United States Department of the Interior

BUREAU OF MINES
Western Field Operations Center
East 360 3rd Avenue
Spokane, Washington 99202-1413

October 28, 1993

Dr. Jonathan G. Price
Director and State Geologist
Nevada Bureau of Mines and Geology
University of Nevada
Reno, NV 89557-0088

Dear Dr. Price:

Enclosed is one copy of the following MLA Open-File Report:

MLA 7-93 Minerals in the Emigrant Trail Study Area, Humboldt, Pershing, and Washoe Counties, Nevada

The U.S. Bureau of Mines will be unable to supply additional copies of this report due to a printing moratorium. However, please feel free to reproduce the report if you need additional copies.

If I may be of further assistance, please let me know.

Sincerely,

Dave Lockard

for Robert B. Hoekzema, Chief
Branch of Resource Evaluation

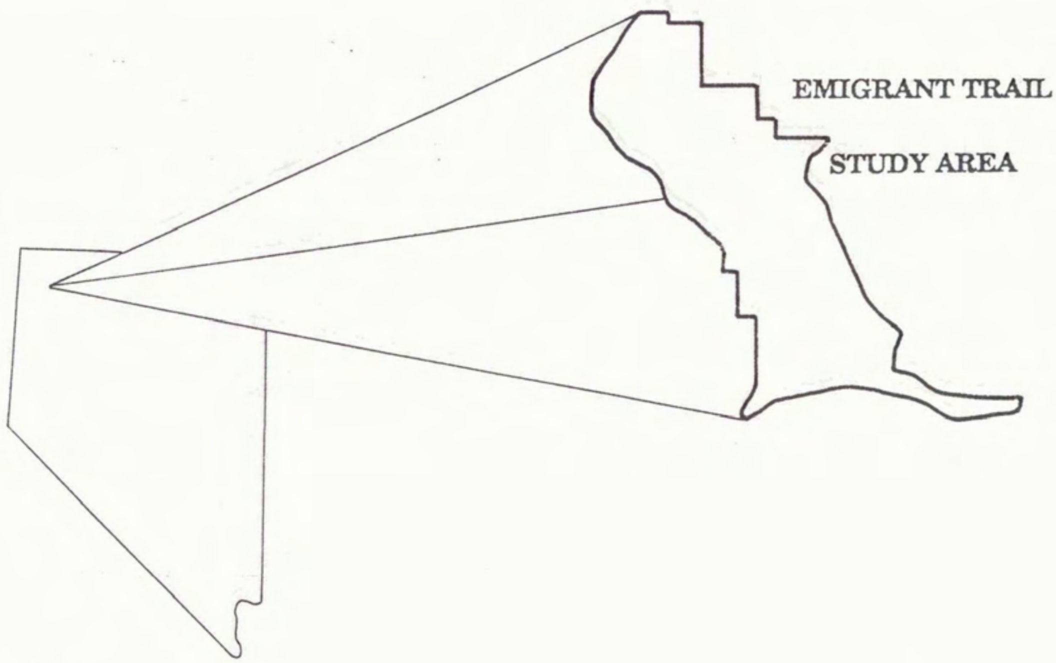
Enclosure

USBM
MLA 7-93

MLA 7-93

Mineral Land Assessment
Open-File Report/1993

Minerals in the Emigrant Trail Study Area, Humboldt, Pershing, and Washoe Counties, Nevada



UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

One plate included

Minerals in the Emigrant Trail Study Area
(Black Rock/High Rock National Conservation Area Proposal)
Humboldt, Pershing, and Washoe Counties, Nevada

by
Michael S. Miller

MLA 7-93

Western Field Operations Center
Spokane, Washington

United States Department of the Interior
Bruce Babbitt, Secretary

U.S. Bureau of Mines
Hermann Enzer, Acting Director

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO.	2.	3. Recipient's Accession No.

4. Title and Subtitle

Minerals in the Emigrant Trail Study Area, Humboldt, Pershing, and Washoe Counties, Nevada

5. Report Date

6.

7. Author(s)

Michael S. Miller

8. Performing Organization Rept. No.

9. Performing Organization Name and Address

U.S. Bureau of Mines
Western Field Operations Center
360 E. 3rd Avenue
Spokane, WA 99202-1413

10. Project/Task/Work Unit No.

11. Contract(C) or Grant(G) No.

(C)

(G)

12. Sponsoring Organization Name and Address

13. Type of Report & Period Covered

14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

The U.S. Bureau of Mines (USBM) conducted mineral investigations in the 1,227,000-acre Emigrant Trail study area of Nevada during 1992. During the USBM investigation of 25 areas of development interest, 190 mineral localities were identified and 260 rock and 50 alluvial samples were taken. At least 0.5 million troy ounces of gold, 2.3 million troy ounces of silver, 3.3 million pounds of copper, 10.9 million pounds of lead, 2.4 million pounds of zinc, 500 tons of alunite, 40,000 tons of sulfur, 9,000 pounds of mercury, and 21,000 pounds of tin have been mined from the area and vicinity. Adjacent to the study area, gold is being mined at large, open-pit gold mines, the Hog Ranch and Hycroft Resources, Inc., Sulphur mines, and new production is planned at the Rosebud LAC/Equinox. Hog Ranch mine is nearing depletion, but resources of more than 0.5 million troy ounces of gold and about 5 million ounces of silver are estimated for the Rosebud LAC/Equinox project and more than 0.4 million ounces of gold for the Hycroft Resources, Inc., Sulphur mine. Significant investigations are occurring at SP Ridge and other sites near Scossa and at the Dan claims in the Southern Calico Mountains. Precious opal, placer gold, and geothermal energy resources occur in the study area and vicinity.

17. Document Analysis a. Descriptors Mineral deposits; gold; silver; copper; lead; zinc; mercury; arsenic; antimony; sulfur; tin; clay; alunite; zeolites; boron; lithium; diatomite; garnet; perlite; pozzolan; oil and gas; geothermal energy; hot springs; caldera; graben; dome; extensional faulting; basin-range faulting; high-angle faults; volcanic rocks; granitic rocks; accreted; tactite; skarn; breccia; quartzite; limestone; shale; gabbro; rhyolite; basalt; phyllite; quartz veins; stockworks; disseminated; silica; clay enrichment; silicic and argillic alteration; limonite; hematite; sericite; chlorite; epidote; adularia; barite; barytocalcite; sulfides; pyrite; pyrhhotite; arsenopyrite; galena; sphalerite.

b. Identifiers/Open-Ended Terms
Nevada state; Humboldt, Pershing, and Washoe Counties; Gerlach, Vya, Sulphur, Rosebud, and Hardin townsites; Lone Pine, Leadville, Donnelly, Sulphur, Rosebud, Trego, Rabbithole, Scossa, Placerites, Antelope, Majuba Hill, and Ryepatch mining districts; Quinn River; Black Rock Desert; Black Rock, Calico, Granite, Pahsupp, Antelope, and Kamma Mountain Ranges; Majuba, Division, Donnelly, Pahute, Bald, Badger, Mahogany, and Hog Ranch Mountains; Soldier Meadows, Fly Ranch, Hualapai, Trego, Gerlach, Black Rock, Double Hot Springs.

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report)	21. No. of Pages
	20. Security Class (This Page)	22. Price

(See ANSI–Z39.18) See Instructions on Reverse OPTIONAL FORM 272 (4–77) (Formerly NTIS–35) Department of Commerce

FOREWORD

This report presents the results of a U.S. Bureau of Mines mineral investigation of the Emigrant Trail study area. The area studied includes lands within the boundary for the Black Rock National Conservation Area delineated by the U.S. Department of the Interior, Bureau of Land Management in May 1991 and located within the Sonoma-Gerlach and Paradise-Denio Resource areas of the Winnemucca District, Nevada, and the Nevada portion of the Surprise Resource area of the Susanville District, California. Mining restrictions or withdrawals have been proposed for all, or part, of this area which includes segments of the Emigrant National Historic Trail in Humboldt, Pershing, and Washoe Counties, Nevada. The contents of this report are intended to assist land-use planning as specified by the Federal Land Policy and Management Act of 1976 and to provide minerals information required by the National Materials and Minerals Policy, Research, and Development Act of 1980. The report is based on available information, reconnaissance field investigations, and contacts with mineral exploration concerns.

This open-file report contains data gathered, interpreted, and edited by personnel of the U.S. Bureau of Mines, Western Field Operations Center, Branch of Resource Evaluation, East 360 Third Avenue, Spokane, Washington, 99202. This report has been reviewed and approved at the Branch of Mineral Land Assessment, Washington, D.C.

CONTENTS

Page

CONTENTS--Continued

ILLUSTRATIONS

TABLES

UNIT OF MEASURE ABBREVIATIONS USED IN THIS REPORT

Calorie	cal
Cubic Yard	yd^3
Degree Celsius	°C
Degree Fahrenheit	°F
Dollar per cubic yard	$\$/yd^3$
Gallon per minute	gpm
Foot	ft
Joule	J
Kilometer	km
Kilometer, cubed	km^3
Meter	m
Mile	mi
Mile, squared	mi^2
Part per billion	ppb
Part per million	ppm
Percent	%
Pound	lb
Pound per cubic foot	lb/ft^3
Ton	Ton, short
Troy ounce	oz
Troy ounce per cubic yard	oz/yd^3
Troy ounce per short ton	oz/ton

SUMMARY

This mineral land assessment was conducted by personnel of the Western Field Operations Center (WFOC) of the U.S. Bureau of Mines (USBM). Studies were in and near the proposed 1,227,000-acre Black Rock Conservation Area (May, 1991) of the U.S. Department of the Interior, Bureau of Land Management (BLM). Areas of mineral development interest (25), mineral sites (190), rock samples (260), and alluvial samples (50) are discussed.

Gold, silver, copper, lead, zinc, gemstones (opal, silicified wood, agate, jasper, chalcedony), sand and gravel, and geothermal energy are of interest for development within the foreseeable future. At least 29 precious- and base-metal mines in the study area and vicinity have produced more than 0.5 million oz of gold, 2 million oz of silver, 3 million lb of copper, 10 million lb of lead, and 2 million lb of zinc.

A large, underground gold mine is being developed near Rosebud Peak at the Lac/Equinox Joint Venture, where more than 500,000 oz of gold and 5 million oz of silver are estimated. Resources of 413,000 oz of gold have been identified at the Hycroft Resources, Inc., gold mine at Sulphur. The Hog Ranch gold mine is nearing closure, but similar rocks occur nearby. The Copper Canyon and Double Hot Springs areas, along the west side of the Black Rock Range, contain anomalous gold, silver, copper, lead, and zinc. Gold-bearing disseminations, quartz veins, and brecciated zones occur at the Donnelly, Cassidy mine, and Pahsupp Mountain areas. At the south end of the Calico Mountains, Ferrett Exploration is continuing to explore bulk-mineable gold. A large, bulk-mineable gold and silver deposit is being developed by Santa Fe Pacific Mining Company near Scossa. High-grade, gold-bearing float has been intensively prospected west of Scossa on the Lantern claims.

Placer gold has been mined in the Rabbithole/Barrel Springs, Rosebud, Placerites, Antelope, Scossa, and Humboldt House areas. Additional placer gold and important, nearby lode sources of gold may be developed.

Silver would probably be mined as a co-product or byproduct during large-scale gold or base-metal mining. Silver was mined with base metals at Leadville and at five other sites in or near the southeast tail of the study area: the Old Noble mine, the Nevada Superior mine, the Iron Mask (Silver King) mine, the De Soto (Arsenic King) mine, and the Poker Brown mine.

Extensions of gold, silver, or base-metal deposits are relatively likely at eight mines: the De Soto, Iron Mask, Last Chance, Leadville, Majuba Hill, Nevada Superior, Old Noble, and Poker Brown. Resources and grade were not inferred, however.

Precious opal has been mined from the Black Rock opal area. Good-quality petrified wood, agate, and jasper occur locally and likewise will be of continuing interest to small-scale miners and hobbyists.

Geothermal energy resources, estimated by others during previous work, total more than $13X10^{18}$ J and 40 km^3 at six areas of development interest: Soldier Meadow, Double Hot Springs, Fly Ranch, Gerlach, Trego Hot Springs, and Humboldt House. These may be developed in the foreseeable future as energy sources nearer markets are obligated.

Sand and gravel are likely to be used for local construction, but will not be transported for use in major population centers in the foreseeable future.

Other commodities, evaluated in the study area because of nearby occurrence or reference in publications but unlikely to be utilized alone are: antimony, barium, cobalt, iron, lithium, manganese, mercury, molybdenum, nickel, rare-earth elements, selenium, tin, tungsten, thorium, uranium, abrasives, alunite, basalt, boron, clay, diatomite, fluorite, gypsum, limestone and dolostone, perlite, pozzolan, silica, sulfur, zeolites, coal, and oil and gas. About 40,000 tons of sulfur, 9,000 lb of mercury, 500 tons of alunite, minor clay, and 21,000 lb of tin have been mined in or near the area.

Mineral and geothermal resources exist in the study area. Possible activity for mineral or energy resources would be within sight of the Emigrant Trail in ninetten areas of development interest: Badger Mountain-Pinto Peak, Soldier Meadow, Black Rock Opal, Copper Canyon, Double Hot Springs, Southern Calico Mountains, Cassidy, Gerlach, Trego Hot Springs, Pahsupp Mountain, Sulphur, Rosebud, Rabbit Hole/Barrel Springs, Placerites, Scossa, Antelope, Majuba Hill, Willow, and Humboldt House. Thirteen relatively significant areas of development interest are: the Hog Ranch, Leadville, Copper Canyon, Double Hot Springs, Donnelly, Southern Calico Mountains, Cassidy mine, Pahsupp Mountain, Sulphur, Rosebud, Scossa, Antelope, and Majuba Hill.

INTRODUCTION

Several groups involved with historic and environmental conservation have proposed National Conservation Area (NCA) designation for lands around the branches of the historic Emigrant Trail (U.S. Department of Interior, Bureau of Land Management, 1992, p. 1-2) in the Sonoma-Gerlach and Paradise-Denio Resource areas of the Winnemucca District, Nevada, and Nevada portions of the Surprise Resource area of the Susanville District, California; these designations are intended to protect historic and scenic values. Mining would be severely affected or eliminated. One proposal included a mining withdrawal for all land visible from the trail. This ridgecrest-to-ridgecrest withdrawal would be thirty or more miles wide. Other proposals suggest a one mile-wide mining withdrawal along the trail, except in areas with active mines and heavy concentrations of mining claims. Current BLM administrative withdrawals (such as BLM actions NV-930-4210-06 and N-52465, which involved the High Rock Area of Critical Environmental Concern, or ACEC, in the north portion of the study area), have affected parts of the study area. The boundary used for this study was that proposed by the BLM in May, 1991 (fig. 1; pl. 1).

Three goals of this study were: delineation of areas of mineral development; providing up-to-date information about mineral activity in the study area; and updating U.S. Bureau of Mines (USBM) Mineral Industry Location System (MILS) data.

This information will be provided to the BLM to facilitate land-use decisions and administration. The data will additionally help assure that sources of minerals will be available for future use in the United States.

Geographic Setting

The Emigrant Trail (pl. 1) was a popular route for travelers in the late 1800's. From the site of Lassen Meadows, now in Rye Patch Reservoir, the trail split. The southern arm lay along the Humboldt River, and the northern arm continued to the Black Rock Desert, where the trail again split, into the Lassen and Applegate segments. The Lassen segment ran west past the town of Gerlach, and the Applegate segment continued north along the west prong of the Black Rock Desert and through High Rock Canyon (Vanderburg, 1938, p. 8).

The Emigrant Trail study area extends northwest from the Basin-Range Province into volcanic plateaus, generally northwest of High Rock Canyon. Dry streams stretch from bare, craggy, colorful mountains into expansive, playa beds. The Black Rock Desert is the largest playa and is typically more than 10 mi wide; the western branch of Black Rock Desert playa extends from Gerlach to near Muddy Meadow Reservoir, a distance of more than 40 mi.

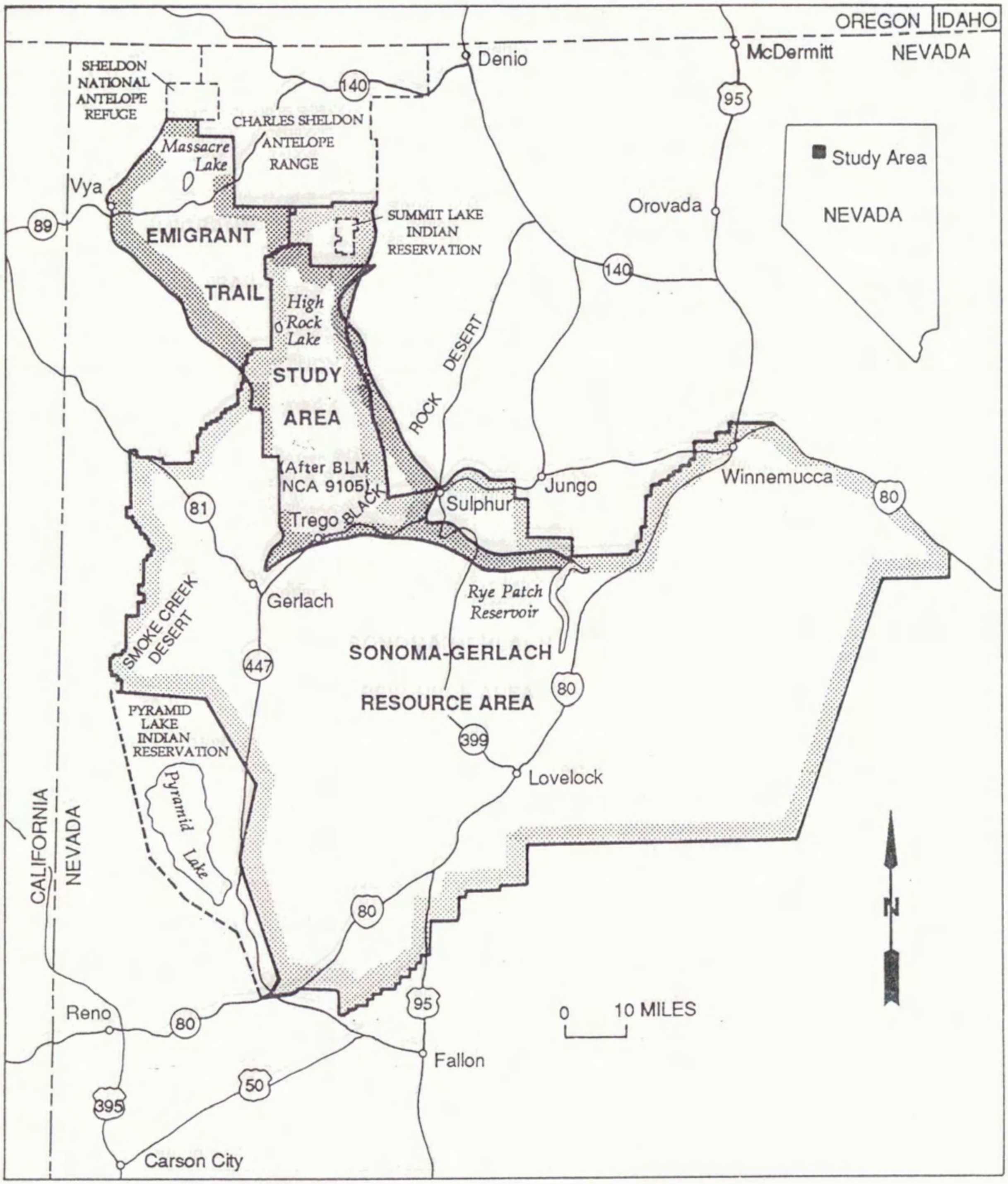


Figure 1.- Location of the Emigrant Trail Study Area, Humboldt, Pershing, and Washoe Counties, Nevada

The study area is at least 100 mi, by road, from Reno, NV, the closest metropolitan area (fig. 1). Major rail lines transect the south end of the study area. The interstate highway system (I-80) between Lovelock and Winnemucca is about 15 mi to the east of the southeast extension of the study area (pl. 1).

