic units. Basalts are flat-lying, vesicular, black, olivine-rich flows occupying lower level or plains type areas (Lydon and others, 1960), and generally occur only on the eastern edge of the study area. These basalts also occur in isolated areas, surrounded by Pleistocene pyroclastics, in the north-central part of the study area. A Pleistocene pyroclastic unit occurs only in the north-central part of the study area and may contain "Basaltic cinders, locally agglutinated; vent tuffs; (and) poorly consolidated rhyolite pumiceous tuff" (Lydon and others, 1960).

Quaternary deposits are composed of nonmarine terrace and alluvial material. The terrace deposits occur exclusively on the southern edge of the study area, near Honey Lake. These deposits contain river terrace gravels and fan, delta, and slope-wash deposits; hot spring deposits penetrated some gravels locally. Alluvial deposits include gravel, silt and sand from creek drainages, and some slope-wash material.

Structures

The Modoc Plateau is characterized by a variety of faulting but no apparent folding (Lydon and others, 1960). In general, faults trend north to northwest and are of three types: strike-slip, dip-slip, and thrust. Most faults are normal with primarily vertical movement (MacDonald and Gay, Jr., 1966, p. 46-47). Macdonald (1966) suggests that the Modoc Plateau fault pattern is not distinctive for this area, but is related to basin-range fault patterns to the east. These patterns, and their relationship to intrusive rocks, heat flow regimes, and regional geophysics is discussed by Thompson and Burke (1974, p. 213-235).

The west face of the Amedee Mountains is formed by a fault scarp from a north-trending normal fault. This fault is one of the basin-range block forming faults. A second, shorter, north-trending normal fault cuts the center of the Amedee Mountains. Two subparallel northwest-trending faults mapped by Lydon and others, 1960 (fig. 2) appear to parallel a valley which separates the Amedee Mountains and the Skedaddle Mountains. Some faults appear radially oriented, and possibly related to the volcanic center. Drainage patterns may, in part, be affected by fault patterns.

Local faults (in this report, faults with less than 2 mi of known aerial extent) are spatially related to areas of alteration and siliceous sinter deposition, hot springs (tuffa) deposits and current hot spring activity. Both basin-range faults and local faults appear to control outcrop patterns, geothermal and hydrothermal activity, and associated mineral deposition.

Mineral Deposits

Currently known mineral commodities within the study area can be divided into two types, vein related, and bulk-tonnage. Only one bulk-tonnage deposit, the industrial mineral perlite, occurs in or near the study area and is discussed later. Vein-related occurrences contain metallic commodities. Most in and near the study area are related to the volcanic center described by Lydon and others (1960). Associated with this center are several faults, breccia zones and shear zones. All of these have acted as conduits for geothermal or hydrothermal fluids, or both, as evidenced by contained and nearby alteration and mineralization. The area of major alteration and mineral prospecting is both cut by and bounded by some radially oriented major faults. Many fault zones locally display a pinch-and-swell character, are vertical or dip steeply, are as thick as 35 ft, and are generally composed of gouge, silicified gouge, breccia or silicified breccia. Quartz veins also occur in or en-echelon to these faults. A few of the prospects also occur at or near local faults, dikes, lithologic contacts, and intrusive-like bodies.

Historically, mercury and gold have been the principal metals sought in this area; gold is of current interest. No base-metal deposits have been discovered in or near the study area.

Most veins, veinlets, and gouge zones contain oxide, sulfide, or oxidized sulfide minerals (carbonates, sulfates), a variety of gangue minerals, and several different alteration minerals. Oxide minerals and oxidized sulfide minerals are most common; sulfide minerals are somewhat rare. Most veins, veinlets, and gouge zones are oxidized at the surface. Sulfide minerals include pyrite, cinnabar, and a trace of chalcopyrite. Other minerals include malachite, secondary iron-oxide, and minor manganese-oxide. Gangue minerals include quartz, white calcite, epidote, chlorite, and sericite. The most common gangue mineral, quartz is opaque, colorless, or blue; it may be massive, saccharoidal, crystalline, or vuggy, and may contain comb structures. All other gangue minerals may occur as admixtures, pockets, cavity fillings, contact occurrences, breccia cement, or cross cutting veinlets in quartz veins. Adjacent host-rock alteration minerals include epidote, chlorite, quartz, sericite, and clay. Vein selvage zones are as thick as 12 ft on either side of most veins.

Some veins are offset by faults; some contain quartz-cemented vein breccias or breccias with silicified fragments and no cement. These features imply multiple-pulse hydrothermal activity, post depositional cataclastic deformation, or both. Veins generally trend northwest or northeast. Geologic mapping by Lydon and others (1960) implies a Pliocene or later age for ore-mineral deposition.

Gold and mercury deposits appear to be related to both the volcanic center and past hot springs activity. Some mercury deposits, especially south of the study area, may be related to Recent hot springs.

Mineralized areas are characterized by host-rock alteration. Alteration varies in aerial extent, from vein selvages to square-mile areas of clay alteration (pl. 1). Alteration minerals include epidote (disseminated and as fracture filling), chlorite, quartz, sericite, clay, and silica. These minerals comprise propylitic, argillic and phyllic alteration zones, which appear centered near the headwaters of the south fork of Wendel Canyon. At a second large area of mineralized and altered rock, tabular sinter-like material both near and north of the head of Thousand Springs Canyon is characterized primarily by silicification. Near the center of each area host-rocks are more intensely bleached, and iron-oxides become more common. Both areas contain some intermediate to felsic volcanics, which include flows, dikes, or pyroclastic units. Rocks include basalt, andesite, dacite, rhyolite, vitrophyre, tuffs, and pyroclastics.

Other commodities considered in and near the study area include basalt, pozzolan, sand and gravel, zeolites, geothermal energy, and oil and gas.

MINING HISTORY

Lassen County mining claim records indicate at least 276 lode and 29 placer claims within the Skedaddle and Amedee Mountains; about 179 lode and 12 placer claims are in the study area. In 1985, BLM records indicated four active claims within or partly within the study area. Six unrecorded claims lie at the headwaters of Thousand Springs Creek. Thus the Skedaddle and Amedee Mountains contain at least 282 lode claims, and a total of at least 311 claims. No claims have been patented. At least 80 percent of the lode claims were in areas of obvious hydrothermal alteration. None of the study area had been leased for oil and gas, but about 3 percent of the study area was under geothermal lease.

Claim location and prospecting activity peaked during the years 1906, 1920, 1941, and 1958 in and near the Skedaddle study area. During these four times, over 50 percent of all known lode and placer claims were located. The first recorded lode claims were by a Mr. McKinsey, who located the NCO no. 1 claim, and by a Mr. Stout, who located the FMO claim on February 12, 1902. Both claims were recorded as being near Amedee, exact location unknown. By 1906, 45 lode claims had been recorded, all in the Amedee Mountains or on the south slope of the Skedaddle Mountains. However, no formal mining district had been organized, and no placer claims had been filed. Almost all of the claims were for gold; a few were for mercury near Amedee Hot Springs.

Purdy (1983, p. 31) described this early mining activity in the Skedaddle and Amedee Mountains and mentioned an informal mining district:

> "During 1906-07, gold fever struck many desert regions. In the summer of 1913, a small gold rush was experienced when J. F. Swan and Frank Spoon discovered gold on Skedaddle Mountain. A majority of the population joined in on the excitement and numerous claims were staked. There were enough claims filed to prompt the naming of it as the Hot Springs Mountain Mining District. There were only a handful of hardy souls that pursued the prospecting enough to make it pay off for a short time. The gold rush died as quickly as it began."

Recorded mining activity stopped until 1920 when 105 claims were located. Five additional claims were located in 1921, and activity virtually ceased until 1941, when 76 new lode claims were located. At least four of these claims were for mercury and were about 1 mi north of Wendel. Only three claims were located between 1931 and 1941. The first nine recorded placer claims were also located during 1941, near Amedee, about 1 mi south of the study area. Between 1941 and 1958, only 21 claims were filed, 17 of which were placer claims. In 1958, 44 new lode mining claims were located. The last mining claims recorded in or near the study area were three placer claims located in 1960.

The Skedaddle Mountains and Amedee Mountains have experienced only minor exploration for nonmetallic commodities, especially perlite. One location on Wendel Creek, near the western edge of the study area, has been explored briefly for perlite.

No mineral production has been recorded from within the study area. Purdy (1983, p. 31) wrote that an unknown amount of gold may have been produced about 1913 from lode claims on the Skedaddle Mountains.

COMMODITY HIGHLIGHTS

Perlite, a volcanic glass with rhyolite composition (Bates and Jackson, 1980) and 2 to 5 percent water (Kadey, 1983, p. 997), is the only identified mineral resource within the study area. Sized grains of crushed perlite heated quickly to the temperature of incipient fusion increase in volume from 10 to 20 times (Kadey, 1983, p. 1009). These expansion properties of perlite have been known since 1886; mining and commercial use in the United States began in 1945; the United States supplies all of its own perlite (Kadey, 1983, p. 1011).

The capacity to swell into light, cellular particles makes perlite commercially valuable. Expanded perlite has a low bulk density, large surface area of its particles, low thermal conductivity, high resistance to fire, and low sound transmissivity; these characterisitics make expanded perlite a desirable industrial mineral, especially in the construction industry. It is used as concrete and plaster aggregate, as an insulator, a soil conditioner, and as a filter aid (Kadey, 1983).

Perlite specifications, and associated value, vary with desired end use. A commercially acceptable expanded perlite must have a bulk density between 2 and 20 lbs/ft^3 (Barnes, 1962, p. 182) without the production of excessive fines. Expansion characteristics, minability, size, and location of the deposit determine the value of a perlite deposit. The 1985 average value per ton of perlite was $34 FOB (free on board) mine (Meissinger, 1986, p. 114).

The industry in the United States is controlled by a few relatively large corporations that mine large deposits of uniform quality perlite (Meissinger, 1985, p. 1). In 1984, all perlite in the United States was produced from 12 operations (Benton, 1984, p. 1); 85 percent of the total production was from two large (more than 10 million tons) deposits in New Mexico.

California is one of seven other important perlite producing states. Chesterman (1966, table 37, p. 340) lists five major perlite deposits in California; one of which is along the western edge of the Modoc Plateau. MacDonald (1966) lists two deposits in the Modoc Plateau and two deposits in the Cascade Mountain Range-Modoc Plateau transition zone. One of the two deposits in the Modoc Plateau is located near Hot Springs Peak, north of Honey Lake and on the western edge of the study area.

Although several perlite market areas exist in the western United States, the nearest markets are in Oregon and California. Markets control location of expansion plants, although perlite is commonly crushed and sized at the mines which are usually open pit. "Because of its low bulk density, perlite is generally shipped in the unexpanded form to the local marketing area, and expanded at that point" (Kadey, 1983, p. 1011). According to Kadey (1983, p. 1012), the nearest expanding plant is at Portland, Oregon, although in 1983, California had eight perlite expanding plants with seven of them located in southern California.

MINES, PROSPECTS, CLAIMS, AND MINERALIZED AREAS

There are no mines or mining operations in the Skedaddle study area.

Fifty-five prospects, mineralized areas, mining claim sites, and groups of mining claims and alluvial sample sites were examined during this study (pl. 1 and tables 1, 2, and 3). The site locations in figure 3 are placed in the center of the claim, claims groups, or mineralized area. Analytical results from samples collected within each claim, claim group, or mineralized area are summarized in the sample data and resource estimate column of table 1. Alluvial sample data is given in table 2. Detailed results and exact locations for each sample are given in table A-1 and figures 3-5 and pls. 2 and 3, respectively (see Appendix).

Twenty-seven sites are inside or partly inside, and 28 are outside of the study area. Only three of the latter (pl. 1, nos. 2, 11, and 12) contain structures which may extend into the study area. At 27 of the 55 sites alluvial samples were collected from streams. These samples are described in the placer text and in tables 2 and 3. Only one site (pl. 1, no. 2) contained identified resources.

Perlite Resources

The Dude 1 through 5 claim group (pl. 1 no. 2 and fig. 3) is owned by Mr. Peter Alosi and is located in secs. 10 and 15, T. 29 N., R. 16 E., on the north fork of Wendel Creek in Wendel Canyon, straddling the western boundary of the study area. Elevations vary from 5,000 to 5,400 ft. Access is by a gravel road and a dozer trail along north fork of Wendel Creek northeast from Lassen County Road 320.

This perlite deposit is probably the one described by MacDonald (1966) and has been known for at least 45 years; the first recorded location was in 1946. Although the Dude claims have been prospected sporadically since 1946, no production has been recorded.