Previous Studies

Significant, previous mineral land assessment (MLA) reports by the USBM have been prepared in the study area and nearby in conjunction with the reviews of the Wilderness Study Areas (WSA's)(Neumann and Close, 1985; Olson, 1985 and 1986; Peters and others, 1987; Schmauch, 1986; Scott, 1987; Tuchek and others, 1984). Additional information on these WSA's was reported in bulletins of the U.S. Geological Survey (USGS)(Ach and others, 1987; Keith and others, 1987; Noble, Plouff, Bergquist, Barton, and Olson, 1987; Noble, Plouff, Bergquist, Neumann, and Close, 1987; Calzia and others, 1987; and Turrin and others, 1988).

National Uranium Resource Evaluation (NURE) studies covered the area (Castor and others, 1982; Cook, 1981; Geodata International, Inc., 1979; High Life Helicopters and Geodata International, 1979; Howell, 1979; Larson and Beal, 1978; and Qualheim, 1979).

Barringer Resources studied the general geology and geochemistry pertinent to WSA's (Connors and others, 1982).

Important Nevada State publications have summarized economic geology of the counties in the study area (Bonham, Jr., and Papke, 1969; Johnson, 1977; Overton, 1947; Smith, 1956; and Willden, 1964).

Numerous geologic mapping projects of the USGS, Nevada State agencies, companies, and individuals have been performed in parts of the area.

Present Study

USBM work was performed in three phases: prefield, field, and data interpretation and report preparation. Prefield work included research of geologic and mineral resource literature, mining claim records, and mine production data pertaining to the study area. Owners of patented and current or recently current claims were identified during searches of county and BLM records and were informed of the study. Records of mining claims located within Humboldt, Washoe, and Pershing Counties were utilized. These recordations and plots predominantly reflect only the mining claim activities from 1975 to 1992, and are a small fraction of the total number of claims recorded for the study area. Additionally, production records of the USBM were reviewed.

State, district, and area offices of the BLM were contacted for geological data, road and trail reports, and other information pertinent to the study including mine claim recordation.

USBM's MILS data were utilized extensively. Information was also used from the USGS's Mineral Resource Data System (MRDS), which was previously the Computer Resource Information Bank (CRIB). Most of these data were compiled from literature surveys of state and federal publications, including production records of the USBM. Detailed discussions of MILS information and terminology are in the appendix.

Three criteria were used to delineate areas of mineral resource development interest: concentrations of mining claims, prospects, or mines; similarity (geology, geophysics, geochemistry) to mining districts with past or present production; and favorable engineering probabilities. These areas of development interest do not include undiscovered resources, nor are they mineralized in whole.

Fieldwork was conducted in 1992. Mineral sites examined during USBM studies of WSA's from 1984 to 1986 were not routinely re-examined. All known mines, prospects, and mineral sites in the study area were sampled and mapped, if warranted. Information about most sites outside the study area was obtained from literature references and oral and written communications.

Rock samples (260) and alluvial samples (50) were analyzed. Rock samples were routinely analyzed for trace elements (34) at a contract laboratory. Details of sampling, analytical, and interpretive procedures are in the appendix.

ACKNOWLEDGEMENTS

Assistants during fieldwork and data preparation were William N. Hale and Clayton M. Rumsey, geologists at WFOC. Additional, appreciated assistance was received from temporary employees Ron M. Dixon, Teresa M. Kinley, and Jeffrey A. Moe.

MINERAL SETTING

Basin-range geomorphology in the southeast part of the study area merges with a region of volcanic plateaus to the northwest. The basin-range portion of the study area mostly lies southeast of the Black Rock Desert. It is a region of block-faulted and tilted mountain ranges and hills composed of shale, phyllite, schist, bedded carbonates, and quartzite. These rocks are locally intruded by coarse- and fine-grained igneous rocks, such as small intrusions southeast of the Antelope area (pl. 1). These intrusions may be related to silver mineralization here and be indicative of a north-trending mineralized zone from the Seven Troughs Mountains, according to oral and written communications of George Albino, geologist with the USGS (1992).

Extrusive rocks occur locally. Types of mineralization include sparse tactites, sulfide-bearing quartz veins, disseminations, and placers. Hot springs (Panteleyev, 1988) have been important mineralizing agents in the southeast part of the study area.

Volcanic rocks and fine-grained intrusive rocks predominate northwest of Soldier Meadow. Peralkaline rocks are prevalent at Soldier Meadow and nearby; compositions from rhyolite to basalt are present, and pyroclastic rocks and welded ash-flow tuffs are common. Hot-spring alteration and mineralization are the dominant types of mineralization at Soldier Meadow. Although mercury occurs locally at several sites, gold and other metallic occurrences are relatively sparse in the northwest part of the study area. Potential gold mineralization may be obscured by thick layers of volcanic rocks (Albino, 1992; Miller, 1988, p. 16).

A transitional zone lies between the Black Rock Desert and Soldier Meadow (pl. 1). A mixture of basin-range fault blocks and volcanic tableland topography occurs here.

Calderas, a significant feature of many gold exploration models, have been postulated widely throughout the area by many authors. Examples are Elephant Mountain (Olson, 1985, p. 7), east of the east-central side of the study area; the Conlon Camp Area (Schmauch, 1986, p. 5-6), in the north-central part of the study area; the Soldier Meadow area (Neumann and Close, 1985, p. 7), in the north-central part of the study area; Pahute Peak (also called Big Mountain), in the east-central part of the study area (Vic Dunn, geologist, BLM, 1985, oral commun., in Olson, 1986, p. 8), and Badger-Mahogany Mountain, in the north-central part of the study area (USGS and USBM, 1984, p. 3, 4). Park (1983) discussed postulated calderas in the Badger Mountain area and mapped thick, overlying, volcanic dome and eruptive deposits. Long Valley, at the northwest corner of the study area, appears to be a north-trending graben (topographic relief maps; Nevada Bureau of Mines and Geology and USGS, 1974).

Rhyolitic rocks, common in the north central part of the study area, erupted along linear fissures extending from several volcanic centers (Korringa, 1972, 1973).

Rocks with similarities to accreted terrains or tectonic wedges occur locally, as in the Black Rock Range and at the south end of the Calico Mountains, and are composed of bedded sedimentary rocks, including carbonates. No occurrences of gypsum (Jones, 1920, p. 150; Papke, 1987, p. 22-24, Nevada Bureau of Mines and Geology, 1992, p. 8), like those being mined at Empire, Nevada, about 10 mi south of the study area, were noted in the study area.

According to Albino (1992), remobilization of metallic elements during metamorphism in the study area produced a type of polymetallic veins; the metals in the veins are related to the host-rock geochemistry. These occurrences were believed by Albino to be similar to the Rochester, a precious-metal mine, which is in the Humboldt Range southeast of the study area. Albino believed that potential of the polymetallic, metamorphic occurrences in the study area was low to moderate.

Faulting has localized mineralization in the study area. Extensional, basin-range faulting has been most important; these faults trend north in the north part of the study area and northeast in the south.

Regional lineaments include the northeast-trending zone of Hose and Taylor (1974, p. 12). The zone extends from the north tip of the Granite Range to Denio and encloses the Soldier Meadow hot springs area. Northeast-trending magnetic anomalies are depicted in aeromagnetic data along the zone (Nevada Bureau of Mines and Geology and USGS, 1974). Northeast-trending magnetic lineaments, adjacent to the northwest, also coincide with the trend of the Badger Mountain-Pinto Peak area. Another regional, northeast-trending lineament extends from the Smoke Creek Desert along the east prong of the Black Rock Desert.

Sand and gravel occur abundantly in alluvial fans, along some stream courses, and in shorelines of ancient Lake Lahontan. Geothermal energy resources exist along range-front faults and in deep alluvial basins. Oil and gas potential of the study area is regarded as unfavorable and speculative (Sandberg, 1983a, p. 9 and 1983b).

MINING DISTRICTS

Mining districts in and near the Emigrant Trail study area include the Lone Pine, Donnelly Peak, Leadville, Trego Hot Springs, Sulphur, Rosebud, Rabbithole, Antelope, Scossa, Placerites, Majuba Hill, and Ryepatch (fig. 2) (Hill, 1912, p. 198-228; Lincoln, 1923; Vanderburg, 1936a, 1936b, and 1938; Ferguson, 1944; Schilling, 1969, 1976; Johnson, 1977; Bonham, Jr., and others, 1985; Albino, 1992). Like most mining districts in this region, these districts are generally not formally designated and may have vague and overlapping boundaries. These districts are associated with areas of development interest, although boundaries do not necessarily coincide. Details of mining district production and history are in descriptions of individual areas of development interest; individual mineral localities are reported in appendix table A-1.

A summary of reported production is in table 1. Twenty-nine or more precious- and base-metal mines in the study area and vicinity have yielded approximately 529,000 oz of gold, 2,345,000 oz of silver, 3,368,000 lb of copper, 10,905,000 lb of lead, and 2,400,000 lb of zinc.

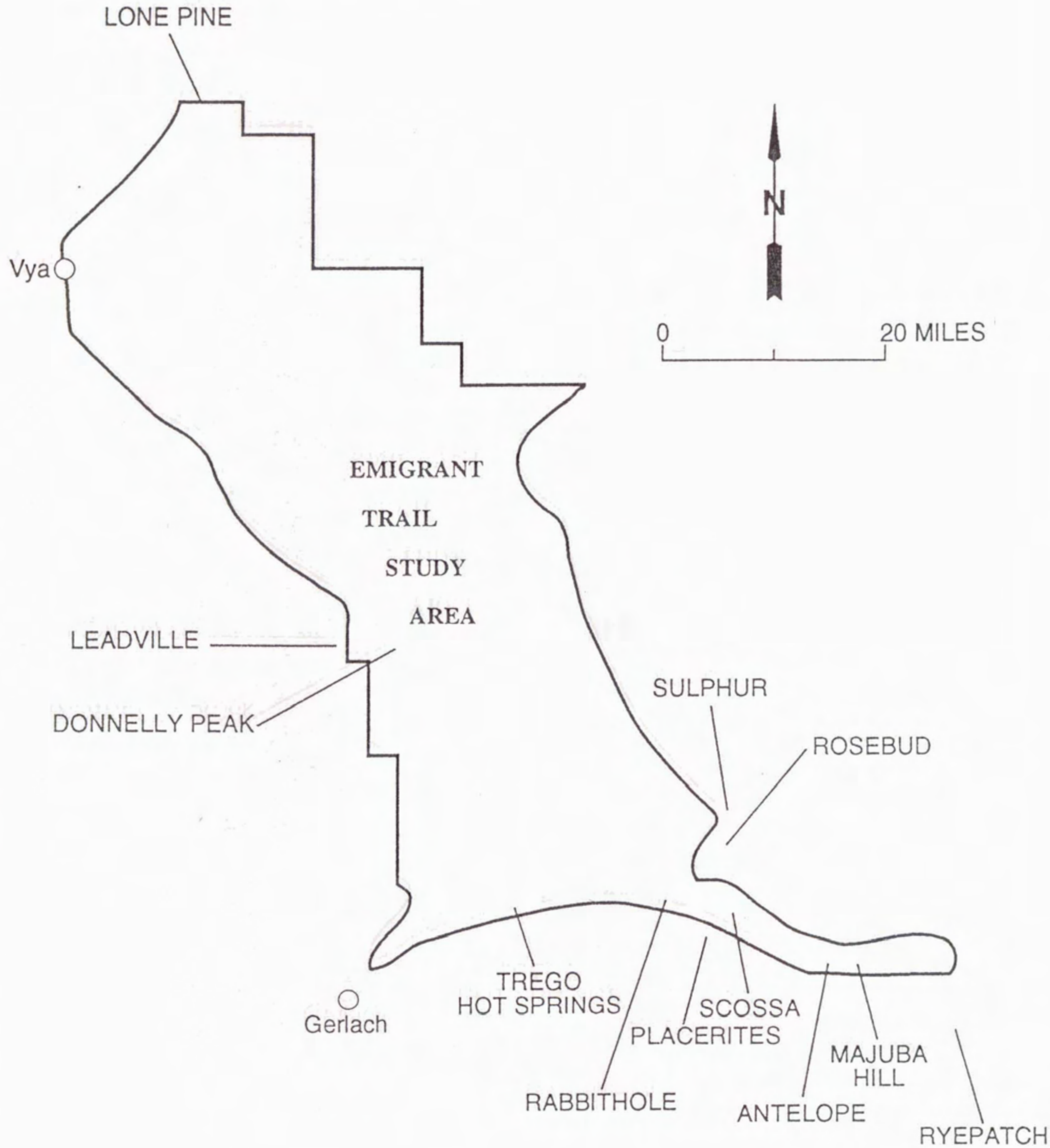


Figure 2. - Mining districts in the Emigrant Trail study area and vicinity, Humboldt, Pershing, and Washoe Counties, Nevada.

MINERAL AND ENERGY RESOURCES

Most important mineral and energy resources in the Emigrant Trail study area are gold, silver, copper, lead, zinc, gemstones (opal, silicified wood, agate, jasper, chalcedony), sand and gravel, and geothermal energy, all of which are believed to be of interest for development now or within the forseeable future. Localities containing, or similar to those containing, mineral or energy commodities are summarized in discussions of areas of development interest. Because geothermal energy resources, sand and gravel, and semiprecious siliceous gemstones occur in most areas of development interest, introductory, general data is presented first to avoid repetition. Nine additional commodities, which are unlikely to be developed in the area, but which are occasionally emphasized during exploration in the study area, are discussed at the end of the resources section. Detailed discussions of all 190 sites considered during this study are in the appendix, table A-1.

Table 1.--Mineral production from the Emigrant Trail study area and vicinity, Humboldt, Pershing, and Washoe Counties, Nevada

[After Vanderburg, 1936a, 1936b, 1938; Couch and Carpenter, 1943; Bonham, Jr., and others, 1985; Johnson, 1973, 1977; Knox, 1992; Bonham, Jr., and Hess, 1992; Nevada Bureau of Mines and Geology, 1992; production figures are minimums due to under-reporting;--, none or not available]

Mine Name	Map No. (pl. 1)	Gold (oz)	Silver (oz)	Copper (lb)	Lead (lb)
Hog Ranch	068	148,750	10,600	---------	---------
Leadville	079	-------	1,300,000	---------	4,900,000
Hycroft Res. Sulphur	138	352,940	399,922	---------	---------
Rosebud district	141	3,775	116,293	18,722	4,600
Rabbithole district	---	7,756	---------	---------	---------
Placerites district	159	2,500	---------	---------	---------
Scossa district	---	489	705	---------	---------
Nevada Superior	164	2,400	526,500	500,000	6,000,000
Majuba Hill	175	-------	---------	2,849,000	---------
Wildcat	189	10,000	---------	---------	---------
Total		528,610	2,354,020	3,367,722	10,904,600

Additionally: 40,000 tons of sulfur, 25 flasks of mercury (76 lb each), and 500 tons of alunite at or near the Hycroft Resources, Inc., Sulphur mine; 21,000 lb of tin at the Majuba Hill mine; 2,400,000 lb of zinc at Nevada Superior; 8,208 lb of mercury at the Hog Ranch mine; minor montmorillonitic clay (pl. 1, no. 133) at Rosebud Canyon.

Reported metallic mineral resources include about 1.1 million oz of gold. These are in the Emigrant Trail study area and nearby, table 2.

Table 2.--Metallic mineral resources in the Emigrant Trail study area and vicinity, Humboldt, Pershing, and Washoe Counties, Nevada

Property	Map No. (pl. 1)	Gold (oz)	Reference
Hycroft Resources Sulphur	138	413,000	Northern Miner (1992)
Rosebud LAC/Equinox[1/]	142	500,000	Walck and others (1992)
Wildcat	189	103,500	Knox (1992)
Total		1,086,500	

[1/] In addition, 5 million oz of silver resources are estimated by Walck and others (1992) at the Rosebud LAC/Equinox property. Several million tons of resources containing leach-grade gold and silver occur at the SP prospect of Santa Fe Pacific Mining, Inc. (Ron Parratt, geologist, oral commun., 1993).

Eight other localities are likely to have mineral-resource extensions from previously productive zones at depth or along strike. This is based on the type of past mineral production, the deposit geometry, and the type of mineralization. These sites are (pl. 1): the De Soto (Arsenic King) mine (silver, copper, lead, zinc), the Iron Mask (Silver King) mine (silver, copper, lead, zinc), the Last Chance mine (silver, lead, gold), Leadville (silver, lead), Majuba Hill mine (copper, tin), Nevada Superior mine (silver, lead, zinc), Old Noble (silver, lead, zinc), and the Poker Brown mine (silver, lead).

Common Study Area Commodities

These commodities are widespread in the study area or have similar physical characteristics; general, introductory comments are made to avoid unnecessary repetition during discussions of areas of development interest.

Geothermal Energy Resources

Geothermal energy resources occur at several localities in the study area and vicinity (Godwin and others, 1971; Keller and Grose, 1978a and 1978b; Muffler, 1973, 1978; Keller and others, 1978; Garside and Schilling, 1979). The geothermal resources (table 3) were the subject of intensive study by the USGS and individuals during the 1970's; customary metric units of measure used for those reports are repeated in this 1993 report. Outlines of two regions favorable for geothermal energy resources were shown by Crandell and Hamilton (1985) in the Double Hot Springs and Gerlach areas. Exploration and development of geothermal energy resources continues in and near the study area.

Significant portions of these known geothermal resource areas (KGRA's) are privately owned. Another consideration for developers is presence of the Desert Dace (a small, protected fish) at Soldier Meadow Hot Springs (Vic Dunn, geologist, BLM, oral commun., 1992).

These geothermal areas are associated with significant regional, range-front, or basin-range faults (Grose, 1978). Recharged surficial groundwater is probably the source of nearly all the water released by study area hot springs. Soldier Meadow, Double Hot Springs, and Fly Ranch geothermal areas are probably shallow, based on relatively high carbonate content, whereas Black Rock, Trego, and Great Boiling/Mud are deep, based on relatively high chloride content (Anderson, 1978, p. 21).

Heat sources of these Basin-Range geothermal areas may not be local, such as a cooling magma, or friction along faults. Rather, the thermal areas may be caused by trapping of slightly elevated thermal flow in deep prisms of sediments in the basins (Keller, and others, 1978, p. 76). Therefore, geothermal resources may be widespread in the Basin-Range province.

In contrast to statements in Keller and others (1978, p. 76) that geothermal power areas should have temperatures of at least 220 °C at less than 3 km depth to be economic, relatively low-temperature geothermal resources have been developed for energy production in recent years. Range of temperatures of reported geothermal power developments in Nevada is from about 107 °C to 221 °C, a temperature range which includes study-area geothermal reservoirs, and average is about 163 °C. Typical, relatively low-temperature geothermal energy producers include Empire (3.6 megawatts capacity from geothermal sources at 129 °C to 137 °C about 15 mi south of the study area) and Wabuska (1.2 megawatts from a geothermal source of 107 °C at 350 ft depth about 100 mi south) (Hess, 1992, p. 50). Relatively low-temperature energy developments also include those at Susanville, California (Munts and Peters, 1987, p. 23), about 100 mi to the southwest. At or near susanville, there are two geothermal energy sites (1.4 and 2.0 megawatts from geothermal sources at about 107 °C); in addition, there is a combined geothermal/waste-wood-burning powerplant, rated at 23 megawatts, but most of the power is from wood burning (Ken Nichols, engineer, Barbara Nichols Binary Geothermal Systems, oral commun., 1993).

A summary of geothermal energy resources is in table 3.

Table 3.--Geothermal energy resources in the Emigrant Trail study area and vicinity, Humboldt, Pershing and Washoe Counties, Nevada

[After White and Williams, 1975, and Muffler, 1978; map nos. on pl. 1; ---, not available]

Geothermal Area	Map No.	Temperature (°C)	Volume (km^3)	Energy Content ($X10^{18}$ Joules)
Soldier Meadow	---	115	12.0	3.00
Double Hot Springs	104	127	12.2	3.70
Black Rock Point	---	129	3.3	1.02
Fly Ranch	113	108	4.4	1.12
Gerlach	118	178	3.3	1.46
Trego	121	115	3.3	0.90
Humboldt House	---	217	3.3	1.82

Besides power generation, geothermal energy resources are also used for drying (primarily agricultural products), aquaculture (mainly warm-water fish, such as catfish), domestic heating, and greenhouses (including mushroom farming, as at Vale, Oregon).

Distance to markets and availability of similar or better geothermal resources outside the study area will delay development of KGRA's for power and non-power uses in the study area and vicinity; however, development interest is likely to occur within the foreseeable future.

Sand and Gravel

Sand and gravel occur widely in the study area and vicinity, in three general types of occurrence: alluvial fans, stream courses, and fossil lakeshores. Gradations of occurrences is common.

Sand and gravel were not tested. However, sand and gravel occurrences were observed to differ in their general properties in the study area by the type of occurrence. Volume, sorting, rounding, weathering, and caliche coating vary roughly according to type of occurrence. Contamination by siliceous, reactive, opaline or volcanic rocks occurs commonly in all types of gravel in the study area. All the types contain interbedded lenses of fine and coarse material, typically from 2 to 50 feet thick.

Alluvial-fan sand and gravel accumulations are the most widespread type in the study area. This material is typically not cleanly sorted into discrete coarse and fine fractions, is angular to subrounded, may be intensely weathered, and is commonly coated by caliche.

Stream-course sand and gravel occurrences are the next most abundant type of material in the study area. This gravel is typically cleanly sorted, rounded to well rounded, relatively unweathered, and occasionally caliche coated.

Ancient-shoreline sand and gravel occurrences take the form of benches, bars, and spits at diverse elevations (Russell, 1885). Erosion of the features has been minimal during the thousands of years since the various stands of Lake Lahontan. The Lake Lahontan climate was one of apparently great storms and powerful currents, as some of the geomorphological features, such as point bars, now-dry lagoons, and peninsulas, are hundreds of feet high and miles long, rivaling present-day, ocean-shoreline features. Gravel in these fossil, high-energy occurrences is locally cleanly sorted, subangular to well rounded, moderately weathered, and caliche coated or cemented. Sulfur coatings and lenses of peat a few inches thick occur locally.

Sand and gravel deposits lie within five miles of most construction projects in the study area and will continue to be used for small-scale, local road construction and maintenance. Use in larger, distant markets is unlikely within the foreseeable future because of the expense of transporting these bulky, heavy materials.

Siliceous Gemstones

Precious opal occurs near High Rock Lake (pl. 1). Common opal, petrified wood, agate, and jasper are locally abundant in the study area. Petrified wood, common opal, jasper, and agate are described in summaries of individual mineralized sites and in discussions of areas of development interest. Petrified, silicified wood of good quality, but limited quantity, occurs at Petrified Canyon (pl. 1, no. 103). The silicified wood, slightly uraniferous, proves that at least minor hydrothermal mineralization has taken place in Petrified Canyon.

Similar wood occurs east of the Hog Ranch Canyon mine (pl. 1, no. 68), at the George W. Lund Memorial Petrified Forest (pl. 1, no. 70). Some of the petrified tree trunks are standing; some contain unpetrified, fibrous carbon remnants. Uranium claims were explored at numerous small pits and trenches excavated in volcanic breccia and tuff (Garside, 1973). Most likely, uranium was deposited with scattered, carbonized wood fragments. Small, fossil, siliceous sinter deposits occur with the petrified wood.

Amounts of siliceous gemstones at any one locality would not support large-scale commercial mining. Small-scale mining and recreational collection will continue, particularly in the Black Rock opal area of development interest.

Areas of Development Interest

Areas of development interest (fig. 3) are discussed from north to south in the text, and individual sites within the areas are tabulated in appendix table A-1. They are either of interest now or could be of interest within the foreseeable future. Private property, including patented mining claims, underlies significant portions of some of these areas. A summary of areas of development interest, including types of mineralization and acreages, is shown in table 4.

Boundaries of areas of development interest are approximate; some areas are open-ended, indicating possible extensions. Intervening ground between areas may become of interest as knowledge of the area is improved.

Hot-spring mineralization occurs at 11 of the 25 areas of development interest. Combined hot-spring and sub-hot-spring mineralization are evident in seven areas. Polymetallic mesothermal vein mineralization occurs in six areas: Climax-type porphyry mineralization, with associated molybdenum, tin, or tungsten, occurs in three of these areas; gold, silver, lead, and tungsten are in two, and copper at one. There are three placer gold areas.

Some of these areas are tens of miles across. Economic mineralization will not occur continuously throughout the larger areas. For example, a mineable concentration of disseminated, low-grade gold may only be a few hundred feet across. High-grade occurrences may be even smaller. Although potentially rewarding, and undertaken on several occasions by individuals and companies, prospecting for scattered ore deposits in such large tracts can be expensive and time consuming.

Anomalous elements are mentioned during discussions of areas of development interest. The pertinent analyses are from limited sampling, are not inclusive of all significant commodities or pathfinders in these areas, and are not representative of mineral resources: anomalous or other levels are not inferred to have economic connotations. Examples of anomalous thresholds commonly used in this report for selected elements in hard-rock samples are: gold, 370 ppb: silver, 30 ppm; copper, 640 ppm; lead, 970 ppm; and zinc, 2,500 ppm. Additional thresholds are listed in the appendix text and in appendix tables A-3 and A-5.

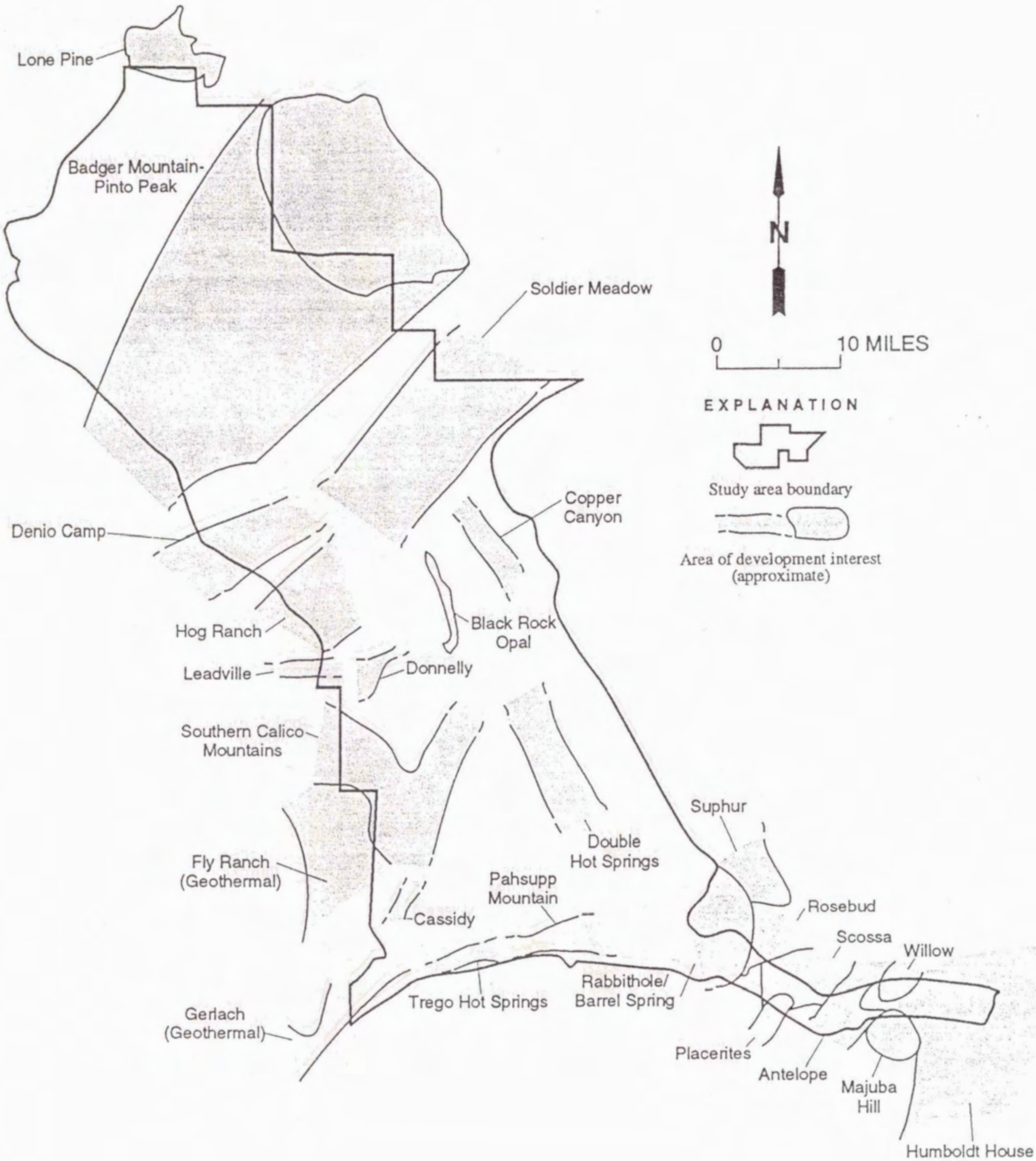


Figure 3. - Areas of development interest in the Emigrant Trail study area and vicinity, Humboldt, Pershing, and Washoe Counties, Nevada.

Table 4.-- Summary of areas of development interest in the Emigrant Trail study area and vicinity, Humboldt, Pershing, and Washoe Counties, Nevada

Area of Development Interest, north to south (showing mineral localities, pl. 1)	Type(s) of Mineralization	Acreage (within BLM May 1991 boundary)
Lone Pine (1, 2)	Hot spring, sub-hot spring; porphyry.	3,000
Badger Mountain-Pinto Peak (5-23)	Hot spring, sub-hot spring; porphyry	250,000
Soldier Meadow (24-39)	Hot spring; geothermal	87,000
Denio Camp (40-50)	Hot spring	17,000
Hog Ranch (63-77)	Hot spring (Albino, 1992)	24,000
Leadville (79-81)	Creede (Albino, 1992)	1,400
Copper Canyon (51-54)	Hot spring, sub-hot spring; tactite; porphyry	8,000
Black Rock opal (55-62)	Hot spring and sub hot spring	2,800
Donnelly (82-85)	Polymetallic mesothermal (Albino, 1992); porphyry gold (Hollister, 1993); granophile (Strong, 1988)	2,800
Southern Calico Mountains (87-103)	Hot spring, sub-hot spring; porphyry	46,000
Double Hot Springs (104-110)	Hot spring, sub-hot spring; porphyry; geothermal	23,000
Cassidy (114-116)	Epithermal hot spring; porphyry; polymetallic metamorphic (Albino, 1992); porphyry gold (Hollister, 1993); granophile (Strong, 1988)	3,000
Fly Ranch (geothermal) (113)	Geothermal; hot spring	4,100

Table 4.--Summary, areas of development interest, Emigrant Trail study area--Continued

Area of Development Interest, north to south (showing mineral localities, pl. 1)	Type(s) of Mineralization	Acreage (within BLM May 1991 boundary)
Gerlach (geothermal) (118)	Geothermal; hot spring	4,700
Trego Hot Springs (121)	Geothermal; hot spring; tactite	3,900
Pahsupp Mountain (122-127)	Polymetallic mesothermal and metamorphic veins and copper veins with tourmaline (Albino, 1992); granophile (Strong, 1988)	11,000
Sulphur (138-140)	Hot spring (Albino, 1992)	None
Rosebud (141-149)	Sub-hot spring (Albino, 1992)	1,300
Rabbithole/Barrel Springs (128-137)	Gold placers (Albino, 1992); sub-hot spring; porphyry	14,000
Placerites (159)	Gold placers (Albino, 1992)	1,300
Scossa (151-158)	Hot spring, sub-hot spring (Noble and others, 1987; Albino, 1992); porphyry.	7,500
Antelope (160-168)	Climax porphyry; polymetallic, mesothermal molybdenum and tin (Albino, 1992)	9,400
Willow (169-171)	Hot spring	1,900
Majuba Hill (172-179)	Climax porphyry; polymetallic, mesothermal molybdenum and tin (Albino, 1992)	900
Humboldt House (180-186)	Tungsten and polymetallic mesothermal veins, tungsten-beryllium pegmatites, and antimony mesothermal veins (Albino, 1992); Climax porphyry (Bloomstein, 1987); gold placers; hot spring	17,000

Lone Pine

Mercury has been mined on a small scale from the Lone Pine area (pl. 1, nos. 1, 2), and it has been intensively explored (Ross, 1941, p. 24-28; Bailey and Phoenix, 1944, p. 189-190; Smith, 1956, p. 120; Holmes, 1965, p. 269; Tuchek and others, 1984, p. 97, 102-103). Workings include four, large dozer trenches and dozens of small pits and trenches. Ruins of three retorts along Bald Mountain Canyon have had small production, judging from the amounts of tailings. Some tailings were confined by a small dam near the east end of the valley.

An intrusive body underlying thick volcanic rocks is conjectured to account for a magnetic anomaly, which closely corresponds to the extent of surficial mineralization (Green, 1984, p. 33; Cathrall and others, 1984, p. 65-82; Plouff, 1984, p. 45-48; USGS and USBM, 1984, p. 3, 4). Surficial mineralization is mostly volatile, gold-indicator elements, such as the mercury (Ashton, 1989).

Argillization, silicification, and limonite alteration are widespread in the Lone Pine area. Silicification is more abundant at outcrops at the west end of workings along Bald Mountain Canyon. Intense alteration of the volcanic rocks caused miners to refer to the friable deposits as "placer ground" (Engel, A.L., metallurgist, USBM, unpublished memorandum, March 25, 1959).

Opal, jasper, and chalcedony all crop out along Bald Mountain Canyon. Cinnabar and metacinnabar is in veins and disseminations in silica masses and in limonitic, argillic zones.

Subeconomic, highly anomalous amounts of mercury (as much as 83 ppm) and antimony (as much as 467 ppm), were found in USBM rock and alluvial samples (tables A-3 and A-5). As much as 487 ppm arsenic was found. More than 50 ppm mercury and 120 ppm antimony were found in alluvial sample concentrates. Rare-earth elements and associates were also anomalous (table A-3 maximums of 127 ppm cesium, 6 ppm europium, 20 ppm ytterbium, 1,500 ppm zirconium).

USBM sample analyses, geophysical observations, and geology are consistent with hot-spring, sub-hot-spring, and porphyry types of mineralization (Hollister, 1993; McMillan and Panteleyev, 1988; Strong, 1988; Panteleyev, 1988). The area was given high potential for discovery of mercury and precious- and base-metal sulfide deposits (USGS and USBM, 1984, p. 3). However, thick layers of andesite and basalt, which cap the ridges, probably obscure potentially mineralized rock adjacent to or within the hypothesized intrusion.

Although the Lone Pine area is of interest for precious and base metals, exploration and development would be relatively expensive because of thickness of overlying, unmineralized rocks.

Badger Mountain-Pinto Peak

Numerous mining claims have been located in the Badger Mountain-Pinto Peak area (pl. 1, nos. 5-23). Uranium prospecting was probably done here in the 1950's, prior to location of these claims, according to oral communications of Chester Nichols (1992). Tenneco, American Copper Nickel Company, Western Mining, and De Kalb have all performed exploration in the Badger Mountain-Pinto Peak area (Chester Nichols, claimant, oral commun., 1993).

Relatively barren, thick layers of volcanic rocks crop out extensively in the Badger Mountain-Pinto Peak area; however, alteration is intense and so extensive that it can be outlined by satellite imagery, according to Nichols (1992). Fractures and breccia zones in the volcanic rocks locally contain upper-level indicators, such as mercury, of gold mineralization.