The perlite deposit is northwest of the apparent center of a volcanic vent (Luedke and Smith, 1981, sheet 1). Lydon and others (1960) mapped this perlite as part of a Pliocene rhyolite unit at the contact of two Pliocene units composed of andesite and intermediate-to-felsic pyroclastics, respectively. The perlite is probably a dome-like deposit, less than 0.5 mi west of a rhyolite flow-dome complex, surrounded by porphyritic andesite (fig. 3). The flow-dome complex is composed of four layers; the outer layer (up to 120 ft thick) is medium-gray, finely porphyritic flow-banded rhyolite. These domes can be significant in that ". . . production has come from flows associated with thick accumulations of tuffs and lava flows, and from domes" (Chesterman, 1966, p. 337).

Below this layer is a 20- to 70-ft-thick rhyolite layer with up to 20 percent botryoidal rhyolite inclusions. These two layers are locally separated by a pale gray to white rhyolitic appearing tuffaceous unit up to 50 ft thick. The botryoidal rhyolite and the tuffaceous unit grade downward into a medium- to dark-gray perlitic rhyolite unit (up to 100 ft thick). The perlite, as exposed in Wendel Canyon, is about 80 ft thick.

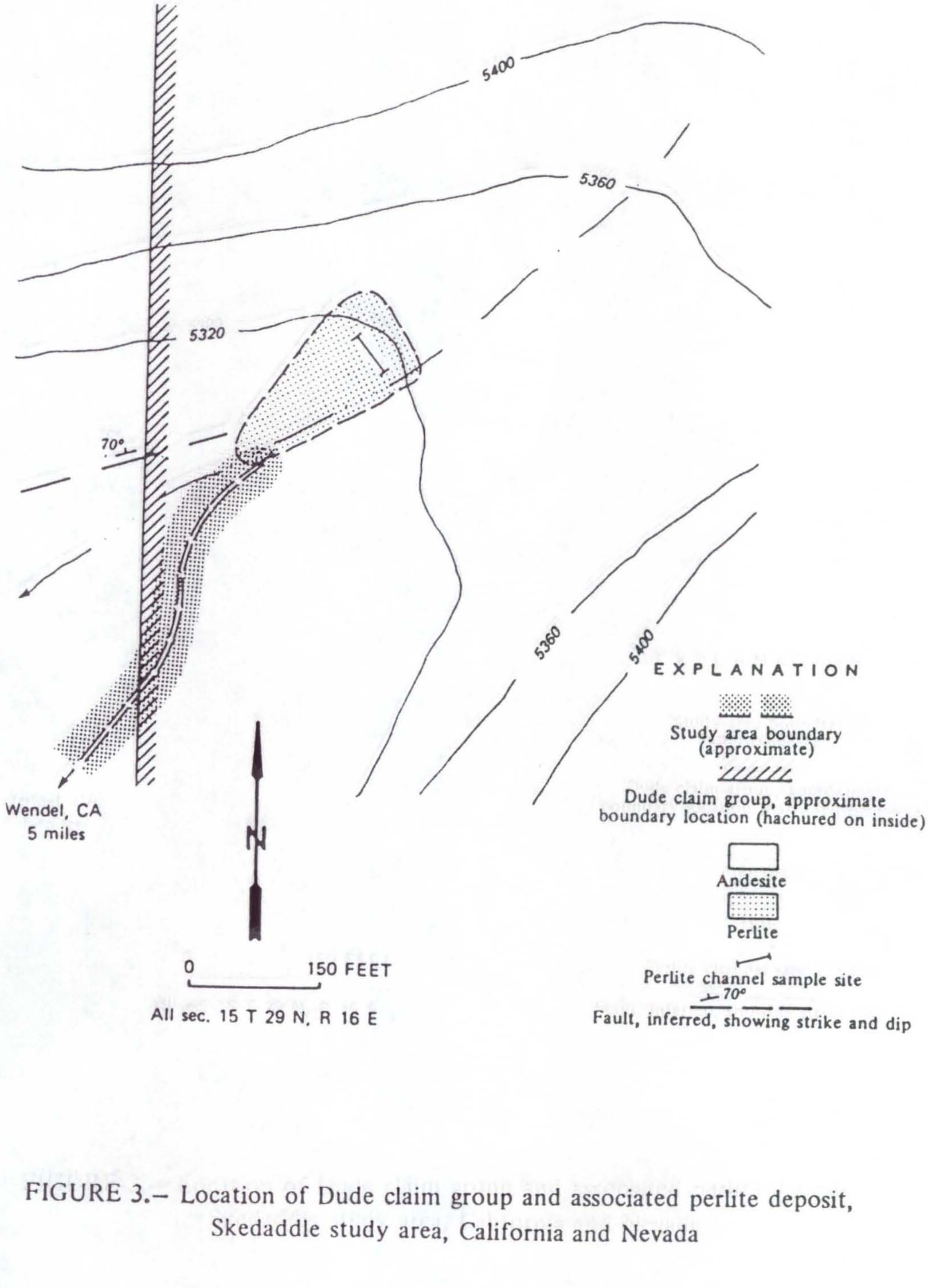

FIGURE 3.– Location of Dude claim group and associated perlite deposit, Skedaddle study area, California and Nevada

Some structural features and subsequent intrusions are also present. Several small-scale faults in the outermost layer of the flow-dome complex generally strike N. 45 W. and dip steeply to the NE. or SW. A few major en-echelon fractures are also present. The major fractures have been filled by dikes. In the eastern part of the dome two porphyritic andesite dikes (5 and 10 ft thick, respectively) intruded such fractures and cut the flow-banded rhyolite. These dikes both strike N. 45 W. and dip vertically.

Workings on the claim group are limited to one small 5-ft by 6-ft pit, 2 ft deep. The major perlite exposure is in the steep bank of Wendel Creek and has not been exposed by excavation.

A 54-ft-long (31 vertical ft) bulk channel sample (approximately 100 lb) was collected from the perlite exposure in Wendel Canyon. This sample was tested by the New Mexico Bureau of Mines and Mineral Resources with five standard tests (results in parenthesis): expanded density (4.52 lb/ft^3), percent furnace yield (95), percent sinker (0.1), compacted density (5.96 lb/ft^3), and compaction resistance (30 $lb/in.^2$ @ 1 in.). In summary, the results indicate the perlite: expanded well, gave good furnace yield, yielded an almost negligible sinker fraction, has a low compaction density value, indicating the expanding perlite will retain its bulk even after repeated handling, has average compaction resistance quality, and that this material is best suited for lightweight end uses, such as filter aid or cryogenics (James Barker and John Hingten, New Mexico Bureau of Mines and Mineral Resources, 1986, written commun.).

The owner in 1985, Mr. Alosi, has also sampled this deposit (personal commun., 1985). The samples, analyzed in 1978 by The Perlite Corporation of Chester, Pennsylvania, were considered to be of commercial-quality perlite.

The surface outcrop of this perlite is polygonal in shape and can be approximated by a triangle and a rectangle. The measured outcrop thickness is 0 to 84 ft, the width varies from 0 to 100 ft, and the length is 220 ft. For calculations of indicated resources, assume a rectangle of 80 ft by 100 ft, an adjoining triangle with a base of 100 ft and a height of 140 ft, a representative thickness of 40 ft, and a tonnage factor of 13 ft^3 per ton. This gives a total indicated resource of about 46,000 tons of perlite. To calculate inferred resources, assume three identical wedges adjoining the indicated resource. The inferred resources would be about 138,000 tons. The total indicated and inferred perlite resources are about 184,000 tons, in and adjacent to the study area.

Sites Without Identified Resources

No resources were identified at 54 sites. However, eight metallic, nonmetallic, and energy commodities occur in or near the study area and are described below.

Metallic Occurrences

Lode Occurrences and Mineralized Areas

This study examined 282 former lode claim areas in or within 1 mi of the study area. None of the claims had extensive workings. Two hundred one lode samples were collected from these claims, prospects, mineralized areas and other rock sample sites in unidentified claim areas, and were analyzed for a variety of elements (tables 1 and A-1). Lode or rock samples were primarily from areas of argillic alteration, siliceous sinter, a rhyolite flow-dome complex, and seven traverses in unaltered basalt, andesite, and dacite with quartz veins. The remaining samples were from mining claims in the Amedee Mountains and on the west border of the study area. Tuffaceous material (pl. 1, nos. 31, 32) was examined and tested for zeolite and pozzolan qualities.

Anomalous sample results described in table 1 may contain gold, silver, barium, copper and zinc. Anomalous concentrations occur sporadically but are related to areas of argillic or phyllic alteration, and siliceous sinter. Many geochemical anomalies are accompanied by color anomalies, either bleached rock-forming minerals, iron-oxide stain, or both.

Two geographic areas within the study area contain areas of anomalous metallic mineral content. These areas are the argillic alteration areas north of Spencer Basin and the siliceous sinter in Spencer Basin. Both areas are geographically related (pl. 1). The two mineralized areas exposed appear to be related by both proximity and geologic character. No mining activity has been recorded in either area. However, a few claim posts were found in both areas, and one (unreadable) claim notice was found in the Spencer Basin area (pl. 1, table 1, no. 11). Both areas were examined in detail.

Placer Occurrences

Four placer claim groups (pl. 1 and table 3) and all major streams and significant tributaries (pl. 1) were evaluated and sampled for alluvial heavy mineral content. Twenty-eight alluvial samples were collected; eight of the alluvial samples (pl. 1, table 2, nos. 34, 38, 40, 45, 46, 47, 53, and 54) contained gold; none contained other important heavy minerals such as cinnabar, ilmenite, scheelite, or zircon. Gold concentrations were all less than 0.001 troy oz gold/yd^3, except for one sample (pl. 1 and table 3, no. 1) of 0.00527 oz gold/yd^3. Gold particles were bright in color, angular to rounded but generally subrounded in shape, and 200 to 400 mesh (screen size). Samples with gold generally contained about twice as much black sand as gold-free samples. Black sand content of samples varied from a trace to 20 percent.

Gold bearing alluvial samples occur in three geographic groups. The first group is represented by two alluvial samples (pl. 1, nos. 53, 54) on the west end of the Amedee Mountains.

A second group, three alluvial samples (pl. 1, nos. 45, 46, 47) from along the south-central portion of this range, is in the Thousand Springs drainage. One sample (pl. 1, no. 47) is from a claim on the terrace gravels north of Honey Lake; a second sample (pl. 1, no. 46) is from Thousand Springs Canyon, and a third sample (pl. 1, no. 45) is from a tributary about 1 mi to the east. The last two of those samples are from creeks which drain an area of alteration which has a history of mining activity.

The third group, of five alluvial samples (pl. 1 and table 2, nos. 34, 38, and 40, and table 3, no. 1) are from tributaries which drain the upper part of Hot Springs Peak. Three of the samples (pl. 1, nos. 34, 38, 40) are from tributaries draining the northeastern slopes, and two samples (pl. 1, prospect no. 1; table 3, no. 1) are from a tributary draining the northwestern slope.

The gold-bearing samples were mainly from streams and creeks which drain areas of past mining and prospecting activity and indicate the existence of gold in these areas.

Nonmetallic Occurrences

Basalts

Pliocene basalts comprise much of the eastern half of the study area (fig. 2). Locally, these basalts form thin (4 to 10 in. thick) layers along parting planes. In some instances, these thin layers also display vesicular surfaces. Both features are desirable for decorative stone, and occur together in basalt flows of the Petes Creek area. However, vesicle content is generally low, and high-vesicle-content areas occur sporadically.

Hart, and others (1984) evaluated a group of basalt occurrences in the northwestern United States for alumina content. None of the basalts in this study area have a high alumina content (greater than 16 percent). High alumina basalts have a variety of uses including a possible source of alumina ore.

Pozzolan

MacDonald and Gay, Jr., (1966, p. 103) described several occurrences of pozzolan in Lassen Co., and Gay (1966, p. 103) concludes that "Other occurrences of vitric tuffs and siliceous volcanic sediments scattered through the region may also be suitable for use as pozzolan should a market develop." Several tuffaceous units are exposed along the eastern edge of the study area. These units are generally light-gray to buff or cream-white in color, contain from 1 to 25 percent pumiceous clasts up to 3 in. across, and are generally less than 20 ft thick. Exposures are capped by one or more flows of basalt from 10 to 45 ft thick. Two representative samples were collected (pl. 1, nos. 31, 32) and analyzed for major-oxide content. Neither sample met minimum physical test specifications [ASTM Standard C 618 (American Society for Testing and Materials, 1985) for Class N pozzolan].

To be considered suitable, samples must contain 70 percent combined Al_2O_3, Fe_2O_3, SiO_2 (aluminum, iron and silicon oxides, respectively) to meet ASTM standards. Maximum specification for total available alkalies as Na_2O (sodium oxide) combined is 1.5 percent. The percentage of SO_3 (sulfate), moisture, and loss on ignition were compared to ASTM standard maximums of 4 percent, 3 percent, and 10 percent, respectively.