Rhyolite caps ridges and overlies tuffaceous rocks. Wide zones of alteration include clay, limonite, and silica. Silica occurs as fossil hot-spring sinter, breccia cement, and veins. Silica varieties include opal, agate, jasper, petrified wood, and quartz crystals. One site (the Gold Plug or historical Massacre claim, pl. 1, no. 18), covered by quartz float, is apparently veined by north- and east-trending, subparallel, vuggy, crystalline-quartz and massive-chalcedony veins, typically a few hundred feet long and tens of feet wide over an area approximately 1,000 feet square (Chester Nichols, 1993).

Significantly, the area abuts the west side of a proposed caldera (Park, 1983; Green, 1984, p. 33; Cathrall and others, 1984, p. 65-82; Plouff, 1984, p. 45-48; USGS and USBM, 1984, p. 3-4; Turrin and others, 1988) and is adjacent to the Denio-Soldier Meadow hot-spring lineament, which extends to Hog Ranch mine (Hose and Taylor, 1974, p. 12). The hypothesized caldera area was given moderate to high potential for discovery of mercury and precious- and base-metal sulfide deposits (USGS and USBM, 1984, p. 3-4).

Moderate potential for precious and base-metal deposits was outlined by Ach and others (1987, p. 4) and Turrin and others (1988. p. 4) in and near Yellow Rock Canyon; however, interest in developing mineral resources has been slight in this area in spite of the classification. Explanations are inaccessibility, enclosure within wilderness study area boundaries, and administrative withdrawals (such as BLM actions NV-930-4210-06 and N-52465, which concern the High Rock ACEC).

Moderate potential for volcanogenic uranium was given to the whole Massacre Rim study area (Causey, 1987; Bergquist and others, 1988), in the center of the northwest part of the Badger Mountain-Pinto Peak area. The east half was given moderate potential for hot-spring-type silver, gold, and mercury deposits. These classifications were based on geology, geochemistry, and geophysics. No mineral exploration or mining claim activity are known in the Massacre Rim area.

Western Mining drilled three holes, each about 500 ft deep, on the Grassy Canyon claims. This drilling, and surface exploration which included mapping, sampling, aeromagnetic surveying, and interpretation of satellite imagery, revealed extensive argillic alteration and silicification, but little gold at the surface or in the drill holes. Significant mercury and arsenic were reported. The satellite imagery interpretations revealed about 200 tonal anomalies in this region; Western Mining evaluated about half of these during helicopter reconnaissance mapping and found minor gold (Larry Smith, geologist, Western Mining Corporation, USA, oral commun., 1993). Likewise, a few holes 400 ft to 500 ft deep, drilled in the area by American Copper Nickel Company showed indicative mercury and arsenic and low, detectable amounts of gold (Mel Lahr, geologist, American Copper Nickel Company, oral commun., 1993).

More than 50 ppm of anomalous mercury was found in USBM samples (table A-3). Uranium, rare-earth elements, and rare-earth associates are also anomalous in this area (table A-3) with maximums of 26 ppm uranium, 7 ppm europium, 6 ppm tantalum, 42 ppm hafnium, 2.0 ppm lutetium, and 1,200 ppm zirconium). Other maximums were 9 ppb gold, 12 ppm silver, 101 ppm arsenic, and 164 ppm antimony. Scott's (1987, p. 16) samples nos. 13 and 16, taken to the east at lower elevations along Yellow Rock Canyon, respectively contained 1,405 and 1,120 ppb gold and 0.380 and 0.770 ppm silver.

As in the Lone Pine area, geochemistry, geophysics, and geology support the presence of hot-spring, sub-hot-spring, and porphyry mineralization here (Hollister, 1993; McMillan and Panteleyev, 1988; Strong, 1988; Panteleyev, 1988). The area will be of continuing interest for development of disseminated and high-grade deposits of gold; greatest interest would be for hidden mineral deposits at depth. Costs of exploring and developing deep, bonanza targets will be relatively high.

Soldier Meadow

The Soldier Meadow area (pl. 1, nos. 24-39) is historically important as a wintering camp for travelers and troops in charge of the Summit Lake Indian Reservation.

Volcanic rocks crop out in the bluffs overlooking alluvial fans, old lake deposits, and hydrothermally altered rocks. Extensive opaline and chalcedonic silicification, argillization, and limonitic alteration occur widely in this hot-spring, range-front environment.

Hot springs at Soldier Meadow are bimodally distributed around 70 °F and 126 °F. Maximum temperature at the surface is about 129 °F. Discharge has been estimated at 500 gpm (Mariner and others, 1975, p. 11; Garside and Schilling, 1979, p. 38). The geothermal springs are aligned with others to the northeast along a lineament identified by Hose and Taylor (1974, p. 12). White and Williams (1975, p. 42-43) estimated that the reservoir here contained about 12 km^3 at about 115 °C and a heat content of $0.7X10^{18}$ cal, or about $3X10^{18}$ J.

Maximum anomalous analyses in USBM rock samples (table A-3) in mercury (more than 50 ppm), molybdenum (32 ppm), uranium (29 ppm), rare-earth elements and rare-earth associates (113 ppm cesium, 608 ppm lanthanum, 1,100 ppm cerium, 98.2 ppm samarium, 14 ppm terbium, 35 ppm ytterbium, 5.1 ppm lutetium, 43 ppm hafnium, 6 ppm tantalum, and 1,500 ppm zirconium) occur in the Soldier Meadow area of development interest. Samples contained as much as 274 ppm arsenic and 42.5 ppm antimony. Concentrates of an alluvial sample (table A-4) contained an estimated equivalent of $0.60/$yd^3$ in placer gold (at $370/oz gold price). These analyses probably reflect hot-spring mineralization and the composition of the undifferentiated, peralkaline (Al_2O_3 less than NaO plus K_2O) volcanic rocks. The Soldier Meadow area will be increasingly interesting to prospectors for hot-spring-type gold deposits.

Denio Camp

Volcanic rocks crop out extensively in the Denio Camp area (pl. 1, nos. 40-50), which lies north of the Hog Ranch area.

The Denio Camp area contains lithologies favorable for precious and base-metal deposits, such as brecciated volcanic rocks; small bodies of perlitic rocks crop out. The rocks are limonitic and have been extensively argillized and silicified. Devitrification of the volcanic rocks has occurred locally. The rocks are similar to those at the Hog Ranch mine (pl. 1, no. 68) and lie on or near the vicinity of the same, northeast-trending lineament (Hose and Taylor, 1974, p. 12) that hosts the mine. Similarity of geology here and at the Hog Ranch mine prompts classifying the Denio Camp area as a hot-spring environment.

Analyses of USBM samples (table A-3) taken from the Denio Camp area contained maximum anomalies in rare-earth elements and rare-earth associates (148 ppm cesium, 19 ppm ytterbium, 1.8 ppm lutetium, and 850 ppm zirconium). Samples (table A-3) also contained as much as 10 ppb gold, 1,120 ppm arsenic, and 105 ppm antimony.

Keith and others (1987, p. 4) mapped moderate potential for epithermal gold and silver in the area. Additionally, Numerous abandoned and active mining claims show the high degree of current and anticipated future interest for hot-spring gold deposits in the Denio Camp area.

Hog Ranch

The Hog Ranch area (pl. 1, nos. 63-77) is a gold-silver area; it is commonly included with the Leadville mining district.

The Hog Ranch mine (pl. 1, no. 68), is at the intersection of two major crustal structures. One structure is the northeast-trending lineament extending to Denio (Hose and Taylor, 1974, p. 12); Mesozoic intrusive rocks generally crop out southeast of this structure, which may have thousands of feet of vertical displacement. The other, intersecting structure trends north along the Granite Range (Larry Smith, geologist, Western Mining Corp., USA, oral commun., 1993). Silicified, brecciated, argillized, limonitic volcanic rocks crop out and are classified as hot-spring gold deposits (Albino, 1992). At the Hog Ranch mine gold mineralization spread out from feeder veins into permissive zones of interlayered silicified, argillized, sericitic volcanic rocks and tuffs. Replacement and primary breccias are abundant. Boulders of ore-grade rock occur abundantly at some localities and are difficult to mine.

At the Hog Ranch mine, initial plans were to mine 800,000 tons of ore annually (Rocky Mountain Pay Dirt, March, 1986, p 31A); by 1991, 148,750 oz of gold, 10,600 oz of silver, and accessory mercury had been produced (Bonham, Jr., and Hess, 1992, p. 25; Nevada Bureau of Mines and Geology, 1992, p. 5). The mine was in its final stages of operation in 1992 and reclamation was becoming the predominant activity.

Cut-off grade was 0.03 oz/ton gold, and average grade was about 0.041 oz/ton. Blending of ore grades was common. Assay boundaries were determined by analyses of cuttings from blast holes: no visible indication of gold-enriched rock exists.

Kriging of ore grades at the Hog Ranch mine was not recommended during oral communications with Mine Superintendent Dan Smith (1992). Good results were obtained with simple four-point averaging: gold production was matched within about 2 percent, and tonnage within about 10 percent.

Anomalous, maximum molybdenum (43 ppm), cobalt (41 ppm), lutetium (1.5 ppm), and tantalum (5 ppm) occurred in USBM rock samples in this area (table A-3). Samples also contained as much as 54 ppb gold and 714 ppm arsenic. According to oral communications of Quentin Brown (1992), geologist with ASARCO, the JABO claims, east of Hog Ranch Canyon, yielded samples from drill holes with gold analyses of as much as 0.1 oz/ton gold locally and 0.02 to 0.03 oz/ton gold over 20 to 30 ft; little gold is shown at the surface.

An environmentally sensitive, threatened variety of buckwheat grows selectively on silicified, acid-leached rock and soil at the Hog Ranch mine and elsewhere in northwestern Nevada (Ken Collum, geologist, Western Mining Corp., USA, oral commun., 1993; Joe McFarlan, BLM geologist, oral commun., 1992). This buckwheat is being cultivated by Western Mining Corp., USA, as part of a comprehensive, extensive, and effective reclamation program. Other reclamation procedures include limited backfilling of pits, extensive contouring, road removal, and establishing other native communities of vegetation.

Keith and others (1987, p. 4) identified moderate potential for epithermal gold and silver in the area. Extensive groups of active and abandoned claims occur in the Hog Ranch area. Additional interest in developing hot-spring gold deposits here should be anticipated. Geophysical exploration methods, such as magnetic and gravity surveys, have been used in the Hog Ranch area and nearby areas of development interest, because these volcanic-hosted deposits are rather randomly distributed and may be obscured by more recent volcanics (Ken Collum, geologist, Western Mining, Corp., USA, oral commun., 1993). According to Larry Smith (geologist, Western Mining Corp. USA, oral commun., 1993), the Hog-Ranch type of gold deposit is too low grade for underground mining, and unless indicative gold amenable to open-pit mining were found, Western Mining Corp., USA, discontinued evaluation of Hog-Ranch-type prospects in the region.

Leadville

The Leadville area (pl. 1, nos. 79-80), centered on a group of patented mining claims (pl. 1, no. 79) with significant past production, was an important lead and silver producer prior to 1940's. The Leadville mining district is usually considered to include the Hog Ranch mine. However, because they show different modes of mineralization, the Leadville and Hog Ranch areas are discussed separately.

Creede-like silver-lead veins occur at Leadville (Albino, 1992). Thick, strongly continuous sulfide veins, surrounded by argillized, limonitic rock, trend east and dip steeply. Prominent structure in the area is divergent from the northeast-trending Denio-Soldier Meadow zone of Hose and Taylor (1974, p. 12). Large-scale gash fracturing in that zone could account for the discordant trends. The Leadville deposit veins align with the Donnelly area.

Peters and others (1987, p. 8) reported that the Leadville district yielded more than 1.3 million oz of silver and 4.9 million lb of lead from 1910 to 1927. The Leadville mine yielded more than 1 million oz of silver, 3.5 million lb of lead, and minor gold and copper (Bonham, Jr., and others, 1985, p. 91). The Leadville Mines Company produced 3,024 tons of ore worth $462,336, and the Tohoqua Mines Company produced 649 tons of ore worth $73,611. Production at Leadville had a ratio of 4 to 8 oz of silver for each percent of lead, with somewhat more zinc than lead, and minor copper (Bonham, Jr., and Papke, 1969, p. 67; Overton, 1947, p. 15-16).

A USBM sample (table A-3) from the Prong mining claim group contained anomalous zirconium (670 ppm). Samples also contained as much as 10 ppb gold.

Lead-silver resources most likely remain in the underground workings of the patented mining claims and similar mineralization has been postulated nearby (Bonham, Jr., and Papke, 1969, p. 67-69). Interest in developing base metal deposits with associated precious metals should be expected in the Leadville area.

Copper Canyon

Allen Hardin, traveling the Emigrant Trail in 1849, prospected Pahute Peak near the Copper Canyon area (pl. 1, nos. 51-54) after finding silver ore nearby. This ore, however, was conjectured to have been float hornsilver from the south near Sulphur (Vanderburg, 1938, p. 9).

According to oral communications of BLM geologist Delores Cates (1992 and 1993), economic geology in the Copper Canyon area is complex. At least two types of granitic rock, plus a gabbroic rock, occur. Permo-Triassic(?) limestone and altered maroon sandstone beds also crop out. She believed that these are possibly parts of accreted terrain, which includes Black Rock Point, at the south end of the Black Rock Range. Zinc-bearing skarns at Pahute Peak may fit models of Meinert and others (1980, p. 314-317) in which distant magma bodies were the source of mineralization (Olson, 1986, p. 10).

According to Cates, at least two periods of hydrothermal activity are evident. Mesozoic mineralization was followed by highly siliceous opalite capping, probably related to Tertiary faulting. Veins a few miles south of Copper Canyon contain fluorite, magnesite, quartz, calcite, and opalite.

Fluorite occurs south of Copper Canyon in the Black Rock Range, east of Muddy Meadow Reservoir. The fluorite is in lenticular veins at and near the contact of intrusive granitic rocks with metasedimentary rocks. Exposed volumes of fluorite are too small to be economic; likewise, long distance to markets is detrimental to mining fluorite.

A faulted zone, parallel to the western range front of the Black Rock Range and south of Copper Canyon is hundreds of ft wide and contains a narrower zone, investigated by Olson (1986, p. 10). This structure is 20 to 30 ft wide and composed of silicified, argillically altered volcanic and intrusive rocks. Trend of this zone roughly aligns with that of the Double Hot Springs zone (pl. 1), several miles to the south. Noble, Plouff, Bergquist, Barton, and Olson (1987, p. 4) reported possible geothermal connections between the Copper Canyon and Double Hot Springs areas and widespread mineral potential around Pahute Peak.

Olson's zone contains limonite, pyrite, chalcopyrite (?), and arsenopyrite (?); it includes as much as 2,800 ppb gold, 1.6 ppm silver, 17 percent arsenic, and 33 ppm antimony (Olson, 1986, p. 10; Noble, Plouff, Bergquist, Barton, and Olson, 1987, p. 5).

Samples (table A-3) taken from the Copper Canyon area during this USBM study contained anomalous maximums of 583 ppb gold, more than 300 ppm silver, 2,705 ppm copper, 2,752 ppm lead, more than 30,000 ppm zinc, 31.24 ppm mercury, 1,890 ppm arsenic, 6,510 antimony, 160 ppm cadmium, 296 ppm molybdenum, and 14,700 ppm barium.

Hot-spring, sub-hot-spring, tactite, and porphyry types of mineralization all are consistent with this geochemistry and geology (Hollister, 1993; McMillan and Panteleyev, 1988; Strong, 1988; Panteleyev, 1988).

Prospecting and several generations of mining claims in Copper Canyon (and in several drainages to the south), sulfide-bearing tactites in Copper Canyon, fluorite occurrences, gold and silver anomalies, occurrence of gold-pathfinder elements, and apparent, mineralized range-front faults (Olson, 1986, p. 10), all support listing the Copper Canyon area as having development interest.

Black Rock Opal

The Black Rock opal area (pl. 1, nos. 55-62) was outlined by Neumann and Close (1985, p. 9), and Noble and others (1988, p. 3, 6). The opal is cloudy to transparent and colorless to colored, including red, brown, and green. Precious opal, present as small percentages of common opal, is mostly unstable, tending to dehydrate and fracture. However, some precious opals, in discrete pockets, retain their fire, clarity, and luster, according to oral communications of BLM geologist Delores Cates (1992 and 1993). According to Cates, the stable opal seems to be associated with a "brown matrix". She also mentioned that other rocks exhibited a type of "rock bursting", which may be an instability factor of the opal. For example, some basalt in the Black Rock opal area emits cracking sounds when excavated.

In Cates' opinion, opal mineralization was associated with siliceous fluids flowing from the Black Rock Range several miles to the east. Low-temperature hydrothermal fluids flowed up along permeable layers in the east-dipping volcanic pile. Opal accumulated along fractures and vesicles in basalt near its contact with overlying tuff.

Presence of a WSA, which includes part of the opal area, has subdued exploration interest. However, numerous mining claims, including patented claims, collecting, and small-scale mining of opal support the conclusion that the Black Rock opal area will continue to be of interest.

Donnelly

The Donnelly area (pl. 1, nos. 82-85) was active in the early 1900's and is said to have produced about $90,000 in gold between 1907 and 1938 (Lincoln, 1923, p. 234). Vanderburg (1938, p. 20-21) reported the mining of 54 tons of ore containing 47 oz of gold and 65 oz of silver, worth $1,691. Several groups of mining claims cover the mineralized areas.

Albino (1992) has proposed that the deposits are gold-rich, polymetallic, mesothermal occurrences, perhaps the result of remobilization of metallic elements during metamorphism. The mineralization also has affinities to the proposed porphyry gold model of Hollister (1993) and granophile model of Strong (1988).

An abundance of quartz veins, silicified breccias, and stockworks in a diverse range of sizes occur and include high-grade and disseminated precious-metal mineralization. Coarse-grained granitic intrusives, slate, quartzite, and volcanic rocks crop out; all are mineralized locally. The Donnelly area appears to align with prominent deposit trends in Leadville, several miles to the west.

USBM rock samples (table A-3) contained highly anomalous maximums of more than 10,000 ppb gold, 48 ppm silver, and 1,597 ppm lead; they also contained as much as 451 ppm arsenic. Alluvial sample concentrates (table A-5) contained anomalous maximums of 1,860 ppb gold and 250 ppm lead; maximum arsenic was 203 ppm.

Tonnage, grade, and geometry of mineralized rock, and the extent of reserve depletion in underground workings are unknown; however, visibly mineralized rocks crop out over hundreds of feet. The Donnelly area will continue to be of interest for high-grade and disseminated gold-silver deposits.

Southern Calico Mountains

Many mining claims have been staked in the Southern Calico Mountain area (pl. 1, nos. 87-103). Numerous claims are current. Many of these are the holdings of Ferrett Minerals, which has prospected the Southern Calico Mountains for more than a decade. Several drilling programs have been completed.

Colorful, intense, and widespread brecciation, silicification, argillation, and iron-enrichment of volcanic rocks are ubiquitous. Hot springs occur to the southwest, in the Fly Ranch geothermal area.

Sahli (1984) has reported near-economic concentrations of gold and gold-pathfinder elements over areas hundreds of feet across in the Southern Calico Mountain area. His averages for 246 samples were 81 ppb gold, 0.428 ppm silver, 1.089 ppb mercury, and 139.5 ppm arsenic. USBM rock samples (table A-3) contained anomalous maximums of 3,800 ppm barium, 31 ppm tungsten, 95 ppm molybdenum and 7 ppm tantalum. Other maximums were 20 ppb gold, 4.099 ppm mercury, 247 ppm arsenic, and 46.2 ppm antimony. Alluvial sample concentrates (table A-5) contained no anomalous analyses but as much as 29 ppb gold, 208 ppm arsenic, 26.6 ppm antimony, 1,100 ppm zinc, and 2,800 ppm barium.

Geology and geochemistry support classification of the Southern Calico Mountain area as one of hot-spring, sub-hot-spring, or porphyry types of mineralization (Hollister, 1993; McMillan and Panteleyev, 1988; Strong, 1988; Panteleyev, 1988).

The Southern Calico Mountain area will continue to be of strong developmental interest, although presence of a WSA has decreased the intensity of exploration activity.

Double Hot Springs

Double Hot Springs and Black Rock Hot Spring were important watering places for early travelers crossing the deserts of Nevada on the Emigrant Trail and are, respectively, at the north and south ends of the Double Hot Springs area (pl. 1, nos. (104-110). Black Rock is a prominent, pyramidal landmark that guides travelers to this historically important site.

Geology in the Double Hot Springs area is complex. Volcanic rocks, lakeshore gravels, alluvium, and playa beds crop out widely. Silicic hot spring accumulations occur on the historic Double Hot prospect (pl. 1, no. 105). Mafic intrusives, some gabbroic, crop out locally. An unusual, faulted block of limy, marine, fossiliferous basaltic breccias constitutes Black Rock Point and lies with bedding nearly vertical. Fossiliferous assemblages at Black Rock contain abundant crinoid parts and other fossils representative of marine, eugeosynclinal deposition (Howe, 1975, p. 7-9). Range-front faulting has localized the hot springs.

The limestone and basaltic breccia are favorable host rocks. They contain barite, barytocalcite(?), calcite, quartz (including chalcedony), chlorite, epidote, adularia(?), and cinnabar(?) veins. Traces of metallic minerals occur in fine, gray disseminations and masses. The rocks are locally sulfur coated.

The Double Hot Springs area presents a tempting color anomaly. Rocks appear similar to those in the southern Calico Range and in the Sulphur mining district.

USBM rock samples (table A-3) contained anomalous maximums of more than 50 ppm mercury, 260 ppm nickel, 3 ppm terbium, 44 ppm ytterbium, 6.6 ppm lutetium, and 1,100 ppm zirconium. Other maximum rock analyses were 12 ppb gold, 131 ppm copper, 620 ppm zinc, 166 ppm arsenic, 19 ppm antimony, and 1,600 ppm barium. Alluvial sample concentrates (table A-5) contained anomalous maximums of

2,710 ppb gold, more than 20,000 ppm barium, 24 ppm molybdenum, 480 ppm nickel, 3.4 ppm lutetium, 140 ppm hafnium, and 5,300 ppm zirconium. The alluvial concentrates also contained as much as 125 ppm copper, 1,500 ppm zinc and 109 ppm arsenic.

Indications are that types of mineralization in the Double Hot Springs area are similar to those in the Copper Canyon area and in the southeast portion of the study area, between Rye Patch Reservoir and Sulphur, where anomalous copper, zinc, cobalt, and nickel occur at mines.

Double Hot Springs, Black Rock Hot Spring, and others flow along a zone of range-front faults several miles long west of Black Rock Point (Russell, 1885, p. 52-53, Olmsted and others, 1975, p. 119-128). Flow rate at the springs and from seeps between springs is adequate to sustain large, grassy and brushy meadows, even in the arid Black Rock Desert. Additionally, geothermal potential exists on trend between the Double Hot Springs and Copper Canyon areas (Noble, Plouff, Bergquist, Barton, and Olson, 1987, p. 4).

The Double Hot Springs-Black Rock Hot Springs geothermal belt has a maximum surface temperature of 202 °F (Hose and Taylor, 1974, p. 12; Garside and Schilling, 1979, p. 35-36, 58). During this 1992 USBM study, flow rate of Double Hot Springs was estimated at more than 400 gpm at a temperature of 180 °F; flow rate of Black Rock Hot Spring was estimated to be more than 50 gpm. Muffler (1978, p. 74-75) estimated that the Double Hot Springs area had a reservoir at about 127 °C containing 12.2 km^3 and 3.7×10^{18} J; the Black Rock Point area was estimated to contain a reservoir at about 129 °C containing about 3.3 km^3 with 1.02×10^{18} J.

Prospecting can be expected to continue in the Double Hot Springs area, particularly for hot-spring gold along range-front faults and other structures, although sub-hot-spring and porphyry types of deposits may also be present (Hollister, 1993; McMillan and Panteleyev, 1988; Strong, 1988; Panteleyev, 1988).

Cassidy

The Cassidy area (pl. 1, nos. 114-116) was worked by the Cassetty Brothers during the early 1900's, according to oral communications of Fred Solheim (1992), who has explored for minerals in the area. Other claim groups, including the Buckhorn and Black Rock, have been located near the mine.

Reportedly, a few railroad carloads of ore were shipped from the Cassidy mine (pl. 1, no. 115) by the Cassetty Brothers in the 1930's; the ore yielded about 1.5 oz/ton gold and 2 oz/ton silver. Underground, hard-rock workings on several levels are a few hundred feet long. Early miners also worked shallow, underground placers along bedrock below cemented alluvium (Solheim, 1992).

Quartz veins contain spotty, high-grade ore shoots, and brecciated volcanic and schistose wallrock is also mineralized at the mine. Extent of the mineralized rocks has not been published. Nearby hot springs, and metamorphism were mentioned by Solheim (1992) as possible sources of gold and silver. Accreted(?) sedimentary rocks (Cates, 1992 and 1993) occur at and near the Cal claims, Steamboat Rock, the Calico Cat, and Cassidy mine. Distinctive, localized gravity highs (Saltus, 1988a and 1988b) and magnetic highs (Hildenbrand and Kuchs, 1988a and 1988b) in the Cassidy mine area may overlie dense, magnetic rocks, including a possible intrusive source of the gold mineralization; however, USGS geologist George Albino (1992) believed that metamorphism and polymetallic mineralization were most important.

USBM rock samples (table A-3) in the Cassidy mine area contained anomalous maximums of more than 10,000 ppb gold, 38 ppm silver, 3,190 ppm lead, 82 ppm tungsten, and 66 ppm bromine; rock samples also contained maximums of 779 ppm arsenic and 103 ppm antimony. Alluvial sample concentrates (table A-5) contained anomalous maximums of 250 ppm lanthanum, 560 ppm cerium, 40.8 ppm samarium, and 12 ppm tantalum by analysis. Alluvial concentrates of a sample (table A-4, no. ETMM018) contained about $0.30/yd^3 in placer gold (gold price of $370/oz).

Interest in the Cassidy mine area will continue for high-grade and disseminated gold. Possible models of mineralization include polymetallic (Albino, 1992), porphyry gold (Hollister, 1993), granophile (Strong, 1988), and epithermal (Panteleyev, 1988).

Fly Ranch (Geothermal)

Extensive geothermal activity has been long known at the Fly Ranch (pl. 1, no. 113; sometimes called Hualapai or Ward's Ranch) area (Russell, 1885, p. 52-53; Olmsted and others, 1975, 119-128; Garside and Schilling, 1979, p. 72-74).

Crewdson (1976, p. iv) reported on electrical geophysical surveys of the Fly Ranch geothermal area (pl. 1, no. 113) and inferred a two-square-mile source of hot water some three miles north of Fly Ranch Hot Springs; depth to the top of the zone was estimated to be 430-610 m. Gravity modeling indicated that basement rocks are overlain by about 1,000 m of alluvium and playa sediments. Vertical permeability of reservoir rocks was believed to be low whereas horizontal permeability may be high locally. Crewdson (1976, p. v, 159-160) hypothesized that a magmatic heat source was not necessary for geothermal reservoir formation in the Fly Ranch geothermal area, and suggested that insulation by low-conductivity sediments could retain heat in a region of moderately elevated heat flow. Muffler (1978, p. 76-77) estimated a reservoir of about 4.4 km^3 at about 108 °C and 1.12×10^{18} J.

Resources of geothermal energy exist in the Fly Ranch area and will be of greater interest in the future as other energy sources, nearer markets, are utilized or depleted.

Gerlach (Geothermal)

Captain John C. Fremont discovered the Great Boiling Springs of Gerlach (pl. 1, no. 118) on January 6, 1844 (Overton, 1947, p. 48; p. 51-53). Siliceous sinter has been deposited at the springs, which have been developed for bathing and swimming.

The Gerlach geothermal area (Olmsted and others, 1975, p. 128-149) has surface temperatures of 208 °F (Mariner and others, 1975, p. 12; Garside and Schilling, 1979, p. 74-78; White and Williams, 1975, p. 14-15). Muffler (1978, p. 50) estimated that a reservoir at about 178 °C contained 3.3 km^3 and about 1.46 X 10^{18} J. According to Cates (1992 and 1993), warm springs occur along the east side of the Calico Mountains north of Gerlach.

Crewdson (1976, p. 160-163) inferred that thickness of sediments above bedrock at the Gerlach geothermal area was a maximum of 1,700 m. The hot-water reservoir was estimated to lie at depths greater than 300-500 m. A marginally economic geothermal reservoir was hypothesized to lie two or three miles north-northeast of Gerlach Hot Springs. Crewdson suggested (1976, p. v) that magma intrusions were not the source of heat, but that trapping of slightly higher crustal heat flow accounted for the geothermal reservoir.

Geothermal energy resources in the Gerlach area can be expected to become more important as other energy sources are utilized or depleted.

Trego Hot Springs

The Trego Hot Springs (Russell, 1885, pl. XIII) area is also called the Butte Hot Springs or Garrett Ranch area. Trego Hot Springs (pl. 1, no. 121) is, like the Double Hot Springs area, of interest for metallic mineralization as well as for geothermal energy. Remains of foundations of a small building at the spring may have been part of an early millsite, possibly a stamp mill.

Alluvial fan deposits, playa beds, and sand dunes occur in the area. Accumulations of hot-spring sinter and travertine have been deposited locally. Granitic and volcanic rocks crop out in the hills adjacent to the south.

Hot-spring gold mineralization (Panteleyev, 1988) along range-front and related faults are indicated by anomalous mercury (more than 50 ppm) in a USBM rock sample (Table A-3, no. ETMM011) from the sinter at the hot spring. Tungsten skarns and anomalous tungsten occur near the Trego Hot Springs area at the Arcturus mine patented claim (pl. 1, no 120)(Stager and Tingley, 1985, 1988, p. 197-198; Albino, 1992).

In 1992, flow rate of Trego Hot Springs was estimated at about 300 gpm, and temperature was 180 °F, close to the 182 °F measured in 1885 by Russell (1885, pl. XIII). Surface spring temperatures may be as high as 187 °F (Mariner and others, 1975, p. 12; Garside and Schilling, 1979, p. 60). Garrett Ranch well, a few miles west of Trego Hot Springs, was in an area yielding water of from 33 °C to 40 °C (Johnson, 1977, p. 106). Muffler (1978, p. 76-77) estimated a geothermal reservoir at about 115 °C of about 3.3 km^3 with an energy content of about $0.9X10^{18}$ J.

Interest in both geothermal energy resources and possible hot-spring gold mineralization should be expected for the Trego Hot Springs area; tungsten skarn deposits are unlikely.

Pahsupp Mountain

Numerous mine workings and ruins of mining-related buildings occur at the north tip of Pahsupp Mountain (pl. 1, nos. 122-127). Small production has probably occurred, based on piles of crushed-quartz tailings. Because of the appearance of the workings and buildings, most mining is believed to have occurred prior to the 1940's.

Two types of mineralization are recognized in this area: polymetallic mesothermal veins and copper veins with tourmaline, perhaps related to metamorphism (Albino, 1992); there are also similarities to the proposed granophile model of Strong (1988). Mineralization occurred in numerous quartz veins (in a diverse range of sizes and attitudes). Intrusive rocks and volcanic rocks contain quartz veins as stockworks.

USBM rock samples (table A-3) contained anomalous maximums of more than 10,000 ppb gold, 11,923 ppm copper, 1,529 ppm lead, more than 10,000 ppm arsenic, 1,680 ppm antimony, 130 ppm molybdenum, and 110 ppm nickel. Alluvial sample concentrates (table A-5) contained anomalous maximums of 182 ppm thorium, 31 ppm uranium, 570 ppm cerium, 250 ppm lanthanum, 49.6 ppm samarium, and 16 ppm tantalum. The alluvial sample concentrates also contained maximums of 320 ppb gold, 89 ppm arsenic and 20.1 ppm antimony.

Possible high-grade and disseminated gold occurrences will be of continuing interest in the Pahsupp Mountain area.

Sulphur

The Sulphur area (pl. 1, nos. 138-140) lies southeast of the ghost town of Sulphur, which is at the junction of several important backcountry roads, trails, and Western Pacific rail lines. Significant production has occurred in the hills southeast of Sulphur, where Hycroft Resources is currently mining on patented and unpatented claims.

Hot-spring, gold-silver deposits occur in the Sulphur area (Albino, 1992). Wallace (1980, p. 80-91) described a sequence of mineralization in which block faulting juxtaposed and telescoped several zones of what may have been a single mineralized system, with a distinctly different suite of minerals above and below the fossil water table. Wallace reported that breccia contained sulfur and mercury above silicified conglomerate containing pyrite and associated arsenic, antimony, gold, and silver; alunite and quartz-calcite veins cut the conglomerate. Chalcedonic veins occur locally. Some of the rocks are intensely argillized.

The Sulphur area is reported to have produced 40,000 tons of sulfur between 1876 and 1938 (Vanderburg, 1938, p. 44-47). The area also yielded about $100,000 in silver between 1908 and 1912, from the Silver Camel mine (probably present-day Hycroft mine). Vanderburg also reported that the area produced 500 tons of alunite around 1917. The area, from 1908 to 1920, produced 15,369 oz of silver and, from 1941 to 1943, 25 flasks (1,900 lb) of mercury (Bailey and Phoenix, 1944, p. 107-108).

The open-pit mine of Hycroft Resources (Lewis-Crofoot-Sulphur) had, as of 1991, produced about 353,000 oz of gold and 385,000 oz of silver (Bonham, Jr., and Hess, 1992, p. 21). Resources of 413,000 oz of gold of gold have been estimated (Northern Miner, 1992).

The Sulphur area can be expected to remain of intense developmental interest for high-grade and disseminated, hot-spring type gold deposits.

Rosebud

The Rosebud area (pl. 1, nos. 141-149) had production from patented and unpatented mining claims, primarily in the early 1900's. Important current developments include the Rosebud LAC/Equinox Joint Venture, which is expected to yield on the order of 0.5 million oz of gold and 5 million oz of silver (Jones, 1992, p. 16; Walck and others, 1992, p 56).

Sub-hot-spring deposits occur in the Rosebud area (Albino, 1992). Gold-bearing, Tertiary volcanic rocks are argillicized, silicified, and sericitic. Faulting and favorable volcanic rocks have controlled mineralization (Walck and others, 1992).

The Rosebud area yielded $10,428 in gold, 70,479 oz of silver, 18,722 lb of copper, and 4,633 lb of lead between 1908 and 1920 (Lincoln, 1923, p. 215; Vanderburg, 1936b, p. 30-33). By 1985, total Rosebud area production from 8,494 tons was 3,775 oz of gold, 116,293 oz of silver, 18,772 lb of copper, and 4,633 lb of lead (Ransome, 1909, p. 25-27; Johnson, 1977, p. 84; Bonham, Jr., and others, 1985, p. 138). Rosebud area production was mostly from the Brown Palace, Dreamland, Durango Girl, Grubstake, and Abe Lincoln mines (Johnson, 1977, p. 81), near the center of the area.

USBM rock samples (table A-3) contained anomalous maximums of 871 ppb gold, 47 ppm silver, 29.31 ppm mercury, 77 ppm selenium, 47 ppm molybdenum, 410 ppm nickel, 62 ppm cobalt, and 5 ppm europium. The samples also contained as much as 783 ppm arsenic and 195 ppm antimony.

The Rosebud area can be expected to be of increasing developmental interest in the near future for high-grade and disseminated sub-hot-spring gold deposits.

Rabbithole/Barrel Springs

The Rabbithole and Barrel Springs area (pl. 1, nos. 128-137) lies along the historically important Emigrant Trail.

Gold placers, including the Rosebud placers, occur here (Smith and Vanderburg, 1932; Johnson, 1973; Robbins, 36-37; Albino, 1992). The placers are in extensive, thick alluvium along the wide valleys. Small percentages of titanium are also contained in area alluvium (Beal, 1962, and 1963, p. 22-23).

Alluvial fans, recent stream gravel, lake beds, volcanic rocks, granitic rocks, slate, phyllite, quartzite, and carbonates underlie the area (Johnson, 1977, pl. 1).

Placer production from the Rabbithole area was reported at $17,400 from 1916 to 1934 (Vanderburg, 1936a, p. 148-152; 1936b, p. 25-26). Some 150 persons worked the deposits in 1935 with dry washers and rockers. Between 1943 and 1963, a reported 3,008 oz of gold were produced from the historic Janke Group and Rio Seco claims, mostly controlled by the Constant Mineral Separating Company (Johnson, 1973, p. 72-73; 1977, p. 77).

Rabbithole area production has been combined with that of the Rosebud area, to the north. More than 7,700 oz of placer gold were recorded for the Rabbithole/Barrel Springs and Rosebud areas (Johnson, 1977, p. 84).