Sand and Gravel

Lacustrian and alluvial sand and gravel deposits occur in or near the study area. Alluvial sand and gravel occur along some of the major drainages in the study area and along the southern edge of the study area. The largest occurrence of stream gravels is just west of the SA, in Wendel Canyon. A smaller occurrence of sand and gravel occurs along the lower portion of Spencer creek, in the east-central portion of the study area. Major deposits of sand and gravel occur outside and adjacent to the southwest corner of the study area in Quaternary lake terraces associated with Honey Lake and Ancient Lake Lahontan. Sand and gravel in both deposit types ranges from sand to boulder size with generally less than 5 percent boulders and up to 50 percent sand locally. An unknown amount of sand and gravel has been produced from several gravel pits 1 to 2 mi south of the study area.

Zeolites

Zeolites are hydrous aluminosilicates that are analogous in composition to feldspars (Bates and Jackson, 1980, p. 710) and may form from one of several types of rocks, including tuffs. Tuffs are exposed along the eastern edge of the study area (pl. 1, nos. 31, 32). Several samples (pl. 1, nos. 31 and 32) were collected from representative exposures of these beds and tested for zeolite content using a chemical field test (Helfferich, 1964) and by x-ray diffraction. None of the samples produced a positive result.

Hot Springs and Geothermal Energy

A large number of hot springs occur throughout the Modoc Plateau region (Norris and Webb, 1976, p. 89) and are "related to the recency of volcanic eruptive activity and the abundance of faulting" (Gay, 1966, p. 101). Southwest and west of the study area, several hot springs form the Amedee and the Wendel groups of hot springs (also known as the Lower Hot Springs and the Upper Hot Springs, respectively; Purdy, 1983, p. 1). According to Majmundar (1983, map) this area is ". . . known or inferred to be underlain at shallow depth (less than 1,000 m) by thermal water of sufficient temperature for direct heat applications."

The Wendel and the Amedee hot springs have been known and used by local residents since 1863 (Purdy, 1983, p. 1). The primary historic use was for medical purposes. These springs are now part of an approximately 11,000 acres designated as a KGRA (Known Geothermal Resource Area) (pl. 3) by the USGS in 1970 (Lassen County, 1983, p. 67). Current uses include power generation and space heating.

The springs vary in character and size. These hot springs generally occur in groups of 2 to 10 and may be placid, ebullient, or geyser-like. Pool sizes range up to 25 ft in diameter, and Bureau of Mines measured surface water temperatures up to 90 ^{o}C.

Hot springs occur in terrace gravels near Honey Lake, within 2 mi of the study area. However, dry tufa cones east of Wendel indicate sites of former hot spring activity closer to the study area. North of Lassen County Road, about 1 mi northeast of Amedee hot springs, andesite outcrops are sporadically coated and encapsulated by tufa from former hot spring activity. Somewhat older hot spring deposits (which include siliceous sinter) occur in the Amedee Mountains near the head of Thousand Springs Canyon. In general, hot spring activity has moved south, away from the Amedee Mountain Range, through time.

In the early 1960's, several exploration companies began geothermal exploration of the Amedee and the Wendel hot springs area. During 1962, ". . . Magma Power Co. drilled a shallow geothermal well in the Wendel Area and another in the Amedee Area" (Lassen County, 1983, p. 67). In 1983, six geothermal wells were drilled. During 1984, ". . . two wells were drilled to depths of 6,000 and 4,012 feet" (Parmentier, 1985, p. 7). One well was drilled by GEO Products; the other well was drilled by Honey Lake Exploration. According to Zeisloft and others (1984, p. 25), at least 14 wells have been drilled in the Wendel-Amedee KGRA. "Thirty greenhouses at Wendel Hot Springs are using geothermal heat for space heating to grow tomatoes and cucumbers. The operation may eventually expand to 200 greenhouses" (Majmundar, 1983). These greenhouses were in full operation in 1985. Nearby a 2-megawatt geothermal power generation plant was under construction in 1985. According to Parmentier (1985, p. 7), "Construction also started for an innovative hybrid waste-wood and geothermal power plant of 18.7 MW in Honey Lake in northern California."

Oil and Gas

According to 1985 BLM records, no oil and gas leases have been issued in the study area. The nearest lease is in sec. 24, T. 28 N., R. 17 E., approximately 3.5 mi south of the study area. Six wells were drilled south of the study area between 1980 and 1984 (Alldredge and Meigs, 1984). According to Warner (1980, p. 340), less than 5 percent of the test wells drilled in northeastern California had "petroleum shows."

APPRAISAL OF MINERAL RESOURCES

A nonmetallic resource, perlite, was identified in the study area; no metallic mineral resources were identified. However, the study disclosed two areas, one in the Spencer Basin-Thousand Springs Canyon area and the other near the headwaters of the south fork of Wendel Canyon, which have characteristics similar to those of some large-tonnage, low-grade, precious-metal deposits.

Areas With Resources

Dude Claims

A subeconomic resource of perlite totaling about 184,000 tons in and adjacent to the study area is identified. Assuming a 225 ton per day production for 250 days a year and a recovery rate of 65 percent during open-pit mining, the mine would have an expected life of almost five years. A preliminary cost evaluation of the deposit, using the Benjamin and Gale (1984) method and based on January 1986 prices, indicated a total capital and operating cost of $42.46 per ton. The average price for perlite in 1985 was $34.00 (Meissinger, 1986). If resources were increased through additional exploration, or a nearby market evolved, this deposit may become economic.

Occurrences Without Resources

Metallics

Lode Occurrences

No metallic resources were identified in the study area.

Twenty of the claims and claim groups in or immediately adjacent to the study area were located for gold or mercury. These prospects generally form a large cluster in the west-central part of the study area in the eastern half of sec. 23 and the south half of sec. 24, T. 29 N., R. 16 E. This is an area associated with volcanic, intrusive, and hydrothermal activity. Another mineralized area (pl. 1, nos. 11, 12) of significance contained siliceous sinter. The area is dumbbell shaped. The southern lobe is near the head of Thousand Springs Canyon (pl. 3), and the northern lobe is in the southern part of Spencer Basin to the north (pl. 2). At least 2 mi of siliceous sinter outcrop is exposed.

There is no currently known major mineral exploration occurring in the study area. None of the prospects, claims, or mineralized areas in the study area contain exposed rock with tonnage or grade sufficient to support vein type mining operations at current metal prices. Small amounts of gold in alluvial samples indicate the presence of gold-bearing lithologies upstream from the sample sites. These rocks have characteristics similar to large-tonnage, low-grade, precious-metal deposits. Only some of these areas contain lode mining claim locations.

As shown in the appendix (table A-1), 25 of the 201 rock samples assayed contained detectable gold. The maximum concentration was 0.065 ppm, far below current minimum economic cutoff grades of about 0.4 ppm at operating mines. Although the concentrations do not indicate the presence of gold resources, resources may exist, and further work will be needed to fully evaluate the area. Silver was detected in 15 samples, the maximum concentration being 9.3 ppm, also below current economic cutoff grade, except as a byproduct. Assays for the base metals lead, zinc, copper, and molybdenum reached a maximum of 0.007 percent, 0.019 percent, 0.025 percent, and 0.014 percent, respectively, also far below current economic cutoff grades. Barium concentrations with a maximum of 0.25 percent are of interest only as an indicator of accessory minerals. Arsenic, antimony, molybdenum, and tungsten concentrations, although uneconomic, can be useful indicators of precious metal deposits.

Placer Claims and Alluvial Samples

Several conclusions may be drawn from placer sample data. Forty percent of the stream samples contain recoverable gold (pl. 1, nos. 1, 34, 38, 40, 45, 46, 47, 53, 54) with values as high as $1.59/yd^3. The size, shape, and color of gold particles (as described on page 21) indicate they may have originated as fine particles and traveled only a moderate distance.

None of the placer claims (pl. 1, nos. 1, 13, 15, 16) contained sufficient quantities of gold to warrant large-scale commercial placer gold mining, and none constitute identified resources.

Geographic areas of lode prospects (figs. 3-5, pls. 1-3), propylitic to silicic alteration, geochemical anomalies (especially gold), color anomalies, and the volcanic center are spatially related. This may imply a mutual temporal or genetic relationship.

Nonmetallic Occurrences

Significant nonmetallic commodities, besides perlite, in the study area include building stone and construction stone. A small area in the SE. 1/4, NW. 1/4, Sec. 26, T. 31 N., R. 13 E., near Petes Creek, contains flaggy basalt composed of 4- to 6-in.-thick slabs useful for ornamental building stone. Limited access and local market conditions will restrict mining of this commodity. Much of the study area is covered by basalt or andesite suitable for commercial construction needs. However, other sources of construction stone are currently available closer to local markets. Therefore, these occurrences will probably not be considered resources in the near future. Basalts in the study area are not high alumina basalts. Thus they are not suitable for any uses requiring high alumina content, including possible future aluminum ore. Tuffaceous material on the east border of the study area (pl. 1, nos. 31, 32) was tested for zeolite and pozzolan qualities. Samples contained no detectable zeolites, and the material was unsuitable for pozzolan. Hot springs occur within 2 mi of the study area. Geologic evidence indicates the southwest corner of the study area is a permissible geologic environment for geothermal activity and hydrothermal metal deposition, especially precious metals.

RECOMMENDATIONS FOR FURTHER WORK

The Skedaddle study area contains three areas which warrant further study; all are in or along the boundary of the study area.

1. Perlite is in a group of rhyolite and rhyolitic units in Wendel Canyon. These units may, in part, be dome or flow-dome units or complexes. The perlite and surrounding area need to be investigated with detailed mapping and sampling, geophysical studies, and possibly drilling to determine tonnage and grade with greater certainty and to look for additional resources.

2. Near the headwaters of the south fork of Wendel Canyon is an area of about 1 mi^2 which contains pervasive argillization, bleaching, extensive limonite coloration, quartz veins and veinlets, felsic dikes, some sulfides, geochemical anomalies, and minor amounts of gold. These characterestics are typical of some bulk-tonnage, low-grade, precious-metal deposits. This area should be examined in greater detail for precious metals, especially gold, in either vein or bulk-tonnage deposits. Work should include detailed geologic mapping, sampling, IP, magnetometer and EM16 geophysical surveys, followed by drilling if appropriate.

3. A 2-mi-long area of siliceous-sinter outcrops occurs near the head of Thousand Springs Canyon, and along the southern edge of Spencer Basin to the north. This area contains an apparently extensive bed of sinter which has been bleached, contains limonite, and has locally anomalous trace elements. Additional work is needed to determine the significance, extent, and character of this occurrence as a possible indicator of disseminated precious metal deposits. Detailed work should include geologic mapping, sampling, geophysical studies (IP, restivity, EM16, and magnetometer) followed by drilling if appropriate.

TABLE 1.--Prospects, mineralized areas, and mining claims and other rock sample sites in and adjacent to the Skedaddle study area, California and Nevada

[Asterisk (*) indicates wholly or partly outside study area; only significant sample data given here. See Appendix for complete sample data

(%, percent; <, less than; ppm, parts per million)

Map. no. (fig. 2)	Name	Summary	Workings	Sample data and resource estimate
3	Big Indian group	Basalt and andesite outcrops are propylitically altered. Locally, these volcanics are altered to clay with minor (<10%) sericite. These rocks are weakly fractured and display traces of iron-oxide.	No workings.	Three random chip samples contained no detectable gold or silver. Barium values ranged from 0.043 to 0.077%.
4	Silver Springs group	Aphanitic andesite outcrops show chlorite and epidote alteration, and are cut by occasional epidote-filled fractures. Occasionally, near major fractures, the andesite is bleached to a cream white color, and altered to clay with minor sericite and some silicification. These bleached areas also contain a trace of pyrite and minor limonite. Major fractures trend N. 10° W. and dip 45° SW.	No workings.	One random chip and one grab sample. No gold or silver was detected.
5	Golden Leaf group	Host rocks include minor basalt, andesite, vitrophyre, some pyroclastics and minor sinter. The vitrophyre displays flow banding with a N. 58°W. strike and vertical dip. Clasts in the pyroclastic unit range up to 10 in. in diameter and are well rounded. A 3-ft-thick basalt dike cuts the andesite, strikes N. 65° W. and dips vertically. Opaque white quartz veinlets (<1 in. thick) cut the sinter and contain limonite after pyrite. No other quartz veins were found. Alteration type and intensity varies with location, and ranges from propylitic to argillic or advanced argillic type. Alteration minerals include chlorite after biotite, epidote after hornblende, sericite after biotite or feldspars, clay and quartz after feldspars, clay alteration of matrix minerals, and silica flooding. Quartz in zones of silica flooding may be opaque to translucent and white to blue. Fracture density increases near and in areas of silicification.	One small (2-ft-deep) pit.	Nine random chip, six chip and one grab sample were collected. No gold or silver was detected. Barium content ranged from 0.02% to 0.15%.