About five square miles has yielded coarse placer gold, mainly at the heads of ravines and in the upper slopes. Gold value in the gravel was reportedly as great as $50/yd^3$ and fineness about 895 to 900. Average gold value of gravel mined in 1932 was about $2/yd^3. Small nuggets worth $0.50 to $3.00 (gold price as great as $35/oz) reportedly constituted most of the production (Vanderburg, 1936a, p. 149; Johnson, 1977, p. 77). Beal (1963, p. 22) reported as much as 5 percent titanium dioxide (TiO_2) in area placers.

USBM rock samples (table A-3) contained anomalous maximums of more than 10,000 ppm lead, 2,980 ppm arsenic, and 91 ppm bromine. Rock samples also contained as much as 250 ppb gold, 1,100 ppm zinc, and 211 ppm antimony. Alluvial sample concentrates contained anomalous maximums of 3,310 ppb gold, 151 ppm antimony, 160 ppm tungsten, and 24 ppm bromine by analysis. An alluvial sample concentrate (table A-5) also contained as much as 410 ppm arsenic and 151 ppm antimony. An alluvial sample concentrate (table A-4, ETWH017) contained an estimated equivalent of $0.50/yd^3 in placer gold ($370/oz gold price). Samples and geology are consistent with sub-hot-spring and porphyry mineralization (Panteleyev, 1988; Hollister, 1993; Panteleyev, 1988).

Placer gold and its lode sources can be expected to maintain mineral resource development interest in the Rabbithole/Barrel Springs area.

Placerites

The Placerites area (pl. 1, no. 159) was active mainly in the early 1900's, and has been intensively explored at small prospects and numerous pits.

Gold placers (Albino, 1992) predominate in the area and are described in detail by Smith and Vanderburg (1932) and Johnson (1973). Alluvial fans, recent stream gravel, and colluvium overlie granitic rocks, shale, hornfels, phyllite, quartzite, and limestones (Johnson, 1973, p. 71-72; 1977, pl. 1). Small mines and prospects, and numerous workings, lie along a northeast-trending mineralized belt, which trends towards Scossa.

The Placerites area has yielded significant placer gold: Vanderburg (1936a, p. 146-148) reported that about $30,000 in placer gold were mined in the early 1870's. Later, in 1928, $5,000 in gold was produced from gravel containing $0.25 to $5.00/yd^3. Total gold production was worth at least $35,600 between 1870 and 1935. Estimated total Placerites area production is 2,500 oz of gold. Fineness of gold was reportedly 730 to 900; the gold is coarse and has probably not traveled far from its sources (Bonham, Jr., and others, 1985, p. 117; Vanderburg, 1936a, p. 148; 1936b, p. 24-25).

Silicified and argillized volcanic and volcaniclastic rocks in the placerites area generally contain very low gold and weakly to moderately anomalous arsenic, antimony, and mercury (anthony Kizis, Jr., consulting geologist, Placer Dome, U.S., written commun., 1992).

USBM alluvial sample concentrates (table A-5) contained no anomalous analyses but as much as 100 ppb gold, 650 ppm zinc, 2.359 ppm mercury, 139 ppm arsenic, 34.2 ppm antimony, and 1,000 ppm barium by analysis. Two sample concentrates (table A-4, nos. ETCR031 and ETCR032) contained about \$1.25/yd^3 and \$0.75/yd^3 in placer gold (\$370/oz gold price).

The placer gold and search for its lode sources will maintain interest in the Placerites area.

Scossa

The Scossa area (pl. 1, nos. 151-158) was active in the early 1900's (Jones and others, 1931; Vanderburg, 1936b, p. 36-37; Johnson, 1973, p. 70; 1977, p. 87; Noble and others, 1987, p. 9).

Between 1931 and 1934, the Scossa area yielded 368 tons containing 489 oz of lode gold, 705 oz of silver, and 22 oz of placer gold, but from 1936 to 1938, production was included with the Antelope mining district (Vanderburg, 1936b, p. 36-37; Johnson, 1977, p. 87; Bonham, Jr., and others, 1985, p. 150-151). Production was mainly from the Dawes (or North Star mine), which had a 400-ft shaft and 1,000 ft of drifts (Vanderburg, 1936b, p. 36-37; Johnson, 1977, p. 87). The Hawkeye mine, north of the North Star, had a 70-ft shaft and 350 ft of drifting (Johnson, 1977, p. 87; Vanderburg, 1936b, p. 37).

Area deposits have been identified as sub-hot-spring gold-mercury (Lantern claim area) and tentatively as hot-spring gold types (Westervelt, 1983; Noble and others, 1987, p. 9; Albino, 1992). Tertiary volcanic rocks, Triassic-Jurassic slate, phyllite, hornfels, quartzite, limestone, and Tertiary gravels crop out (Johnson, 1977, pl. 1).

Robbins (1985, p. 47-58) reported that two types of mineralization exist in the Lantern area (pl. 1, no. 151). One type produced the gold boulders, large quartzose masses containing up to about one ounce of gold per ton. The other type of mineralization produced in-situ mineralized Tertiary-Quaternary-age sediments, contrary to the opinions of Albino (1992). The mineralization occurred along faults and hot springs in sediments at intermediate and shallow depths.

John C. Barnett, in an unpublished consultant's report for Newhawk Gold Mines, Ltd. in 1984, stated that the jasperoid zone (or gold boulder zone) is comprised of up-ended alluvial concentrations of silicified detritus in old channels, probably not far from the source, which Barnett believed to lie at depth to the northeast within a tensional fault zone, now buried by lake sediments.

Ostrander (1990), in an unpublished consultant's report to Santa Fe Pacific Mining, Inc., stated that controlled-source audio magneto telluric (CSAMT) soundings in the

Scossa area suggested epithermal alteration of alluvium, or geothermal water, at depths of 200 to 600 ft, with greatest indication of strong epithermal mineralization at 1,700 to 2,000 ft depth. Features indicative of sinter formation along a fault were observed.

The Lantern and Lamp groups of claims were described in an unpublished memorandum of Corona Gold (December 3, 1990) as lying at the intersection of two deep-seated crustal structures, the northeast-trending Midas lineament and the northwest-trending Rye Patch lineament. Graben structures have formed, with extensive hydrothermal alteration occurring along the bounding, north-striking faults.

Epithermal mineralization of Tertiary-age gravels has probably occurred at SP Ridge, according to oral communications of Santa Fe Pacific project geologist, Robert Yambrick (1992). The company is investigating gold and silver resources at SP Ridge. According to Yambrick, precious-metal mineralization lies along high-angle fractures and faults in Triassic-Jurassic bedrock and Tertiary-age gravel. The surficial few hundred feet are oxidized. Pyrite, marcasite, and arsenopyrite are the predominant metallic minerals. Gold is associated with argillization, and silver is associated with silicification. Pathfinder elements are zoned: gold, silver and arsenic are at the heart of the mineralized system; antimony is adjacent to the center; and mercury is most distant from the source. Lead is insignificant at SP Ridge; copper (in chalcopyrite veins) is scarce; and zinc has apparently been flushed out of the ridge. Gold is microscopic; silver may occur in tetrahedrite or argentite.

Pyrrhotite, at the site of a magnetic anomaly at the north end of SP Ridge, occurs in Tertiary-age fanglomerate, as a nickel-rich replacement of hexagonal biotite plates (Yambrick, 1992, 1993).

In adjacent sec. 8, silicification, hematite, and reed structures in float indicate ancient hot springs. Yambrick (1992) reported that some quartz veins have cockscomb structures and are vuggy; fluid-inclusion studies are anticipated.

Cyanide leaching is effective on the mineralized rock. Unoxidized silver minerals are potentially amenable to flotation.

USBM rock samples (table A-3) contained anomalous maximums of 4,610 ppb gold, 280 ppm silver, more than 50 ppm mercury, 1,680 ppm arsenic, 223 ppm antimony, 160 ppm tungsten, 73 ppm selenium, 1,100 ppm nickel, 110 ppm cobalt, and 1,500 ppm chromium. These analyses and geology support additional classification as a porphyry (Hollister, 1993; McMillan and Panteleyev, 1988; Strong, 1988) environment.

Several million tons of resources contain leach-grade gold and silver at SP Ridge (Ron Parratt, geologist, Santa Fe Pacific Mining Inc., oral commun., 1993), and the

Scossa area is generally a center of intense development for high-grade and disseminated gold and silver.

Antelope

The Antelope area (pl. 1, nos. 160-168) has yielded significant gold, silver, copper, lead, and zinc.

Tentatively identified as Climax-type porphyry deposits, occurrences also include polymetallic, mesothermal molybdenum and tin types (Albino, 1992).

Granitic and volcanic rocks, quartzite, phyllite, slate, and limestone crop out (Johnson, 1977, pl. 1). Significant faults and wide shear zones are mineralized with sulfides.

East Antelope Range placers yielded more than 100 oz of gold per year between 1938 and 1941 (Johnson, 1977, p. 44). The Antelope mine had dump assays of 9.04 oz/ton silver, 1.1 percent lead, and 0.7 percent antimony (Johnson, 1977, p. 44).

The Nevada Superior mine (pl. 1, no. 164) had a 350-ft shaft and a 2,000-ft adit and yielded 8.6 oz/ton silver, 11.2 percent lead, 1 percent copper, and 8 percent zinc (Johnson, 1977, p. 48). It was developed in 1905 and shipped ore in 1906 and later (Johnson, 1977, p. 44). The Noble mine yielded $5,000 in silver ore before 1904 and 9 tons of silver-lead ore worth $890 later (Johnson, 1977, p. 44).

USBM rock samples (table A-3) contained anomalous maximums of 666 ppb gold, more than 300 ppm silver, 7,105 ppm copper, more than 10,000 ppm lead, more than 30,000 ppm zinc, 7,100 ppm arsenic, 490 ppm antimony, 330 ppm cadmium, 160 ppm tungsten, 99 ppm nickel, 87 ppm cobalt, 125 ppm bromine, 6 ppm europium, and 1,100 ppm zirconium.

Interest in developing base- and precious-metal, Climax-type porphyry and polymetallic, mesothermal molybdenum- and tin-types of mineral deposits in the Antelope area should be anticipated.

Willow

The Willow area (pl. 1, nos. 169-171) lies north of Willow Springs in the southeast part of the study area. Willow Springs is on the old Emigrant Trail.

The Willow claim area of FirstMiss Gold, Inc. (pl. 1, no. 170) shows silicification (including quartz veins), and carbonaceous clay gouge in shale, phyllite, hornfels, quartzite, and limestone intruded by rhyolite dikes. These rhyolite dikes probably radiate from the Majuba volcanic complex a few miles south. Gold analyses of 0.01 to 0.03 oz/ton have been reported (Martin, 1992). Hot-spring alteration around Willow Springs has occurred.

USBM rock samples (table A-3) from the Willow area had no anomalous analyses but as much as 32 ppm arsenic and 12 ppm antimony.

FirstMiss Gold, Inc. plans to maintain the Willow claims, indicating continued interest in high-grade and disseminated gold deposits in this Willow area.

Majuba Hill

The Majuba Hill area (pl. 1, nos. 172-179) has yielded copper, tin, and collectors' mineral specimens. The area has been studied intensively at several times (Jensen, 1985; Mackenzie and Bookstrom, 1976; Matson, 1948; Smith and Gianella, 1942; Stevens, 1971; Trites and Thurston, 1958).

As in the Antelope area, mineralization in the Majuba Hill area has been tentatively identified as Climax-type deposits, but occurrences also include polymetallic, mesothermal molybdenum and tin types (Albino, 1992). Stevens (1971, p. 66) referred to the deposits as xenothermal; these are shallow- to moderate-depth, high-temperature deposits.

The Majuba volcanic complex was the source of mineralization and intruded earlier igneous rocks, shale, hornfels, phyllite, quartzite, and limestone (Mackenzie and Bookstrom, 1976; Johnson, 1977, pl. 1). Prospects north of the mine indicate a belt of mineralization, perhaps related to the Majuba placers, lying along the foothills west of Ryepatch Reservoir.

The Majuba Hill mine (pl. 1, no. 175) was worked on three levels with a total of more than 4,000 ft of workings, and, between 1916 and 1919, it yielded 4,000 tons of ore containing 12 percent copper (Smith and Gianella, 1942, p. 41; Mackenzie and Bookstrom, 1976, p. 5; Johnson, 1977, p. 47). This mine produced 2,849,000 lb of copper and 21,000 lb of tin (Bonham, Jr., and others, 1985, p. 1). Between 1941 and 1943, 350 tons of ore yielded 3.4 percent tin (Matson, 1948). Between 1943 and 1945, copper-tin ore worth more than $275,000 was mined (Matson, 1948, p. 1-2; Johnson, 1977, p. 44, 47).

East of the Majuba Hill mine, the Last Chance mine (pl. 1, no. 179) had 830 ft of drifting and a 117-ft shaft with levels at 40 and 100 ft. Oxidized ore contained 17 oz/ton silver, $1.50/ton in gold, and 5 percent lead. Unoxidized ore contained 30 oz/ton silver, $2/ton in gold, and 15 percent lead. The property yielded 1,000 tons with 40 oz/ton silver and 8 percent lead (Mackenzie and Bookstrom, 1976, p. 22; Zimmerman, Mines register, 1937, p. 540, in Johnson, 1977, p. 47; Vanderburg, 1936b, p. 8). To the west, the De Soto (Arsenic King; pl. 1, no. 172) mine yielded oxidized arsenic and copper ore with 20 percent arsenic and 6 oz/ton silver in 1924 (Johnson, 1977).

USBM rock samples (table A-3) contained anomalous maximums of 250 ppm silver, more than 20,000 ppm copper, 3,706 ppm lead, 2,700 ppm zinc, more than 10,000 ppm arsenic, 274 ppm antimony, 210 ppm cadmium, 50 ppm molybdenum, 260 ppm nickel, 2 ppm lutetium, and 5 ppm europium. The samples also contained a maximum of 35 ppb gold.

Interest in developing base- and precious-metal, Climax-type porphyry and polymetallic, mesothermal molybdenum- and tin-types of mineral resources in the Majuba Hill area should be anticipated.

Humboldt House

The broad Humboldt House (Ryepatch) area (pl. 1, nos. 180-186)(Russell, 1885, p. 54) contains hydrothermal mineral occurrences throughout and placers on the west. It takes in the Humboldt House geothermal area, the Ryepatch mining district, parts of the Poker Brown (San Jacinto) mining district, and parts of the Antelope Range placers.

Occurrences in the Humboldt House area include tungsten and polymetallic mesothermal veins, tungsten-beryllium pegmatites, and antimony mesothermal veins (Albino, 1992); gold placers also are present.

Small-scale production of placer gold has been credited to this area, especially that of the Dusty mine (pl. 1, no. 185; Hess and Castor, 1991). The 56 copper mine (pl. 1, no. 184) was the earliest producer in Pershing County (Johnson, 1977, p. 41), and the Poker Brown mine (pl. 1, no. 186) had small production (Bonham, Jr., and others, 1985, p. 147; Johnson, 1977, p. 86). Anomalous zinc, lead, antimony, cadmium, boron, and 0.25 to 0.8 ppm gold were reported at the south end of the Antelope Range at the Poker Brown mine (pl. 1, no. 186)(Bonham, Jr., and others, 1985).

Granodiorite, quartzite, hornfels, phyllite, and limestone are overlain by diverse alluvial, fluvial, and wind-blown accumulations (Johnson, 1977, pl. 1; Davis, 1988). Sinter and tufa mounds (Davis, 1988) in this region contain sulfur, gypsum, and mercury; sinter mounds are as large as 1,000 ft by 700 ft. Lead-, copper-, silver-, and arsenic-bearing veins are in altered shear zones (Bonham, Jr., and others, 1985; unpublished USBM files) and probably are of the polymetallic type.

Wade Hodges (1992), geologist with Santa Fe Pacific Mining, Inc., reported on epithermal mineralization in the Humboldt House geothermal area. He reported that the curved outline of the north end of Rye Patch Reservoir reflects an intrusive, igneous system which has argillized overlying rocks. Hot water occurs at depth in the area, and may adversely affect future mining. Thermal water from drill holes is depositing silver with hard-water scale in pipes at the concentration of a few ounces of silver per ton. The geothermal system may be the upper-most showings of an underlying, porphyry copper-molybdenum type occurrence, based on geochemistry, and may be related to the mineralization at Majuba Mountain.

The Humboldt House geothermal area is not a typical hot-spring epithermal system: potassic alteration of the porphyry type, including orthoclase, sericite, muscovite, and tourmaline are present, instead of kaolinite, alunite, and pyrophyllite. Two stages of pyrite deposition are noted: the earliest does not contain gold-indicator elements; the second stage contains pyrite with antimony and arsenic, mainly in small fractures associated with quartz, opal, and apatite (Bloomstein, unpublished Santa Fe Pacific Mining, Inc., memorandum, 1987).

Humboldt House (or Humboldt, or Rye Patch) geothermal area (sections 32 and 33, T. 32 N., R. 33 E.) was estimated by Muffler (1978, p. 52) to have a geothermal reservoir temperature of about 217 °C and 3.3 km^3 containing 1.82×10^{18} J. No present-day hot springs are known here (Russell, 1885; Bailey and Phoenix, 1944, p. 183; Garside and Schilling, 1979, p. 60).

Concentrates of a USBM alluvial sample (table A-5, no. ETCR001) contained anomalous copper (157 ppm), lead (332 ppm), arsenic (447 ppm), and hafnium (130 ppm). The sample also contained 130 ppm gold and 4,000 ppm zirconium.

Interest in development in the Humboldt House area includes delineating additional placer resources and discovering lode sources of the placer gold, possibly in Climax-type porphyry, tungsten and polymetallic mesothermal veins, tungsten-beryllium pegmatites, and antimony mesothermal veins, which may lie in the hills in the west and north parts of the area or at depth. Prospecting and developing metallic exploration targets at depth here would be relatively expensive. Geothermal resources are currently of interest.

Other Mineral Occurrences

Nine additional mineral and energy commodities are of particular interest in this region, although development for these commodities in the study area is not likely in the near future. These commodities are boron, diatomite, garnet, lithium, oil and gas, perlite, pozzolan, sulfur, and zeolites; they are discussed in alphabetical order. Numerous other commodities in the study area are unlikely to be mined or utilized in the near future: antimony, barium, cobalt, iron, manganese, molybdenum, nickel, rare-earth elements, selenium, tin, titanium, tungsten, thorium, uranium, abrasives, alunite, basalt, clay, diatomite, fluorite, gypsum, limestone and dolostone, perlite, silica, and coal (lignitic sediment layers).