TABLE 1.--Prospects, mineralized areas, and mining claims and other rock sample sites in and adjacent to the Skedaddle study area, California and Nevada--Continued

Map. no. (fig. 2)	Name	Summary	Workings	Sample data and resource estimate
6	Snowstorm group	Host rocks consist primarily of finely porphyritic andesite with minor pyroclastic flows and crystal lithic tuff. Three dikes cut these units. The dikes include a 10-ft-thick dacite dike which trends N. 20° W. and dips 50° SW.; a 15-ft-thick andesite dike which trends N. 70° E. and dips 80° NW., and an 18-ft-thick basalt dike which trends east west and dips 15° S. The dacite and basalt dike are unaltered; the andesite dike has some clay and chlorite alteration. The host rocks show propylitic to phyllic alteration. Alteration minerals include some epidote, and chlorite, clay, sericite, and silicification. In several locations silicification is pervasive and may contain rounded quartz phenocrysts up to 3 mm (millimeters) in diameter. Silicification generally increases near fractures. Schorl tourmaline occurs locally in silicified zones. Many host rocks are bleached. Sulfides include pyrite (up to 8%), a trace of chalcopyrite, and a trace of cinnabar. Limonite after pyrite occurs in fractures in the silicified host. Andesite contains veinlets (up to 0.5 in. thick) of clear to opaque white quartz. Fractures generally trend N. 78° W. and dip 70° to 86° NE.	Three pits as much as 4 ft deep and one 12-ft-long trench.	Eleven chip and seven grab samples were collected. None contained gold and only one (a grab sample) contained silver (0.031 ppm). Barium concentrations range from 0.078% to 0.18%. One sample (chip) contained anomalous zinc (100 ppm).
7	Who-Who group	Veinlets of clear white to blue quartz, and a 6-ft-thick silicified breccia zone cut andesite. The breccia zone has angular clasts up to 2 in. in diameter, in an aphanitic matrix trends N. 30° E. and dips vertically. Some andesite is altered to clay with sericite. Large areas of andesite are pervasively silicified with some sericite; these areas are intensely bleached. Sulfide minerals occur in the silicified areas and include trace amounts of pyrite and cinnabar.	Three trenches, 15 ft, 30 ft, and 40 ft long, respectively. One 5-ft-deep pit.	Eight chip and six grab samples. No silver was detected and only one sample (a chip) contained gold (0.044 ppm). Barium concentrations ranged from 0.04% to 0.18%. One chip sample contained 78 ppm molybdenum and one grab sample contained 150 ppm copper.

TABLE 1.--Prospects, mineralized areas, and mining claims and other rock sample sites in and adjacent to the Skedaddle study area, California and Nevada--Continued

Map. no. (fig. 2)	Name	Summary	Workings	Sample data and resource estimate
8	Southern Star group	A 30-ft-thick silicified vein-like structure cuts porphyritic andesite, strikes N. 20° W., and dips 66° NE. Veinlets of gray opaque chalcedony and buff-colored opalite cut andesite with a N. 54° E. trend and dip 80° SE. Three dikes also cut the andesite dike (strikes N. 10° W. with vertical dip), an 8-ft-thick basalt dike (with a N. 60 W. strike and vertical dip) and a 1-ft-thick pebble dike (strikes N. 20° W. with a 75° SW. dip). Alteration varies from epidote and chlorite through clay + sericite with local silicification to total silicification. Schorl tourmaline is also present in trace amounts. Sulfide minerals include as much as 2% cubic pyrite (locally altered to limonite) and trace amounts of cinnabar.	Three pits (less than 7 ft deep), two trenches (20-ft- and 40-ft-long, respectively) and one 10-ft-deep cut.	Fourteen chip samples and three grab samples were collected. No gold or silver was detected. Barium concentrations ranged from 0.01% to 0.12%. One sample (a 2.5-ft chip sample) contained 200 ppm copper.
9	Friends group	Host rocks include basalt, andesite, pyroclastics, and vitrophyre. The andesite is locally brecciated; this breccia is altered to clay and minor sericite with some silicification and is bleached to a cream white. Some breccia clasts contain clear blue quartz veinlets. Other alteration ranges from epidote to silicification with some clay and sericite. One pit exposes silicified andesite cut by clear white quartz veinlets. The only visible sulfide is pyrite; some limonite is present, especially near pyrite.	Two pits (each 4 ft deep) and one 10-ft-long trench.	Four chip, one random chip and one grab sample were collected. None contained detectable gold or silver and only two (chip samples) contained anomalous barium (0.019% each).
10	Luilla Queen group	Host rock lithologies include andesite, rhyolite, dacite, and vitrophyre. The andesite is aphanitic to finely porphyritic and is cut by a black vitrophyre dike 50 ft thick which strikes N. 5° E. and dips 85° SE. The dacite displays flow bands tending NS. and dipping 35° E. The andesite and vitrophyre are bleached locally and display propylitic to phyllic alteration. Alteration minerals include epidote, clay sericite, and silica as silica flooding. The rhyolite is locally altered to clay and epidote with rare silicification; the dacite is relatively unaltered. Pyrite is the only visible sulfide and is often altered to limonite. Float of vein quartz is banded with bands of translucent blue quartz, clear quartz, opaque white comb quartz, and occasionally chalcedony.	One 3-ft-deep pit.	Ten samples were collected; these included five chip and five grab samples. No gold or silver was detected. Barium content ranged from 0.075% to 0.25%.

TABLE 1.--Prospects, mineralized areas, and mining claims and other rock sample sites in and adjacent to the Skedaddle study area, California and Nevada--Continued

Map. no. (fig. 2)	Name	Summary	Workings	Sample data and resource estimate
11*	Ace Chief group	An aerially extensive 30- to 100-ft-thich siliceous opaline breccia zone is interbedded with flows of basalt and andesite. Surrounding host rocks show epidote and chlorite alteration. The breccia zone is strongly bleached with minor amounts of limonite and iron oxide. Breccia clasts are silicified and occasionally show multiple tectonic events.	No workings	Twenty-four chip and three grab samples. Three chip samples contained 0.38 to 8.1 ppm silver; five chip samples contained 0.017 to 0.38 ppm gold. Barium concentrations ranged from 0.02% to 0.18%. Two chip samples contained 2.4 and 7.6 ppm tin, respectively. Fluorine concentrations for one grab and five chip samples ranged from 0.039% to 0.33%.
12*	Unknown	Extensive area of tabular opal and silica deposits interbedded with intertonguing basalt and andesite flows. The opal/silica unit, as much as 75 ft thick, appears to be horizontally bedded, and locally contains silicified rhyolite breccia. Silica flooding and silica cementation of breccia is the dominant alteration. Iron oxides stain the rocks near fractures. Some rocks within the unit appear bleached. However, beds both above and below show only epidote and chlorite alteration. The opal/silica unit thins to the south and intertongues with an andesite tuff breccia.	No workings.	Ten chip and two grab samples. No silver was detected. Two chip samples contained 0.063 and 0.131 ppm gold, respectively. Fluorine concentrations ranged from 0.039% to 0.30% and barium concentrations ranged from 46 ppm to 0.19%. One chip sample contained 0.12 ppm beryllium.
14*	Skedaddle claim	Porphyritic platy andesite is locally encrusted by tuffa. Neither display visible alteration.	No workings.	One 2-ft chip sample of tuffa contained 0.017 ppm gold, no detectable silver, 0.07% barium, and 10 ppm tin.
17*	Hot Rock group	Host rock includes andesite and pyroclastic flows. The andesite is occasionally porphyritic, and massive to flow banded. Flow bands form plates 0.25 in. to 2 in. thick, which strike N. 55° E. and dips 45° W. Some exposures are draped with layers of tuffa.	No workings.	Six chip samples were collected; no gold was detected; one sample had detectable silver (9.3 ppm) and barium concentrations ranged from 0.077% to 0.11%.
18	Hillside claim	Porphyritic andesite flows over a bedded pyroclastics unit. Andesite contains fractures up to 3 in. thick filled with tuffa. Near these fractures andesite is bleached to a light gray with clay and chlorite alteration. Silicification is also present locally.	No workings.	One random chip sample of andesite contained no detectable gold or silver, and 0.11% barium.
19	Lava Cave claim	Small exposure of unaltered porphyritic biotite andesite.	No workings.	One 4-ft-chip sample contained no detectable gold or silver.
20	Lost Cave group	Cliff face composed of multiple flows of porphyritic unaltered andesite.	No workings.	One 3.2-ft chip sample contained no detectable gold or silver.

TABLE 1.--Prospects, mineralized areas, and mining claims and other rock sample sites in and adjacent to the Skedaddle study area, California and Nevada--Continued

Map. no. (fig. 2)	Name	Summary	Workings	Sample data and resource estimate
21	Divide group	Vesicular porphyritic andesite with minor epiclastic basal breccia. Some outcrops are encrusted with tuffa, and occassionally show some silicification and chloritization.	No workings.	Three random chip samples contained no detectable gold or silver and barium concentrations ranged from 0.10% to 0.12%.
22	Shamrock	Host rock includes porphyritic vesicular andesite and laharic pyroclastics. Andesite is occassionally altered to chlorite and epidote with minor limonite. The pyroclastics are altered to clay (50%-60%) and sericite (25%-35%) with some silicification (25%-50%). Opaque white vein quartz float occurs nearby.	No workings.	Three random chip samples contained no detectable gold or silver.
23	Unknown	Rhyolite flow dome complex.	No workings	Nineteen samples. No anomalous concentrations.
24	Unknown	Traverse of about 2 mi bearing north in unaltered porphyritic andesite.	No workings.	Three samples. No anomalous concentrations (see appendix nos. 1, 2, and 3).
25	Unknown	Traverse of about 3 mi bearing north in unaltered platy andesite, vesicular basalt, and some dacite with quartz veins.	No workings.	Four samples. No anomalous concentrations (see appendix nos. 4, 5, 6, and 7).
26	Unknown	Traverse of about 5 mi bearing N. 50° E. in unaltered basalt and some unaltered tuff.	No workings.	Five samples. No anomalous concentrations (see appendix nos. 8, 9, 10, 11 and 25).
27	Unknown	Traverse of about 5 mi bearing N. 58° E. in unaltered vesicular basalt and some unaltered andesite.	No. workings.	Six samples. No anomalous concentrations (see appendix nos. 12, 15, 16, 17 and 18).
28	Unknown	Traverse of about 5 mi bearing N. 70° E. in unaltered vesicular basalt and some unaltered platy andesite.	No workings.	Four samples. No anomalous concentrations (see appendix sample no. 13, 14, 19, and 21).
29*	Unknown	Traverse of about 1 mi bearing east adjacent to the south boundary of the study area. Chalcedonic float with pyrite.	No workings.	Three samples. No anomalous concentrations (see appendix sample nos. 26, 27, and 28).
30*	Unknown	Traverse of about 5 mi bearing north adjacent to the west side of the study area. Tuffa mound, porphyritic andesite, and siliceous sinter.	No workings.	Three samples. No anomalous concentrations (see appendix nos. 36, 39 and 40).
31*	Unknown	Light gray to buff or cream white tuffaceous unit generally less than 20 ft thick containing from 1% to 25% pumiceous clasts up to 0.2 ft in diameter. Exposure capped by one or more basal flows from 10 to 45 ft thick.	No workings.	One sample. Unsuitable for pozzolan. No zeolites in analysis.
32	Unknown	Same as number 31.	No workings.	Same as number 31.

TABLE 2.--Alluvial sample data collected in and adjacent to the Skedaddle study area, California and Nevada (figure 3)

Asterisk (*) indicates wholly or partly outside study area.

[%, percent; N, not detected; >, greater than; <, less than]

Sample no.	Volume (cu yd)	Description	Gold content (oz per cu yd)1/	Gold content ($ per cu yd)2/
33*	0.008	Dry creek bed in basalt flows; very little gravel----------------------	N	$0.00
34*	do--	Dry creek bed with andesite and basalt gravel; 70% bolders, 30% sand and pebbles------------------	0.00082	.25
35*	do--	Dry creek bed with very little gravel. Existing gravel composed of boulders and cobbles of basalt-------------	N	.00
36*	do--	Dry creek bed with subangular basalt and andesite gravel with 60-70% boulders and cobbles, and 30-40% sand------------------------------	N	.00
37*	do--	Dry creek bed with subangular, massive basalt gravel of boulders and cobbles (60-70%, and sand (30-40%)---------	N	.00
38*	do--	Active stream bed with clay rich sediment, gravel comprises <50% of bed load--------------------------	.00016	.05
39	do--	Dry creek bed with little gravel or sand. Gravel is composed of massive to vesicular basalt (with desert varnish), dacite and jasper.	N	.00
40	do--	Dry narrow creek bed in basalt gravel composed of boulders of vesicular basalt (60%) and sand and pebbles (40%)-----------------	.00014	.04
41*	do--	Dry creek bed in basalt; gravel contains 5-10% cobbles and 90-95% sand----------------------------------	N	.00
42*	do--	Dry creek bed in basalt. Gravel composed of boulders (80%) and sand (20%)------------------------------	N	.00

TABLE 2.--Alluvial sample data collected in and adjacent to the Skedaddle study area, California and Nevada (figure 3)--Continued

Sample no.	Volume (cu yd)	Description	Gold content (oz per cu yd)1/	Gold content ($ per cu yd)2/
43*	0.008	Dry creek bed with subangular cobbles (80%) of basalt, and sand (20%)----	N	$0.00
44*	do--	Dry creek bed with gravel composed primarily of andesite with minor pyroclastics; about 5% >0.25 in.---	N	.00
45*	do--	Dry creek bed with gravel of andesite; about 10% >1/4 in.-------	0.00011	.03
46*	do--	Dry creek bed. Gravel is 90% andesite, about 9% pyroclastics and 1% miscellaneous rocks including quartz, chalcedony, opalite and calcite----------------------------	.00018	.05
47*	do--	Alluvial fan and bar complex with nearby outcrops of siliceous sinter. Gravel is composed of andesite; about 10% >1/4 in.-----------------	.00013	.04
48*	do--	Terrace gravels up to 40 ft thick composed of cobbles (10-20%), pebbles (20-30%) and sand (50-70%) of basalt and andesite-------------	N	.00
49*	do--	Dry creek bed. Gravel composed of porphyritic andesite; about 30% >1/4 in.--------------------------	N	.00
50	do--	Alluvium and eluvial material between ridges composed of andesite and sinter------------------------	N	.00
51	do--	Dry creek bed in pyroclastics. Andesite gravel is boulders and cobbles; about 30% >1/4 in.--------	N	.00
52	do--	Dry creek bed in andesite. Very little sand; boulders and cobbles (50-70%) dominant------------------	N	.00
53*	do--	Sample of terrace gravel. Gravels are generally rounded, composed of andesite and basalt, and contain <10% gravel >1/4 in. in diameter---	.00016	.05

TABLE 2.--Alluvial sample data collected in and adjacent to the Skedaddle study area, California and Nevada (figure 3)--Continued

Sample no.	Volume (cu yd)	Description	Gold content (oz per cu yd)1/	Gold content ($ per cu yd)2/
54*	0.008	Active stream with dacite and rhyolite gravel up to boulder size. Sizes include boulders (10%), cobbles (50%) and sand and gravel (40%)------------------------------	0.00012	0.04
55*	do--	Dry creek bed contains rhyolite, perlite, and vesicular basalt; most gravel is pebble size with <20% >1/4 in.---------------------------	N	.00

1/ oz per cu yd; troy ounces per cubic yard.
2/ Dollars per cubic yard calculated assuming a gold price of $300.00 per troy oz.

TABLE 3.--Sample data from placer prospects in and near the Skeddale study area, California and Nevada (figure 3) 1/

Asterisk (*) indicates wholly or partly outside study area.

[N - not detected; >, greater than]

Map no. (fig. 3)	Prospect name	Description	Gold content (oz per cu yd) 3/	Gold content ($ per cu yd) 2/
1	Wendle group	Four unpatented claims. Two samples collected from dry creek beds. Less than 100 cu yd of gravel is exposed in this drainage-------------	0.00527 .00063	$1.59 .18
*13	Pomroy	One unpatented claim. One sample of terrace gravels with 40% >0.25 in. diameter. Exposed gravel at least 40 ft thick---------------------	N	N
*15	Square Peak	Two unpatented claims. One sample of terrace gravels with 35% >0.25 in. diameter material---------------------	N	N
*16	Black Diamond	Three unpatented claims. One sample was collected from a dry creek bed. Sample consists of both alluvial and eluvial material; 20% >0.25 in. diameter------------	N	N

1/ None of the claims have recorded production or identifiable reserves or resources.
2/ Assuming gold price of $300 per oz.
3/ oz per cu yd; troy ounces per cubic yard

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APPENDIX A

TABLE A-1.--Sample data for lode samples from the Skedaddle study area, California and Nevada

[ppm, parts per million; --, not analyzed; <, less than shown; %, percent, used where appropriate]

Sample				Analyses									
No.	Type	Length (feet)	Description	Gold (ppm)	Silver (ppm)	Lead (ppm)	Zinc (ppm)	Copper (ppm)	Molybdenum (ppm)	Arsenic (ppm)	Barium (ppm)	Antimony (ppm)	Tungsten (ppm)
1	Random chip	--	Unaltered porphyritic andesite------	<0.007	<0.3	<10	130	35	27	--	--	--	--
2	do--	--	do----------------------------------	<.007	<.3	<10	95	24	25	--	--	--	--
3	do--	--	do----------------------------------	<.007	<.3	<10	96	17	24	--	--	--	--
4	Grab	--	Unaltered platy andesite------------	<.007	<.3	<10	81	25	22	--	--	--	--
5	Random chip	--	Unaltered medium grained andesite---	<.007	<.3	<10	120	53	23	--	--	--	--
6	Grab	--	Unaltered vesicular basalt----------	<.007	<.3	<10	120	60	17	--	--	--	--
7	Random chip	--	Porphyritic andesite with extensive Kaolinitic alteration and intensive bleaching-------------------------	<.007	<.3	<10	120	226	24	--	--	--	--
8	do--	--	Unaltered basalt--------------------	<.007	<.3	<10	90	88	21	--	--	--	--
9	Grab	--	do----------------------------------	<.007	<.3	<10	120	62	20	--	--	--	--
10	do--	--	Unaltered tuff and tuffaceous sediments-------------------------	<.007	<.3	<10	47	15	20	--	--	--	--
11	Random chip	--	Unaltered vesicular basalt----------	<.007	<.3	<10	92	34	24	--	--	--	--
12	do--	--	do----------------------------------	<.007	.370	<10	120	47	20	--	--	--	--
13	do--	--	Unaltered platy andesite------------	<.007	<.3	<10	85	15	19	--	--	--	--
14	do--	--	do----------------------------------	<.007	<.3	<10	91	47	20	--	--	--	--
15	Grab	--	Unaltered vesicular basalt----------	<.007	<.3	<10	120	44	18	--	--	--	--
16	Random chip	--	do----------------------------------	<.007	<.3	<10	120	47	21	--	--	--	--
17	Grab	--	do----------------------------------	<.007	<.3	<10	97	45	20	--	--	--	--
18	Random chip	--	Unaltered andesite dike trends N. 60° W., dips vertically-----------	<.007	<.3	<10	89	44	21	--	--	--	--

TABLE A-1.--Sample data for lode samples from the Skedaddle study area, California and Nevada--Continued

Sample				Analyses									
No.	Type	Length (feet)	Description	Gold (ppm)	Silver (ppm)	Lead (ppm)	Zinc (ppm)	Copper (ppm)	Molybdenum (ppm)	Arsenic (ppm)	Barium (ppm)	Antimony (ppm)	Tungsten (ppm)
19	Select	--	Unaltered vesicular basalt----------	<0.007	<0.3	<10	110	47	24	--	--	--	--
20	Random chip	--	do----------------------------------	<.007	.340	<10	100	44	22	--	--	--	--
21	do--	--	do----------------------------------	<.007	<.3	<10	110	64	20	--	--	--	--
22	do--	--	Unaltered porphyritic andesite------	<.007	<.3	13	97	35	22	--	--	--	--
23	do--	--	do----------------------------------	<.007	<.3	16	89	37	24	--	--	--	--
24	do--	--	do----------------------------------	<.007	<.3	31	52	6	4	--	--	--	--
25	do--	--	Unaltered basalt--------------------	<.007	<.3	<10	70	40	23	--	--	--	--
26	Chip	2.0	Unaltered andesite------------------	<.007	9.3	<10	83	30	20	<2	990	<2	100
27	do--	2.6	Unaltered porphyritic andesite------	<.007	<5	<10	77	38	24	<2	.11%	<2	120
28	Grab	--	Opaline and chalcedonic rock with trace of pyrite--------------------	<.007	<5	<10	27	8	29	7	.12%	<2	75
29	do--	--	Lithic tuff-------------------------	<.007	<.3	23	53	50	20	250	940	<2	84
30	Random chip	--	Unaltered vesicular basalt----------	<.007	<.3	<10	110	57	20	--	--	--	--
31	Grab	--	Tuffaceous rhyolite-----------------	<.007	<5	<10	40	42	14	160	0.10%	<2	68
32	Chip	12.0	Tufa--------------------------------	.017	.400	<10	24	9.9	6.2	30	730	<2	31
33	do--	3.0	do----------------------------------	<.007	.400	<10	13	7.6	<5	<30	790	<2	<30
34	Grab	--	Unaltered platy andesite------------	.018	.400	<10	180	43	22	200	890	<2	110
35	Chip	2.0	Tufa--------------------------------	.022	.400	<10	<10	<6	<5	<30	880	<2	<30
36	do--	4.0	Unaltered pyroclastic tuff----------	.021	.470	<10	180	43	22	220	770	<2	120
37	do--	3.5	do----------------------------------	.020	<.3	<10	170	43	19	210	700	<2	110
38	Random chip	--	Silicified andesite-----------------	.021	.390	<10	180	38	22	210	.11%	<2	120

TABLE A-1.--Sample data for lode samples from the Skedaddle study area, California and Nevada--Continued

Sample				Analyses									
No.	Type	Length (feet)	Description	Gold (ppm)	Silver (ppm)	Lead (ppm)	Zinc (ppm)	Copper (ppm)	Molybdenum (ppm)	Arsenic (ppm)	Barium (ppm)	Antimony (ppm)	Tungsten (ppm)
39	Chip	4.0	Unaltered porphyritic andesite------	0.023	<0.3	<10	190	44	23	--	--	--	--
40	do--	3.2	do----------------------------------	.065	.520	<10	190	41	23	--	--	--	--
41	do--	14.0	Silicified dike trends N. 20° W., dips 80° NE----------------------------	<.007	<.3	<10	120	26	24	--	--	--	--
42	do--	3.5	Silicified dacite dike strikes N. 80° E. with vertical dip-----------	<.007	<.3	<10	120	32	20	--	--	--	--
43	Random chip	--	Unaltered basalt--------------------	<.007	<.3	<10	190	60	21	--	--	--	--
44	Grab	--	Tufa mound--------------------------	<.007	<.3	<10	35	<6	<5	--	--	--	--
45	Chip	2.5	Limonitic basalt breccia------------	.019	<.3	<10	100	56	20	--	--	--	--
46	do--	17.0	Unaltered basalt dike---------------	.027	<.3	<10	75	14	21	--	--	--	--
47	do--	11.0	Unaltered flow-banded rhyolite------	.019	<.3	<10	56	<6	24	--	--	--	--
48	do--	19.0	do----------------------------------	.019	<.3	<10	58	<6	24	--	--	--	--
49	Grab	--	Massive unaltered rhyolite----------	<.007	<5	<10	83	30	23	240	0.14%	<30	99
50	Chip	.25	Clay gouge zone in rhyolite---------	<.007	<5	<10	56	<6	22	230	.12%	<30	80
51	Grab	--	Unaltered flow-banded rhyolite------	<.007	<5	<10	56	<6	23	230	.14%	<30	80
52	Random chip	--	Unaltered perlitic flow banded rhyolite--------------------------	<.007	<5	<10	56	<6	23	230	.14%	<30	86
53	Grab	--	do----------------------------------	<.007	<5	26	54	<6	23	230	.13%	<30	75
54	Random chip	--	Unaltered flow-banded rhyolite------	<.007	<5	40	57	<6	28	230	.14%	<30	79
55	Grab	--	Unaltered vitric rhyolite-----------	<.007	<5	40	56	<6	23	230	.14%	<30	77
56	Random chip	--	do----------------------------------	<.007	<5	40	55	<6	23	230	.14%	<30	76
57	Grab	--	Unaltered pyroclastic flow----------	<.007	<5	40	63	<6	22	240	.15%	<30	96
58	do--	--	Unaltered tuffaceous unit-----------	<.007	<5	40	60	<6	23	230	.14%	<30	80

TABLE A-1.--Sample data for lode samples from the Skedaddle study area, California and Nevada--Continued