Boron

Maximum boron in a selected group of samples (appendix table A-7) was 406 ppm (sample ETRD011 from the Arcturus mine; this boron is probably in a metamorphic mineral, such as tourmaline. Maximum boron in sediments was 287 and 248 ppm, in samples ETRD001 and ETRD003, respectively, from playas near the NBRPP claims (pl. 1, no. 108).

Diatomite

Diatomite south of Camp Denio on the bluffs overlooking Cottonwood Creek is locally of excellent quality. This diatomite is mostly of the cake variety, compact and massive. At a pit from which gravel overburden had been stripped off, cake diatomite (sample ETRD052) is at least three feet thick and has a block density of 22 to 30 lb/ft^3; it averages about 27 lb/ft^3. According to the density criteria of Moore (1937, p. 113), this diatomite is of excellent quality. However, microscopic examination by (Eric Cather, USBM geologist at WFOC, oral commun., 1992), revealed that most of the diatoms are broken and of low quality. Iron content (4.16 percent) and sulfur content (1.65 percent) are both objectionably high in this sample. Furthermore, the occurrence, which is poorly exposed, is apparently lenticular and interbedded with silt, sand, shale, and tuff; it is far from markets and is not currently economic.

Garnet

Garnet occurrences in skarns and tactites in the study area are small, lenticular, and impure, as at the Arcturus mine. Furthermore, expensive crushing, beneficiation, and sizing would be required to produce a commercial abrasive product. Distance to market would require expensive shipping. The occurrences are not economic.

Lithium

Three samples taken by Bohannon and Meier (1976, p. 6) from the Black Rock Desert contained a maximum of 120 ppm and an average of 94 ppm lithium. Lithium content of 30 samples taken by Olson (1985, p. 9, 16) in the Black Rock Desert WSA was from 20 to 60 ppm. Selected samples analyzed for lithium during the 1992 study were consistent with these earlier analyses. Maximum lithium in a hot-spring environment was 62 ppm (sample ETMM035) taken from alluvium at the Lucky Kelso prospect (pl. 1, no. 31), at Soldier Meadow.

Oil and Gas

Geothermal activity, volcanism, and extensive metamorphism probably have destroyed most hydrocarbons in the region (Sandberg, 1983a, p. 9, and 1983b). It is unlikely that hydrocarbon-bearing rocks exist beneath over-thrust fault sheets of baked rocks. Potential source rocks exist, as shown by the late-Paleozoic rocks at Black Rock. Willden (1979, p. 541-548) speculated that source rocks survived under the study area, but Tauberneck (1971) postulated that igneous rocks are predominant at depth. Crandell and Hamilton (1985, pl. 2) outlined a region about 50 mi across, northeast of Gerlach, with low oil and gas potential.

Trace amounts of hydrocarbon in diatomite and tuff underlying ignimbrite have been reported in sec. 9, T. 39 N., R. 22 E., near Weimer Springs (Garside and Davis, 1992, p. 8).

Traces of hydrocarbons have been reported from wildcat drilling in the Black Rock Desert area. The King Lear Federal No. 1-17 hole, completed in 1983 to 7,931 ft of depth in SW1/4SW1/4 sec. 17, T. 37 N., R. 29 E., had oil shows in core from 6,880 to 7,052 ft and minor shows of gas at 6,894 to 6,930 ft. The hole was plugged and abandoned (Garside and others, 1988, p. 38).

The Sulphur-M.P. 476.67 hole, completed in 1909 to a depth of 970 ft in T. 35 N., R. 29 E. at mile post 474.67 at Sulphur, contained a possible oil show from 845 to 875 ft, but this was not confirmed. The hole was abandoned (Garside and others, 1988, p. 38).

The Black Rock Oil, Gas, Refining and Development Company hole No. 1 was completed in 1921 to a depth of 800 ft near the Sulphur-M.P. 476.67 well, in NW1/4 NW1/4NE1/4 sec. 13, T. 35 N., R. 29 E. It was plugged and abandoned (Garside and others, 1988, p. 37).

Perlite

Large amounts of perlite occur at the Mithril claims (pl. 1, no. 111). This perlite contains abundant crystalline material (Eric Cather, USBM geologist, oral commun., 1992). Thundereggs, jasper, and chalcedony are collected here by hobbyists. Vitrophyric perlite east of Middle Lake is poorly hydrated and contains abundant lithic and crystalline inclusions. Perlite in Smoky Canyon, in the central part of the study area, is of better quality; however, volume there is small. Many other occurrences of perlite exist in the volcanic extrusives and tuffaceous rocks in the study area; however, these are too small, far from markets, and subject to expensive transportation costs to be developed on a large scale.

Pozzolan

Pozzolanic volcanic tuffs (USBM, 1969) occur in the area. Pozzolans are siliceous, cementiferous materials that are added to cement as extenders or modifiers. Tests of the tuffs near Little High Rock Reservoir revealed that the material was of marginal quality (compared to standards in American Society for Testing and Materials, 1985). Also, existing markets are far away, beyond the range of economic transportation of these bulky, dense materials. Whole-rock analysis of a diatomite sample south of Cottonwood Creek (ETRD052) showed that this material would be basically suitable for natural pozzolan, except that sulfur content (1.65 percent) is relatively high. Nearby hot springs probably contributed sulfur during accumulation of the diatomite.

Sulfur

Sulfur occurs in trace amounts at hot spring occurrences in the Emigrant Trail study area. The nearby townsite of Sulphur was named after commercial deposits that yielded relatively small amounts from fossil hot-spring sulfur accumulations.

Zeolites

Zeolitic (mainly clinoptilolite) volcanic tuffs occur in the study area. The rocks typically contain unreacted glassy fragments, and zeolite content is low (generally less than about 65 percent, always less than 80 percent (Neumann and Close, 1985, p. 9; Scott, 1987, p. 9; Olson, 1985, p. 17). Commercial deposits of zeolites typically contain higher grades than in the study area (Scott, 1987). Localities with more complete zeolitization may exist near active or fossil hot springs.

Many commercial zeolite deposits typically contain massive lacustrine tuffs that have altered nearly entirely to zeolites. Clinoptilolite is common. Two, large-scale uses for clinoptilolite tuffs are as an absorbent for ammonia in waste effluents and as a soil conditioner. Smaller deposits of other zeolites with higher unit value are mined locally for catalysts for the chemical industry.

Deleterious glassy fragments, low zeolite content, and long distances to markets probably preclude mining zeolites in the study area.

CONCLUSIONS

The southeast part of the study area contains the greatest concentration of areas of development interest for underground and open-pit mining. However, significant areas of similar interest occur northwest of Soldier Meadows, where mineral deposits may be more deeply buried and more costly to explore and develop than at most of the areas southeast of the Black Rock Desert. Most of the areas of development interest contain gold and silver prospects. Copper, lead, zinc, sand and gravel, siliceous gemstones, and geothermal energy resources are also important in several areas.

Thirteen areas of relatively significant mineral- or energy-resource development interest lie on or near the branches of the Emigrant Trail. These areas are either of interest now or probably will be of interest within the foreseeable future. Significant areas are (from north to south): Hog Ranch, Leadville, Copper Canyon, Double Hot Springs, Donnelly, Southern Calico Range, Cassidy, Pahsupp Mountain, Sulphur, Rosebud, Scossa, Antelope, and Majuba Hill.

Large-scale development of mineral resources or energy resources in the Badger Mountain-Pinto Peak, Soldier Meadow, Black Rock Opal, Copper Canyon, Double Hot Springs, Southern Calico Mountains, Cassidy, Gerlach, Trego Hot Springs, Pahsupp Mountain, Sulphur, Rosebud, Rabbit Hole/Barrel Springs, Placerites, Scossa, Antelope, Majuba Hill, Willow, and Humboldt House areas of development interest would lie adjacent to or in the line of sight from the branches of the Emigrant Trail.

Geothermal energy occurrences at Soldier Meadow, Double Hot Springs, Gerlach, and Trego Hot Spring areas overlap branches of the Emigrant Trail or are contiguous.

Size of mineral resources of interest ranges widely in the study area and nearby, from carats of precious opal to millions of tons of rock containing disseminated gold. Sand and gravel and geothermal-energy resource developments would involve conspicuous surface disturbances or construction. Any of these mineral- or energy-resource developments could be planned to minimize or eliminate visibility from the Emigrant Trail route.

REFERENCES

Ach, J.A., Plouff, Donald, Turner, R.L., and Schmauch, S.W., 1987, Mineral resources of the East Fork High Rock Canyon Wilderness Study Area, Washoe and Humboldt Counties, Nevada: U.S. Geological Survey Bulletin 1707-B, 14 p.

Albino, George, 1992, Classification of mining districts in northwest Nevada, oral and written commun. *in* Miller, M.S.: Spokane, Washington, Western Field Operations Center, U.S. Bureau of Mines, unpublished Progress Reports.

American Society for Testing and Materials, 1985, Concrete and mineral aggregates (ASSTM C 618-85): Annual Book of ASTM Standards, v. 04.02.

Anderson, J.P., 1978, A geochemical study of the southwest part of the Black Rock Desert and its geothermal areas; Washoe, Pershing, and Humboldt Counties, Nevada, *in* Keller, G.V., and Grose, L.T., *editors*, 1978, Studies of a geothermal system in northwestern Nevada, part 1: Colorado School of Mines Quarterly, v. 73, no. 3, p. 15-22.

Ashton, L.W., 1989, Geochemical exploration guidelines to disseminated gold deposits: Mining Engineering, v. 41, no. 3, p. 169-174.

Bailey, E.H., and Phoenix, D.A., 1944, Quicksilver deposits in Nevada: Nevada University Bulletin, v. 38, no. 5, Geology and Mineral Series No. 41, p. 107-108.

Beal, L.H., 1962, Titanium occurrences in Nevada: Nevada Bureau of Mines Map 4, scale 1:1,000,000.

Beal, L.H., 1963, Investigation of titanium occurrences in Nevada: Nevada Bureau of Mines and Geology, Report 3, 42 p.

Bergquist, J.R., Plouff, D., Turner, R.L., and Causey, J.D., 1988, Mineral resources of the Massacre Rim Wilderness Study Area, Washoe County, Nevada: U.S. Geological Survey Bulletin 1707-E, 16 p.

Bloomstein, Ed, 1987, Description of Humboldt House mineralization: Reno, Nevada, Santa Fe Pacific Mining, Inc., unpublished Internal Correspondence.

Bohannon, R.G., and Meier, A.L., 1976, Lithium in sediments and rocks in Nevada: U.S. Geological Survey Open-File Report 76-567, 17 p.

Bonham, H.F., Jr., and Hess, R.H., 1992, Bulk-mineable precious-metal deposits, *in* Nevada Bureau of Mines and Geology, The Nevada Mineral Industry-1991: Nevada Bureau of Mines Special Publication MI-1991, p. 17-25.

Bonham, H.F., Jr., and Papke, K.G., 1969, Geology and mineral deposits of Washoe and Storey Counties, Nevada, *with a section on* industrial rocks and minerals by K.G. Papke: Nevada Bureau of Mines and Geology Bulletin 70, 140 p.

Bonham, H.F., Jr., Garside, L.J., Jones, R.B., Papke, K.G., Quade, J., and Tingley, J.V., 1985, A mineral inventory of the Paradise-Denio and Sonoma-Gerlach Resource Areas, Winnemucca District, Nevada: Nevada Bureau of Mines and Geology Open-File Report 85-3, 218 p. and appendixes.

Brown, Quentin, 1992, Emigrant Trail mineralization, oral commun. *in* Miller, M.S.: Spokane, Washington, Western Field Operations Center, U.S. Bureau of Mines, unpublished Progress Report.

Calzia, J.P., Lawson, W.A., Dohrenwend, J.C., Plouff, Donald, Turner, Robert, and Olson, J.E., 1987, Mineral resources of the Black Rock Desert Wilderness Study Area, Humboldt County, Nevada: U.S. Geological Survey Bulletin 1726-E, 13 p.

Castor, S.B., Mitchell, T.P., and Quade, J., 1982, Vya quadrangle, Nevada, Oregon, and California: U.S. Department of Energy Open-File Report PGJF-135 (82).

Cates, Delores, 1992 and 1993, Geologic comments on the Black Rock Desert area, oral commun. *in* Miller, M.S.: Spokane, Washington, Western Field Operations Center, U.S. Bureau of Mines, unpublished Progress Reports.

Cathrall, J.B., Siems, D.F., Crenshaw, G.L., and Cooley, E.F., 1984, Geochemical evaluation of the mineral and geothermal resources of the Charles Sheldon Wilderness Study Area, Nevada and Oregon: U.S. Geological Survey Bulletin 1538-C, p. 53-87.

Causey, J.D., 1987, Mineral resources of the Massacre Rim study area, Washoe County, Nevada: U.S. Bureau of Mines Open-File Report MLA 9-87, 8 p.

Connors, R.A., Robinson, M.L., Bukofski, J.F., Meyer, W.T., and Howarth, R.J., 1982, Geochemical and geostatistical evaluation, wilderness study areas, Winnemucca district, northwest Nevada: prepared for BLM under contract no. YA-553-CT1-1096 by Barringer Resources, Inc., 72 p. and appendixes.

Cook, J.R., 1981, Vya 1° by 2° NTMS area, Nevada data report (abbreviated): U.S. Department of Energy Open-File Report GJBX-285 (81).

Couch, B.F., and Carpenter, J.A., 1943, Nevada's metal and mineral production (1859-1940 inclusive): Nevada University Bulletin 37, no. 4., Geology and mining Series no. 38.

Crandell, W.D., and Hamilton, M.M., 1985, Availability of federally owned minerals for exploration and development in western states: Nevada, 1985: U.S. Bureau of Mines Special Report, 54 p., two plates, scale 1:500,000.

Crewdson, R.A., 1976, Geophysical studies in the Black Rock Desert geothermal prospect, Nevada: Golden, Colorado, Colorado School of Mines unpublished Ph.D. thesis, 180 p.

Davis, J.O., 1988, Geologic map of the Rye Patch Reservoir South Quadrangle: Nevada Bureau of Mines and Geology Map 76, scale 1:24,000.

Elevatorski, E.A., *manager*, 1973, Nevada industrial minerals: MINOBRAS, 62 p.

Ferguson, H.G., 1944, The mining districts of Nevada: University of Nevada Bulletin, v. 38, no. 4, p. 77-110.

Garside, L.J., 1973, Radioactive mineral occurrences in Nevada: Nevada Bureau of Mines and Geology Bulletin 81, p. 58.

Garside, L.J., and Davis, D.A., 1992, A mineral inventory of the Nevada portion of the Cedarville Resource Area, Susanville Bureau of Land Management District, Nevada: Nevada Bureau of Mines and Geology, Open-File Report, 126 p.

Garside, L.J., and Schilling, J.H., 1979, Thermal waters of Nevada: Nevada Bureau of Mines and Geology Bulletin 91, 163 p.

Garside, L.J., Hess, R.H., Fleming, Keryl L., and Weimer, Becky S., 1988, Oil and gas developments in Nevada: Nevada Bureau of Mines and Geology Bulletin 104, 136 p.

Geodata International, Inc., 1979, Aerial radiometric and magnetic survey, Vya National Topographic Map Sheet, Nevada: U.S. Department of Energy Open-File Report GJBX-136(79), v. 1 and 2.

Godwin, L.H., Haigler, L.B., Rioux, R.L., White, D.E., Muffler, L.J.P., and Wayland, R.G., 1971, Classification of public lands valuable for geothermal steam and associated geothermal resources: U.S. Geological Survey Circular 647, 18 p.

Green, R.C., 1984, Geologic appraisal of the Charles Sheldon Wilderness Study Area, Nevada and Oregon: U.S. Geological Survey Bulletin 1538-A, p. 15-34.

Grose, L.T., 1978, Late Quaternary tectonic controls of occurrence of geothermal systems in Gerlach-Hualapai flat area, northwestern Nevada, *in* Keller, G.V., and Grose, L.T., *editors*, 1978, Studies of a geothermal system in northwestern Nevada, part 1: Colorado School of Mines Quarterly, v. 73, no. 3, p. 11-14.

Hess, R. H., 1992, Geothermal energy: Nevada Bureau of Mines and Geology Special Publication MI-1991, p. 47-51.

Hess, R.H., and Castor, S.B., 1991, Directory of mining and milling operations: Nevada Bureau of Mines and Geology Special Publication MI-1991, p. 31-40.

Hess, R.H., and Castor, S.B., 1992, Directory of mining and milling operations: Nevada Bureau of Mines and Geology Special Publication MI-1991, p. 31-40.

High Life Helicopters and Geodata International, 1979, Aerial radiometric and magnetic survey, Vya National Topographic map, Nevada: U.S. Department of Energy Open-File Report GJBX-136 (79), 51 p.

Hildenbrand, T.G., and Kucks, R.P., 1988a, Total intensity magnetic anomaly map of Nevada: Nevada Bureau of Mines and Geology Map 93A, scale 1:750,000.

Hildenbrand, T.G., and Kucks, R.P., 1988b, Filtered magnetic anomaly maps of Nevada: Nevada Bureau of Mines and Geology Map 93B, four sheets, scale 1:1,000,000, one sheet, scale 1:2,000,000.

Hill, J.M., 1912, The mining districts of the western United States: U.S. Geological Survey Bulletin 507, 215 p.

Hodges, Wade, 1992, Mineralization in the Emigrant Trail vicinity, oral commun. *in* Miller, M.S.: Spokane, Washington, Western Field Operations Center, U.S. Bureau of Mines, unpublished Progress Report.

Hollister, V.F., 1993, On a proposed plutonic porphyry gold deposit model: Nonrenewable Resources, v. 1, no. 4, p. 293-302.

Holmes, G.H., 1965, Mercury potential of the United States: U.S. Bureau of Mines Information Circular 8252, p. 217-300.

Hose, R.K., and Taylor, B.E., 1974, Geothermal systems of northern Nevada: U.S. Geological Survey Open-File Report 74-271, 31 p.

Howe, D.M., 1975, Correlation of the fauna from the Middle Permian section at Black Rock, northwestern Nevada: Reno, Nevada, University of Nevada unpublished M.S. thesis, 133 p.

Howell, D.E., 1979, Geology and mineral resources of the Vya 1° by 2° NTMS quadrangle, Nevada, Oregon, and California: U.S. Department of Energy Open-File Report GJBX-7 (83), 91 p.

Jensen, Martin, 1985, The Majuba Hill mine, Pershing County, Nevada: Mineralogical Record, vol. 16, p. 57-72.