Sample				Analyses									
No.	Type	Length (feet)	Description	Gold (ppm)	Silver (ppm)	Lead (ppm)	Zinc (ppm)	Copper (ppm)	Molybdenum (ppm)	Arsenic (ppm)	Barium (ppm)	Antimony (ppm)	Tungsten (ppm)
59	Random chip	--	Unaltered pyroclastic flow----------	0.017	<0.3	<10	59	<6	21	--	--	--	--
60	Grab	--	Vitreous rhyolite breccia-----------	.019	<.3	<10	55	<6	20	--	--	--	--
61	Chip	4.0	Vitreous rhyolite-------------------	.023	<.3	<10	60	<6	23	--	--	--	--
62	Grab	--	Pit in vitreous rhyolite 15 ft square 5 ft deep-------------------------	<.007	<.3	<10	47	<6	24	--	--	--	--
63	Chip	3.5	Unaltered rhyolite flow strikes N. 60° W., dips 60° SW.------------	.021	<.3	<10	47	<6	18	--	--	--	--
64	Random chip	--	Vesicular quartz dacite-------------	<.007	<.3	<10	70	39	18	--	--	--	--
65	Grab	--	Quartz dacite-----------------------	<.007	<.3	<10	64	31	21	--	--	--	--
66	Random chip	--	Quartz dacite with epidote alteration.	<.007	<.3	<10	62	57	19	--	--	--	--
67	do--	--	Biotite dacite porphyry with epidote alteration------------------------	<.007	<.3	<10	54	30	19	--	--	--	--
68	Chip	10.	Dacite porphyry dike with epidote alteration------------------------	<.007	<.3	<10	61	38	20	--	--	--	--
69	Random chip	--	Quartz diorite porphyry with epidote.	<.007	<.3	<10	48	31	19	--	--	--	--
70	do--	--	Unaltered platy andesite------------	<.007	<.3	<10	99	50	23	--	--	--	--
71	do--	--	Basalt with chlorite alteration-----	.065	<.3	<10	130	65	20	2	.072%	<2	--
72	do--	--	Porphyritic andesite with argillization---------------------	<.007	<.3	<10	100	20	15	13	.043%	<2	--
73	do--	--	Unaltered porphyritic andesite------	<.007	<.3	<10	96	51	25	42	.077%	<2	--
74	Random chip	--	Perlitic vitrophyre-----------------	<.007	<.3	<10	43	7.5	16	7	.104%	<2	--
75	do--	--	Pyroclastic tuff--------------------	<.007	<.3	<10	18	6.5	17	<2	.100%	<2	--
76	do--	--	Pyroclastic tuff with argillization.	<.007	<.3	10	32	<6	19	19.2	.106%	<2	--

TABLE A-1.--Sample data for lode samples from the Skedaddle study area, California and Nevada--Continued

Sample				Analyses									
No.	Type	Length (feet)	Description	Gold (ppm)	Silver (ppm)	Lead (ppm)	Zinc (ppm)	Copper (ppm)	Molybdenum (ppm)	Arsenic (ppm)	Barium (ppm)	Antimony (ppm)	Tungsten (ppm)
77	Random chip	--	Porphyritic andesite with extensive kaolinite alteration and intense bleaching-------------------------	<0.007	<0.3	32	57	48	22	--	--	--	--
78	Random	--	Unaltered andesite------------------	<.007	<.3	<10	36	14	17	4	.094%	<2	--
79	Grab	--	Bleached porphyritic andesite-------	<.007	<.3	<10	<3	<6	<5	130	870	<30	30
80	Random chip	--	Andesite with argillization---------	<.007	<.3	16	51	72	19	290	980	53	79
81	Chip	5.0	Porphyritic andesite with quartz and argillization------------------	<.007	<.3	24	40	44	20	270	.13%	59	110
82	do--	4.0	do----------------------------------	<.007	<.3	27	49	44	20	270	.12%	56	100
83	Random chip	--	Andesite with argillization---------	<.007	<.3	15	54	60	18	290	150	50	75
84	do--	--	Silicified pyroclastic flow---------	<.007	<.3	37	29	16	36	200	150	43	58
85	do--	--	Andesite with argillization---------	<.007	<.3	<10	37	24	25	230	640	50	72
86	do--	--	Bleached tuff with argillization----	<.007	<.3	<10	19	30	45	12.1	.069%	<2	--
87	Chip	5.0	Silicified vitrophyre in 5-ft x 5-ft by 2-ft pit-----------------------	<.007	<.3	<10	90	26	24	21.9	.081%	<2	--
88	Random chip	--	Unaltered porphyritic andesite------	<.007	<.3	<10	59	41	17	<2	.080%	<2	--
89	do--	--	Unaltered, porphyritic andesite-----	<.007	<.3	<10	59	41	17	160	.11%	<30	66
90	do--	--	Bleached porphyritic andesite-------	<.007	<.3	23	53	50	20	250	940	55	84
91	Grab	--	do----------------------------------	<.007	<.3	23	28	12	12	190	.11%	<30	48
92	Random chip	--	Bleached pyroclastic with argillic andesite--------------------------	<.007	<.3	<10	5.9	7.4	25	210	230	<30	53
93	do--	--	Bleached porphyritic andesite-------	.044	<.3	<10	28	71	70	190	800	<30	110
94	Grab	--	do----------------------------------	<.007	<.3	<10	120	50	20	190	910	<30	56
95	Chip	6.0	Silicified and kaolinized andesite--	<.007	<.3	20	22	20	20	240	450	50	81

TABLE A-1.--Sample data for lode samples from the Skedaddle study area, California and Nevada--Continued

Sample				Analyses									
No.	Type	Length (feet)	Description	Gold (ppm)	Silver (ppm)	Lead (ppm)	Zinc (ppm)	Copper (ppm)	Molybdenum (ppm)	Arsenic (ppm)	Barium (ppm)	Antimony (ppm)	Tungsten (ppm)
96	Random chip	--	Silicified and bleached porphyritic andesite--------------------------	<0.007	<0.3	17	28	9.4	78	130	820	<30	110
97	do-----	--	Silicified pyroclastic--------------	<.007	<.3	37	29	67	36	200	150	43	58
98	Grab--	--	Unaltered andesite------------------	<.007	<5	<10	<3	25	20	160	810	<30	83
99	do----	--	Silicified and bleached andesite----	.031	<.3	<10	87	46	49	200	780	<30	120
100	Random chip	--	Crystal lithic tuff with argillization----------------------	<.007	<5	<10	100	43	17	200	.11%	<30	60
101	Grab--	--	Bleached pyroclasts with argillization----------------------	<.007	<5	<10	58	62	17	160	.14%	<30	61
102	Random chip	--	Porphyritic andesite dike with minor chlorite---------------------	<.007	<5	<10	56	45	18	170	.10%	<30	55
103	do----	--	Unaltered basalt--------------------	<.007	<.3	<10	58	31	19	--	--	--	--
104	do----	--	Porphyritic andesite with prophylitic alteration------------------------	<.007	<.3	<10	48	34	19	140	840	<30	84
105	Grab--	--	Dacite with argillization-----------	<.007	<.3	12	37	55	17	250	880	46	81
106	Chip	6.0	Three-inch breccia zone cuts andesite	<.007	<.3	<10	35	<6	<5	--	--	--	--
107	do--	3.0	Silicified porphyritic andesite-----	<.007	<.3	<10	5.2	55	27	--	--	--	--
108	Random chip	--	Bleached andesite------------------	<.007	<.3	<10	<3	41	25	--	--	--	--
109	Chip	7.5	Bleached andesite with argillization	<.007	<.3	22	<3	30	27	--	--	--	--
110	Grab	--	Silicified andesite-----------------	<.007	<.3	66	<3	29	29	--	--	--	--
111	do--	--	do--------------------------------	<.007	<.3	20	<3	38	41	--	--	--	--
112	do--	--	Andesite with argillization---------	<.007	<.3	35	<3	57	26	--	--	--	--
113	Chip	4.0	do--------------------------------	<.007	<.3	31	<3	50	36	--	--	--	--
114	do--	5.0	Bleached andesite with argillization	<.007	<.3	12	<3	30	28	--	--	--	--
115	Grab	--	Andesite with argillization---------	<.007	<.3	<10	<3	19	27	--	--	--	--
116	Random chip	--	Tectonic breccia of andesite--------	<.007	<.3	26	<3	<6	26	--	--	--	--

TABLE A-1.--Sample data for lode samples from the Skedaddle study area, California and Nevada--Continued

Sample				Analyses									
No.	Type	Length (feet)	Description	Gold (ppm)	Silver (ppm)	Lead (ppm)	Zinc (ppm)	Copper (ppm)	Molybdenum (ppm)	Arsenic (ppm)	Barium (ppm)	Antimony (ppm)	Tungsten (ppm)
117	Random chip	--	Andesite with argillization and some silicification----------------	<0.007	<0.3	<10	25	67	25	260	880	47	62
118	Chip--	2.5	Andesite with argillization---------	<.007	<.3	<10	69	84	19	140	950	<30	84
119	Grab--	--	do----------------------------------	<.007	<.3	<10	<3	67	26	160	920	<30	65
120	Random chip	--	Andesite with clay argillization and silicification----------------	<.007	<.3	<10	<3	34	28	220	.112%	<30	67
121	Chip--	4.0	Andesite with argillization---------	<.007	<.3	<10	<3	23	23	200	900	<30	63
122	Random chip	--	Andesite with argillization and silicification---------------------	<.007	<.3	<10	<3	<6	19	170	450	<30	70
123	Grab--	--	Pryoclastic unit with argillization	<.007	<.3	<10	80	150	21	260	840	51	42
124	do----	--	Unaltered andesite------------------	<.007	<.3	<10	84	72	22	250	960	<30	100
125	do----	--	Quartz, chalcedony, and jasper------	<.007	<.3	17	23	6.7	44	<30	160	56	<30
126	Chip--	4.0	Bleached silicified andesite--------	<.007	<.3	<10	<3	33	19	160	960	<30	81
127	do----	5.0	Andesite with argillization and some silicification----------------	<.007	<.3	<10	<3	9	25	160	.13%	<30	71
128	Random chip	--	Bleached andesite with argillization	<.007	<.3	<10	<3	34	21	150	.14%	<30	63
129	Grab--	--	Bleached pyroclastic unit with argillization----------------------	<.007	<.03	34	54	95	29	210	690	39	38
130	Chip--	3.0	Bleached tuff with argillization----	<.007	<.3	27	63	36	18	240	.11%	47	82
131	Random chip	--	do----------------------------------	<.007	<.3	<10	26	45	20	--	--	--	--
132	do----	--	Bleached pyroclastic unit with argillization----------------------	<.007	<.3	13	46	48	29	250	620	54	72
133	Chip--	6.0	Andesite with argillization and some silicification----------------	<.007	<.3	<10	<3	36	22	--	--	--	--

TABLE A-1.--Sample data for lode samples from the Skedaddle study area, California and Nevada--Continued

Sample				Analyses									
No.	Type	Length (feet)	Description	Gold (ppm)	Silver (ppm)	Lead (ppm)	Zinc (ppm)	Copper (ppm)	Molybdenum (ppm)	Arsenic (ppm)	Barium (ppm)	Antimony (ppm)	Tungsten (ppm)
134	Chip	2.5	Andesite with argillization and some silicification	<0.007	<0.3	<10	88	200	22	--	--	--	--
135	do	2.0	do	.032	<.3	70	<3	62	22	--	--	--	--
136	Random chip	--	Unaltered andesite	<.007	<.3	<10	61	52	22	--	--	--	--
137	Grab		do	<.007	<.3	<10	<3	25	20	--	--	--	--
138	Chip	6.0	Andesite with arillization and sericite alteration	<.007	<.3	<10	<3	32	24	--	--	--	--
139	Random chip	--	do	<.007	<.3	<10	<3	61	27	--	--	--	--
140	do	--	Brecciated silicified andesite	<.007	<.3	<10	<3	16	20	--	--	--	--
141	Chip	6.0	Andesite, completely silicified	<.007	<.3	<10	<3	17	65	--	--	--	--
142	do	3.5	Andesite with argillization	<.007	<.3	<10	<3	7.6	27	--	--	--	--
143	Random chip	--	Andesite with argillization and sericite alteration	<.007	<.3	<10	<3	14	35	--	--	--	--
144	Grab	--	Silicified andesite	<.007	<.3	<10	<3	30	23	170	460	<30	70
145	do	--	Andesite with argillization	<.007	<.3	<10	<3	55	16	190	760	<30	86
146	Chip	8.8	Silicified andesite	<.007	<.3	<10	<3	<6	29	170	800	<30	69
147	Grab	--	do	<.007	<.3	<10	<3	30	29	94	950	<30	<30
148	Random chip	--	Bleached vesicular tuff	<.007	<.3	<10	68	38	14	140	770	<30	71
149	do	--	Basalt	<.007	<.3	<10	93	25	18	140	810	<30	79
150	Grab	--	Silicified andesite	<.007	<.3	<10	75	8.5	17	160	0.11%	<30	5.4
151	Random chip	--	Crystal tuff with argillization	<.007	<.3	<10	70	<6	16	160	.10%	<30	<3

TABLE A-1.--Sample data for lode samples from the Skedaddle study area, California and Nevada--Continued

Sample				Analyses									
No.	Type	Length (feet)	Description	Gold (ppm)	Silver (ppm)	Lead (ppm)	Zinc (ppm)	Copper (ppm)	Molybdenum (ppm)	Arsenic (ppm)	Barium (ppm)	Antimony (ppm)	Tungsten (ppm)
152	Grab--	--	Andesite with white quartz veinlets	<0.007	<0.3	<10	47	12	140	140	750	<30	24
153	Chip--	6.0	Unaltered vitrophyre----------------	<.007	<.3	<10	60	6	20	160	0.13%	<30	17
154	Random chip	--	Vitrophyre with argillization-------	<.007	<.3	58	26	13		160	.13%	<30	<3
155	do----	--	do----------------------------------	<.007	<.3	<10	57	15	89	150	980	<30	<3
156	Grab--	--	Silicified rhyolite-----------------	<.007	<.3	<10	<3	<6	15	150	.25%	<30	67
157	Chip--	9.0	Unaltered basalt--------------------	<.007	<.3	<10	96	6.7	44	<30	160	<30	96
158	Random chip	--	Epidote-bearing vitrophyre----------	<.007	<.3	17	89	26	23	240	960	56	90
159	Grab--	--	Bleached andesite with argillization	<.007	<.3	31	52	<6	14	200	940	39	68
160	Random chip	--	Unaltered basalt dike---------------	<.007	<.3	16	97	37	24	240	.12%	46	90
161	do----	--	Unaltered dacite--------------------	<.007	<.3	13	98	35	22	240	.10%	48	96
162	do----	--	Unaltered dacite--------------------	<.007	<.3	18	98	44	23	260	950	52	96
163	Grab--	--	Silicified rhyolite-----------------	<.007	<.3	<10	<3	<6	20	--	--	--	--
164	Chip--	3.0	Silicified volcanics----------------	<.007	<.3	<10	<3	<6	31	--	--	--	--
165	do----	5.0	Bleached tuff-----------------------	<.007	<.3	<10	<3	14	32	--	--	--	--
166	Random chip	--	Silicified volcanic breccia---------	<.007	<.3	<10	<3	<6	24	--	--	--	--
167	Chip--	2.0	do----------------------------------	<.007	<.3	<10	<3	15	44	--	--	--	--
168	do----	20.0	Silicified rhyolite breccia---------	<.007	0.380	<10	<3	9.3	26	--	--	--	--
169	Grab--	--	do----------------------------------	<.007	.380	<10	41	6.9	32	220	970	<30	55
170	Random chip	--	do----------------------------------	<.007	.380	<10	23	6.1	24	150	.19%	<30	77
171	Chip--	50.0	Silicified rhyolite breccia---------	<.007	.380	13	34	7.5	30	150	.146	32	37

TABLE A-1.--Sample data for lode samples from the Skedaddle study area, California and Nevada--Continued

Sample				Analyses									
No.	Type	Length (feet)	Description	Gold (ppm)	Silver (ppm)	Lead (ppm)	Zinc (ppm)	Copper (ppm)	Molybdenum (ppm)	Arsenic (ppm)	Barium (ppm)	Antimony (ppm)	Tungsten (ppm)
172	Random chip	--	Silicified breccia with some limonite	<0.007	<0.3	<10	35	<6	50	180	0.15%	<30	66
173	do----	--	do----------------------------------	<.007	<.3	<10	31	6.4	33	290	210	<30	65
174	do----	--	do----------------------------------	<.007	<.3	<10	29	8.9	30	200	.12%	<30	65
175	do----	--	do----------------------------------	<.007	<.3	<10	25	<6	43	210	.13%	<30	67
176	do----	--	do----------------------------------	<.007	<.3	<10	22	8.5	27	190	.12%	<30	69
177	do----	--	do----------------------------------	<.007	<.3	<10	71	9.6	28	190	.12%	<30	35
178	do----	--	do----------------------------------	<.007	<.3	<10	85	8.4	34	190	600	<30	61
179	do----	--	do----------------------------------	<.007	<.3	<10	53	13	26	190	.11%	<30	25
180	do----	--	do----------------------------------	<.007	<.3	<10	63	13	37	210	.15%	<30	24
181	Chip	6	do----------------------------------	<.007	<.3	<10	30	<6	41	180	210	<30	73
182	Random chip	--	do----------------------------------	<.007	<.3	<10	24	<6	29	200	.13%	<30	74
183	Chip--	3.5	do----------------------------------	.017	<.3	<10	36	<6	40	170	.13%	<30	61
184	Random chip	--	do----------------------------------	.017	<.3	<10	31	7.7	28	240	610	<30	71
185	Chip--	6.0	do----------------------------------	.017	<.3	<10	22	<6	31	170	.11%	<30	60
186	do----	11.0	do----------------------------------	<.007	<.3	<10	28	<6	24	180	.12%	<30	63
187	do----	11.0	do----------------------------------	<.007	<.3	<10	25	<6	26	200	.13%	<30	63
188	do----	5.0	do----------------------------------	<.007	<.3	<10	28	<6	41	200	880	<30	60
189	do----	12.0	do----------------------------------	<.007	<.3	<10	28	<6	32	170	.14%	<30	57
190	Select	--	Vesicular andesite with minor propylitic alteration--------------	<.007	<.3	<10	110	47	24	170	.12%	<30	87
191	Chip--	18.0	Silicified rhyolite breccia----------	<.007	<.3	<10	<3	<6	35	--	--	--	--
192	do----	6.5	Brecciated yellow opal and silica rock-------------------------------	<.007	<.3	<10	<3	<6	35	--	--	--	--

TABLE A-1.--Sample data for lode samples from the Skedaddle study area, California and Nevada--Continued

Sample				Analyses									
No.	Type	Length (feet)	Description	Gold (ppm)	Silver (ppm)	Lead (ppm)	Zinc (ppm)	Copper (ppm)	Molybdenum (ppm)	Arsenic (ppm)	Barium (ppm)	Antimony (ppm)	Tungsten (ppm)
193	Random chip	--	Silicified rhyolite breccia----------	<0.007	<0.3	<10	<3	26	20	--	--	--	--
194	Grab--	--	do----------------------------------	<.007	<.3	<10	<3	<6	32	--	--	--	--
195	Chip--	24.0	do----------------------------------	<.007	<.3	<10	<3	13	31	--	--	--	--
196	do----	10.0	do----------------------------------	<.007	<.3	<10	<3	88	17	--	--	--	--
197	do----	4.0	do----------------------------------	.063	<.3	<10	<3	<6	33	--	--	--	--
198	do----	28.0	do----------------------------------	<.007	<.3	<10	<3	<6	18	--	--	--	--
199	do----	25.0	do----------------------------------	.031	<10	<3	19	30	--	--	--	--	--
200	do----	13.0	do----------------------------------	<.007	<.3	<10	<3	6.1	19	--	--	--	--
201	Grab--	--	do----------------------------------	<.007	<.3	<10	<3	<6	16	--	--	--	--

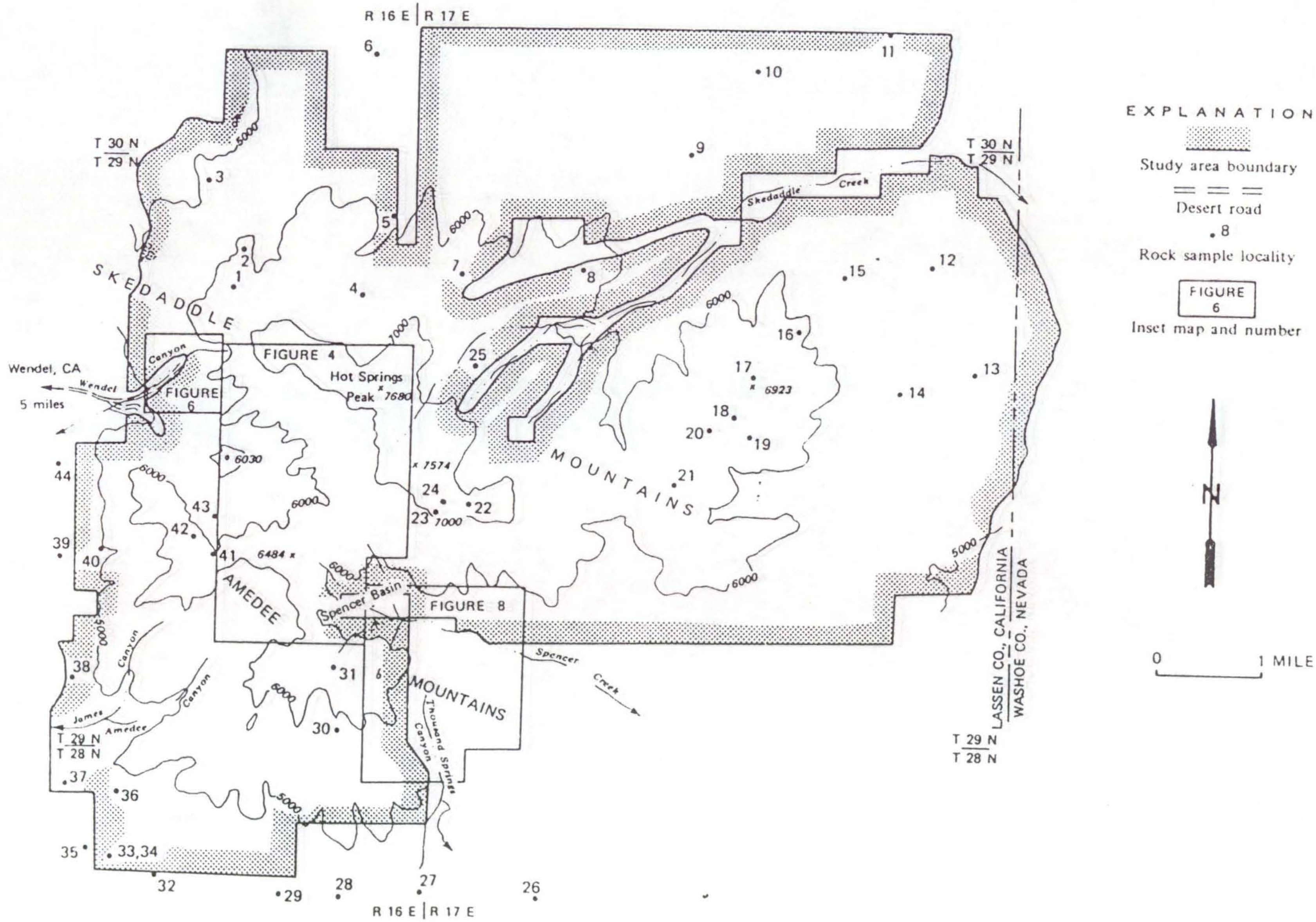

FIGURE 4.– Index map of all rock samples collected in the Skedaddle study area, California and Nevada

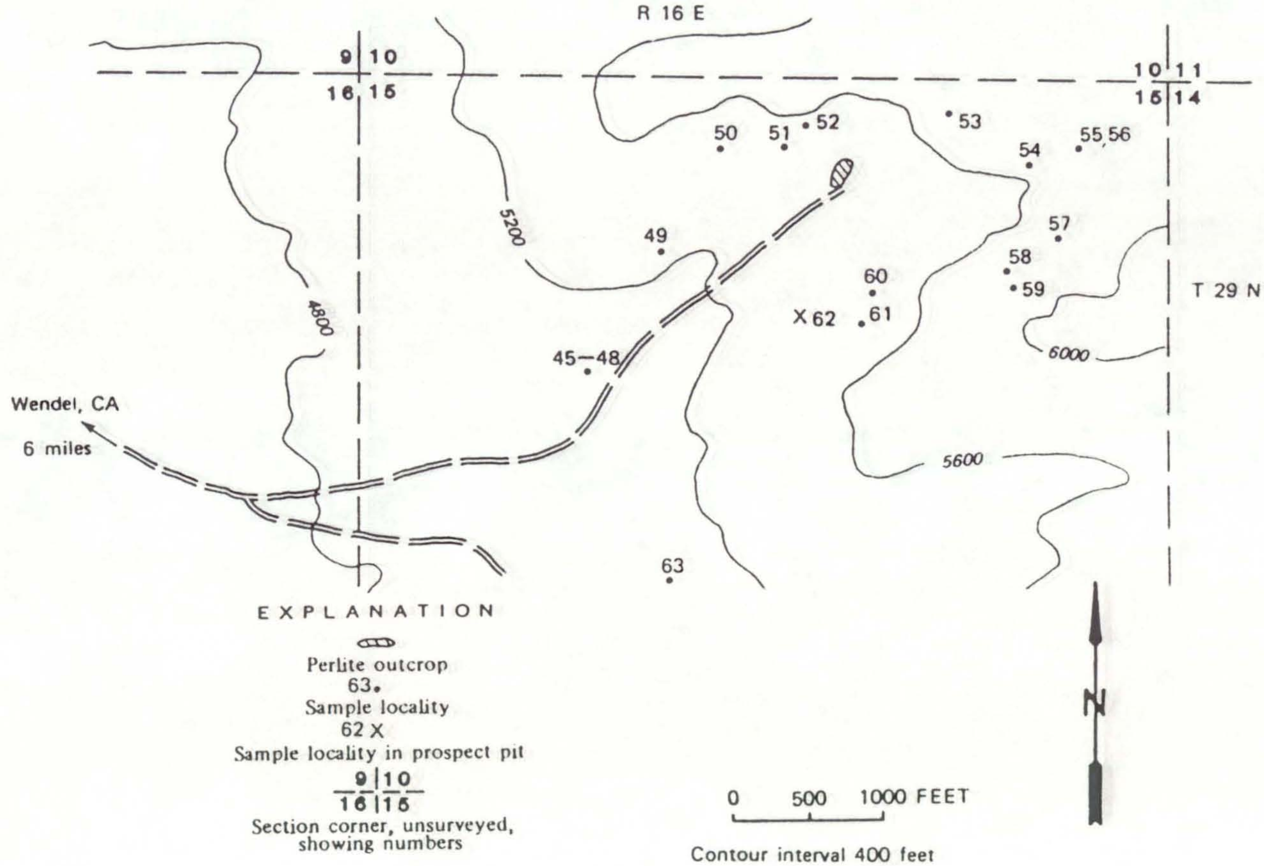

FIGURE 5.– Detailed location map of rock samples collected in northwest portion of the Skedaddle study area, California and Nevada

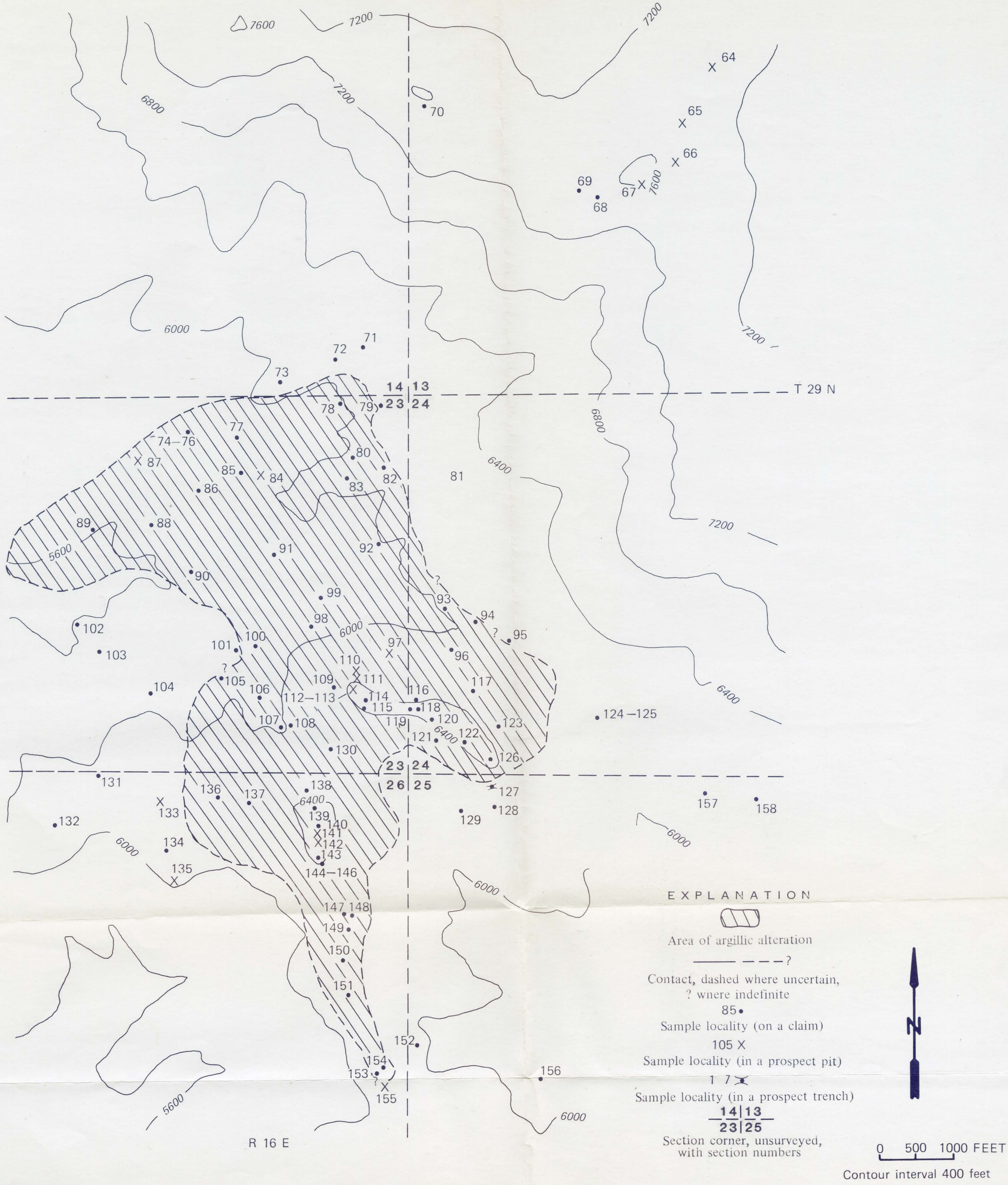

PLATE 2.–Detailed location map of rock samples collected in the central portion of the Skedaddle study area, California and Nevada

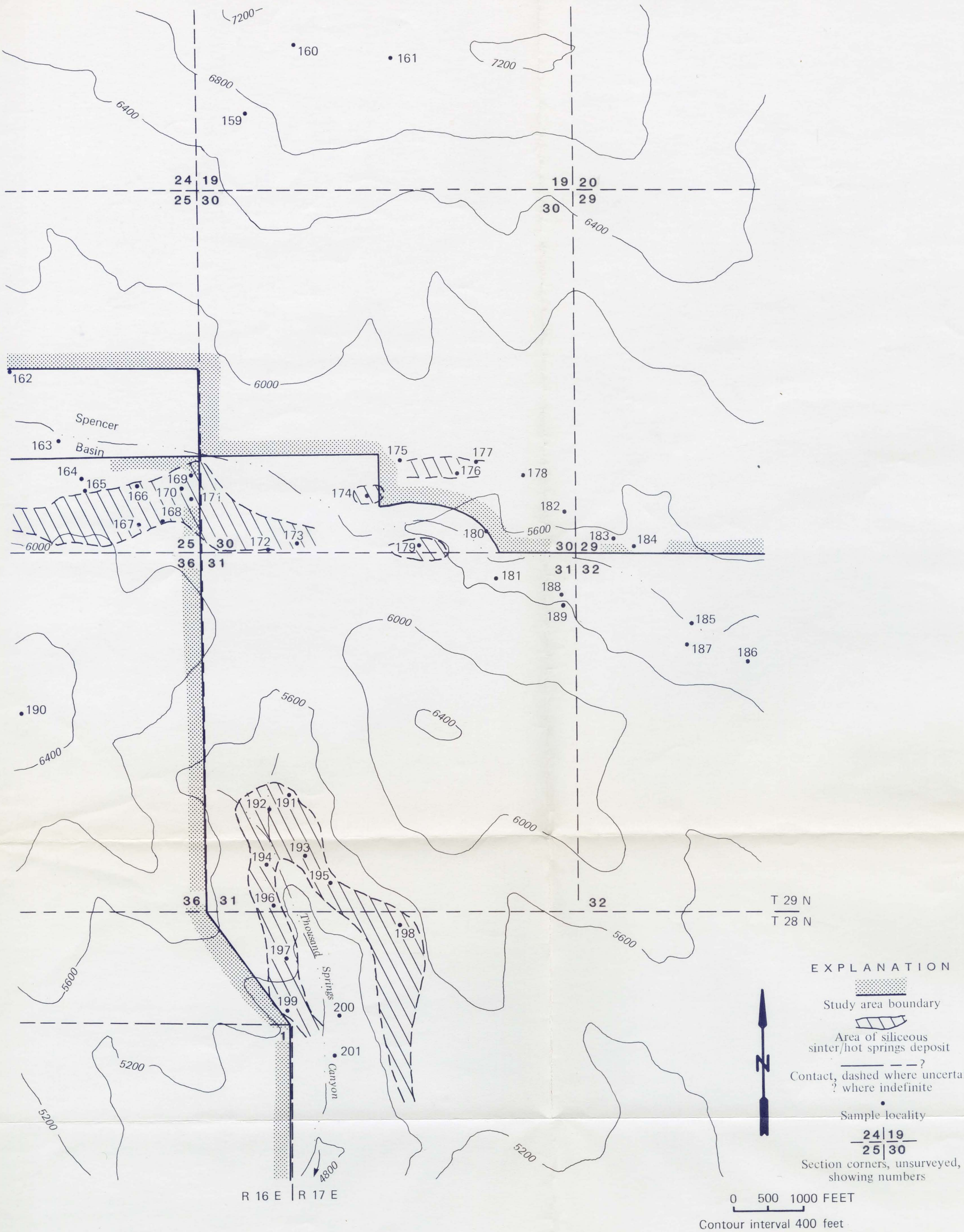

PLATE 3.–Detailed location map of rock samples collected in the south–central portion Skedaddle study area, California and Nevada

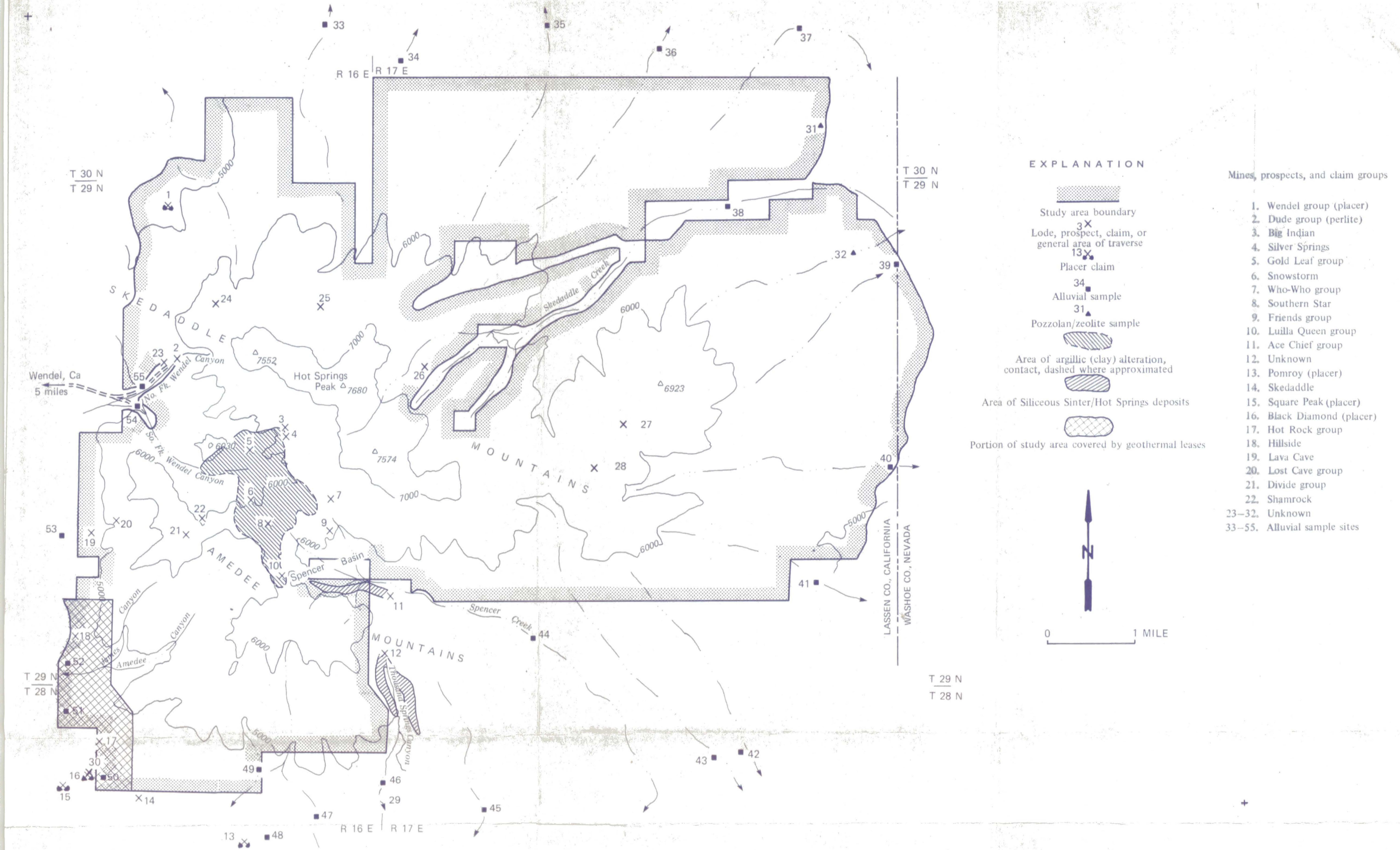

PLATE 1.—Location of mines, prospects, claims, mineralized areas, alluvial sample sites, and industrial mineral sample sites, Skedaddle study area, California and Nevada