Johnson, M.G., 1973, Placer gold deposits of Nevada: U.S. Geological Survey Bulletin 1356, p. 29-36.

_____ 1977, Geology and mineral deposits of Pershing County, Nevada: Nevada Bureau of Mines and Geology Bulletin 89, 115 p.

Jones, J.C., 1920, Gypsum deposits of the United States (Nevada): U.S. Geological Survey Bulletin 697, p. 139-160.

Jones, J.C., Smith, A.M., and Stoddard, Carl, 1931, The preliminary survey of the Scossa mining district, Pershing County, Nevada: Nevada University Bulletin 25 [11], no. 4.

Jones, R.B., 1992, Metals, *in* Nevada Bureau of Mines and Geology, The Nevada Mineral Industry-1991: Nevada Bureau of Mines Special Publication MI-1991, p. 11-16.

Keith, W.J., Turner, R.L., Plouff, D., and Peters, T.J., 1988, Mineral resources of the Little High Rock Canyon Wilderness Study Area, Humboldt and Washoe Counties, Nevada: U.S. Geological Survey Bulletin 1707-C, 17 p.

Keller, G.V., and Grose, L.T., *editors*, 1978a, Studies of a geothermal system in northwestern Nevada - Part 1: Colorado School of Mines Quarterly, v. 73, no. 3, 84 p.

_____ 1978b, Studies of a geothermal system in northwestern Nevada - Part 2: Colorado School of Mines Quarterly, v. 73, no. 4, 76 p.

Keller, G.V., Grose, L.T., and Crewdson, R.A., 1978, Speculations on nature of geothermal energy in Basin and Range Province of Western United States, *in* Keller, G.V., and Grose, L.T., *editors*, 1978, Studies of a geothermal system in northwestern Nevada, part 2: Colorado School of Mines Quarterly v. 73, no. 4, p. 71-76.

Knox, R.D., 1992, Mineral property reports for 24 sites in the vicinity of the U.S. Bureau of Land Management Emigrant Trail study area: Reno, Nevada, Corona Gold, Inc., unpublished, confidential written communications, 48 p.

Korringa, M.K., 1972, Vent area of the Soldier Meadow Tuff, an ash-flow sheet in northwestern Nevada: Palo Alto, California, Stanford University Ph.D. thesis, 105 p.

_____ 1973, Linear vent area of the Soldier Meadow Tuff, and ash-flow sheet in northwestern Nevada: Geological Society of America Bulletin, v. 84, p. 3849-3866.

Larson, L.T., and Beal, L.H., 1978, Great Basin geologic framework and uranium favorability, final report: U.S. Department of Energy Open-file Report GJBX-36(78), 226 p.

Levinson, A.A., 1974, Introduction to exploration geochemistry: Wilmette, Illinois, Applied Publishing, Ltd., 614 p.

Lincoln, F.C., 1923, Mining districts and mineral resources of Nevada: Reno, Nevada, Nevada Newsletter Publishing Company.

Lucas, J.M., 1992, Gold: U.S. Bureau of Mines Mineral Commodity Summaries for 1992, p. 74-75.

MacKenzie, W.B., and Bookstrom, A.A., 1976, Geology of the Majuba Hill area, Pershing County, Nevada: Nevada Bureau of Mines and Geology Bulletin 86, 23 p.

McFarlan, Joseph, 1992, Mineralization in the Emigrant Trail vicinity, oral commun. *in* Miller, M.S.: Spokane, Washington, Western Field Operations Center, U.S. Bureau of Mines, unpublished Progress Report.

McMillan, W.J., and Panteleyev, Andrejs, 1988, Porphyry copper deposits, *in* Roberts, R.G., and Sheahan, P.A., *editors*, Ore deposit models: Geological Association of Canada, p. 45-58.

Mariner, R.H., Presser, T.S., Rapp, J.B., Willey, L.M., 1975, The minor and trace elements, gas, and isotope compositions of the principal hot springs of Nevada and Oregon: U.S. Geological Survey Open-File Report, 27 p.

Martin, Ken, 1992, Willow Claims: Golconda, Nevada, unpublished written commun. from Firstmiss Gold, Inc., 1 p.

Matson, E.J., 1948, Investigation of Majuba Hill copper-tin mine, Pershing County, Nevada: U.S. Bureau of Mines Report of Investigations 4378, 10 p.

Meinert, L.D., Newberry, R.J., and Einaudi, M.T., 1980, An overview of the tungsten-, copper-, and zinc-bearing skarns in western North America: U.S. Geological Survey Open-File Report 81-355, p. 303-327.

Miller, M.S., 1988, Mineral resources of the Spaulding study area, Harney and Lake Counties, Oregon: U.S. Bureau of Mines Open-File Report MLA 23-88, 30 p.

Moore, B.N., 1937, Nonmetallic mineral resources of eastern Oregon: U.S. Geological Survey Bulletin 875, 180 p.

Muffler, L.J.P., 1973, Geothermal resources, *in* United States mineral resources: U.S. Geological Survey Professional Paper 820, p. 251-261.

_____ 1978, Assessment of geothermal resources of the United States-1978: U.S. Geological Survey Circular 790, 163 p.

Munts, S.R., and Peters, T.J., 1987, Mineral resources of the Skedaddle study area, Lassen County, California, and Washoe County, Nevada: U.S. Bureau of Mines Open-File Report MLA 22-87, 53 p.

Neumann, T.R., and Close, T.J., 1985, Mineral resources of the High Rock Lake Wilderness Study Area (BLM NO. NV-020-007), Humboldt County, Nevada: U.S. Bureau of Mines Open-File Report MLA 38-85, 14 p.

Nevada Bureau of Mines and Geology, 1992, The Nevada mineral industry-1991: Nevada Bureau of Mines and Geology Special Publication MI-1991, 51 p.

Nevada Bureau of Mines and Geology and U.S. Geological Survey, 1974, Vya sheet: Aeromagnetic map of Nevada, map 48, scale 1:250,000.

Nevada Department of Minerals and Nevada Bureau of Mines and Geology, 1992, Major mines of Nevada, 1991: Nevada Bureau of Mines and Geology Special Publication 3, 28 p.

Nichols, Chester, 1992, Mineralization in the Chester Nichols claim area, oral commun. *in* Miller, M.S.: Spokane, Washington, Western Field Operations Center, U.S. Bureau of Mines, unpublished Progress Report.

Noble, D.C., McKee, E.H., and Larson, L.T., 1987, Late Miocene hydrothermal activity at the Willard and Scossa mining districts, Pershing County, northwestern Nevada: Isochron West, no. 48, p. 9-10.

Noble, D.C., Plouff, Donald, Bergquist, J.R., Barton, H.N., and Olson, J.E., 1987, Mineral resources of the Pahute Peak Wilderness Study Area, Humboldt County, Nevada: U.S. Geological Survey Bulletin 1726-C, 12 p.

Noble, D.C., Plouff, D., Bergquist, J.R., Neumann, T.R., and Close, T.J., 1988, Mineral Resources of the High Rock Lake Wilderness Study Area, Humboldt County, Nevada: U.S. Geological Survey Bulletin 1707-A, 9 p.

Northern Miner, 1992, Hycroft boosts Crofoot/Lewis reserves: Northern Miner, Nov. 2, 1992, p. 11.

Olmsted, F.H., Glancy, P.A., Harrill, J.R., Rush, F.E., and Van Denburgh, A.S., 1975, Preliminary hydrogeologic appraisal of selected hydrothermal systems in northern and central Nevada: U.S. Geological Survey Open-File Report 75-56, 267 p.

Olson, J.E., 1985, Mineral resources of the Black Rock Desert Wilderness Study Area, Humboldt County, Nevada: U.S. Bureau of Mines Open-File Report MLA 65-85, 19 p.

_____ 1986, Mineral resources of the Pahute Peak Wilderness Study Area, Humboldt County, Nevada: U.S. Bureau of Mines Open-File Report MLA 13-86, 20 p.

Ostrander, Arnie, 1990, CSAMT survey, interpretation, and final report, Scossa, Pershing County, Nevada, for Santa Fe Pacific Mining, Inc.: Reno, Nevada, Santa Fe Pacific Minerals unpublished report, 3 p.

Overton, T.D., 1947, Mineral resources of Douglas, Ormsby, and Washoe Counties, Nevada: Nevada University Bulletin 41, no. 9, Geology and Mineral Series 46, p. 81.

Panteleyev, Andrejs, 1988, A Canadian Cordilleran model for epithermal gold-silver deposits, *in* Roberts, R.G., and Sheahan, P.A., *editors*, Ore deposit models: Geological Association of Canada, p. 31-43.

Papke, K.G., 1970, Montmorillonite, bentonite, and fuller's earth deposits in Nevada: Nevada Bureau of Mines Bulletin 76, 47 p.

_____ 1987, Gypsum deposits in Nevada: Nevada Bureau of Mines and Geology Bulletin 103, 26 p.

Park, S. L., 1983, Paleomagnetic stratigraphy, geochemistry and source areas of Miocene ash-flow tuffs and lavas of the Badger Mountain area, northwestern Nevada: Reno, Nevada, University of Nevada M.S. thesis, 112 p.

Peters, T.J., Munts, S.R., and Miller, M.S., 1987, Mineral resources of the Little High Rock Canyon study area, Humboldt and Washoe Counties, Nevada: U.S. Bureau of Mines Open-File Report MLA 16-87, 39 p.

Plouff, Donald, 1984, Interpretation of aeromagnetic and gravity data, Charles Sheldon Wilderness Study Area, Nevada and Oregon: U.S. Geological Survey Bulletin 1538-B, p. 37-49.

Qualheim, B., 1979, Hydrogeochemical and stream sediment reconnaissance report for the Lovelock NTMS Quadrangle, Nevada: U.S. Department of Energy Open-File Report GJBX-90 (79).

Ransome, F.L., 1909, Notes on some mining districts in Humboldt County, Nevada: U.S. Geological Survey Bulletin 414, 75 p.

Robbins, C.H., 1985, Geology of the Lantern property near the Scossa mining district, Pershing County, Nevada: Reno, Nevada, University of Nevada unpublished M.S. thesis, 89 p.

Roberts, R.G., and Sheahan, P.A., *editors*, 1988, Ore Deposit Models: Geological Association of Canada, 194 p.

Rocky Mountain Pay Dirt, March 1986, Firm says Hog Ranch gold project is coming together: Pay Dirt Magazine, Bisbee, Arizona, p. 31A.

Ross, C.P., 1941, Some quicksilver prospects in adjacent parts of Nevada, California, and Oregon: U.S. Geological Survey Bulletin 931-B, p. 23-37.

Russell, I.C., 1885, Geological history of Lake Lahontan, a Quaternary lake of northwestern Nevada: U.S. Geological Survey Monograph 11, 288 p.

Sahli, M.C., 1984, Dan Claim Group: Unpublished consultant's report, 15 p.

Saltus, R.W., 1988a, Bouguer gravity anomaly map of Nevada: Nevada Bureau of Mines and Geology Map 94a, scale 1:750,000.

_____ 1988b, Regional, residual, and derivative gravity maps of Nevada: Nevada Bureau of Mines and Geology Map 94B, two scale 1:1,000,000 and two sheets, scale 1:250,000.

Sandberg, C.A., 1983a, Petroleum potential of wilderness lands in Nevada: U.S. Geological Survey Circular 902-H, 11 p.

_____ 1983b, Petroleum potential of wilderness lands, Nevada: U.S. Geological Survey Miscellaneous Investigations Series Map I-1542, 11 p.

Schilling, J.H., 1969, Metal mining districts of Nevada, second edition: Nevada Bureau of Mines Map 37, scale 1:1,000,000.

_____ 1976, Metal Mining districts of Nevada: Nevada Bureau of Mines and Geology map 37, scale 1:1,000,000.

Schilling, J.H., and Hall, Joyce, 1980, The Nevada mineral industry-1980: Nevada Bureau of Mines and Geology Special Publication MI-1980.

Schmauch, S.W., 1986, Mineral resources of the East Fork High Rock Canyon study area: U.S. Bureau of Mines Open-File Report MLA 60-86, 9 p.

Scott, D.F., 1987, Mineral resources of the High Rock Canyon study area, Washoe County, Nevada: U.S. Bureau of Mines Open-File Report MLA 14-87, 18 p.

Smith, A.M., 1956, Resources report, Washoe County, Nevada, 1956: Nevada Bureau of Mines and Geology, 166 p.

Smith, A.M., and Vanderburg, W.O., 1932, Placer mining in Nevada: University of Nevada Bulletin 26, no. 8, 104 p.

Smith, Dan, 1992, 1993, Hog Ranch Mine, oral commun. *in* Miller, M.S.: Spokane, Washington, Western Field Operations Center, U.S. Bureau of Mines, unpublished Progress Report.

Smith, W.C., and Gianella, V.P., 1942, The tin deposit of Majuba Hill, Pershing County, Nevada: U.S. Geological Survey Bulletin 936-B, p. 39-58.

Solheim, Fred, 1992, Geological notes about the Cassetty mine (Buckhorn claim) area, oral and written commun. *in* Miller, M.S.: Spokane, Washington, Western Field Operations Center, U.S. Bureau of Mines, unpublished Progress Report.

Stager, H.K., and Tingley, J.V., 1985, Tungsten deposits of Nevada: Nevada Bureau of Mines and Geology Map 87, scale 1:1,000,000.

_____ 1988, Tungsten deposits in Nevada: Nevada Bureau of Mines and Geology Bulletin 105, 256 p.

Stevens, D.L., 1971, The geology and ore deposits of the Antelope (Majuba Hill) mining district, Pershing County, Nevada: Reno, Nevada, University of Nevada unpublished M.S. thesis, 89 p.

Strong, D.F., 1988, A model for granophile mineral deposits, *in* Roberts, R.G., and Sheahan, P.A., *editors*, Ore deposit models: Geological Association of Canada, p. 59-66.

Tauberneck, W.H., 1971, Idaho batholith and its southern extension: Geological Society of America Bulletin v. 82, no. 7, p. 1899-1928.

Temkin, T.D., Feb. 15, 1981, Jim B. prospect: unpublished report in Homestake archives.

Trites, A.F., Jr., and Thurston, R.H., 1958, Geology of Majuba Hill, Pershing County, Nevada: U.S. Geological Survey Bulletin 1046-I, p. 183-203.

Tuchek, E.T., Johnson, F.L., and Conyac, M.D., 1984, Economic appraisal of the Charles Sheldon Wilderness Study Area, Nevada and Oregon: U.S. Geological Survey Bulletin 1538-D, p. 97-139.

Turrin, B.D., Bergquist, J.R., Turner, R.L., Plouff, D., Ponader, C.W., and Scott, D.F., 1988, Mineral resources of the High Rock Canyon Wilderness Study Area, Washoe County, Nevada: U.S. Geological Survey Bulletin 1707-D, 14 p.

U.S. Bureau of Mines, 1969, Pozzolanic raw materials resources in central and western United States: U.S. Bureau of Mines Information Circular 8421, 117 p.

U.S. Bureau of Mines and U.S. Geological Survey, 1980, Principles of a resource/reserve classification for minerals: U.S. Geological Survey Circular 831, 5 p.

U.S. Department of the Interior, Bureau of Land Management, 1992, Black Rock/High Rock interdistrict management summary, Sonoma/Gerlach Resource Area, Winnemucca District, Surprise Resource Area, Susanville District: U.S. Bureau of Land Management, Draft Open-File Report, 69 p.

U.S. Geological Survey and U.S. Bureau of Mines, 1984, Mineral resources of the Charles Sheldon Wilderness Study Area, Humboldt and Washoe Counties, Nevada, and Lake and Harney Counties, Oregon: U.S. Geological Survey Bulletin 1538, 139 p.

Vanderburg, W.O., 1936a, Placer mining in Nevada: Nevada University Bulletin v. 30, no. 4, p.

_____ 1936b, Mines of Pershing County, Nevada: U.S. Bureau of Mines Information Circular 6902, 56 p.

_____ 1938, Reconnaissance of mining districts in Humboldt County, Nevada: U.S. Bureau of Mines Information Circular 6995, 54 p.

Walck, C.M., Bennett, R.E., Kuhl, T.O., and Kenner, K., 1992, Discovery and geology of gold mineralization at the Rosebud project, Pershing County, Nevada: American Institute of Mining and Engineering, Society of Mining Engineers, 1993 Annual Meeting (122) and Exhibit, program and abstracts, p. 56.

Wallace, A.B., 1980, Geology of the Sulphur district, southwestern Humboldt County, Nevada: U.S. Geological Survey and Society of Economic Geologists, Field trip guide to epithermal precious metal deposits of northern Nevada, p. 80-91.

Welch, A.H., 1985, Geothermal resources of the western Black rock Desert, northwestern Nevada: Reno, Nevada, University of Nevada unpublished Ph.D. thesis, 139 p.

Westervelt, R.D., 1983, A preliminary report on the Lantern Property, Pershing County, Nevada, for Newhawk Gold Mines, Ltd.: unpublished consultant's report, available from Anaconda Geological Document Collection, American Heritage Center, University of Wyoming, 12 p.

White, D.E., and Williams, D.L., *editors*, 1975, Assessment of geothermal resources of the United States--1975: U.S. Geological Survey Circular 726, 57 p.

Appendix

APPENDIX

APPENDIX TABLES

SAMPLING PROCEDURES AND ANALYTICAL METHODS

Types of samples taken consisted of chip (fragments broken from a rock exposure in a continuous line or at approximately equal intervals), random chip (fragments broken unsystematically from the face of an apparently homogenous rock exposure), grab (fragments of loose material collected unsystematically from loose material or outcrops), channel (rock or loose material collected from a trough of measured width, depth, and length), select (chipped or grabbed material of intentionally biased composition from a rock exposure or loose material), and pan (loose, alluvial accumulations, typically concentrated with a 14-inch-diameter gold pan). Samples were located by latitude and longitude, using the 1927 North American Datum.

Chemical analyses were performed at a commercial laboratory. Geochemical analyses were by neutron activation analysis (NAA) for gold (Au), iridium (Ir), silver (Ag), zinc (Zn), molybdenum (Mo), nickel (Ni), cobalt (Co), cadmium (Cd), arsenic (As), antimony (Sb), iron (Fe), selenium (Se), tellurium (Te), barium (Ba), chromium (Cr), tin (Sn), tungsten (W), cesium (Cs), lanthanum (La), cerium (Ce), samarium (Sm), europium (Eu), terbium (Tb), ytterbium (Yb), lutetium (Lu), scandium (Sc), hafnium (Hf), tantalum (Ta), thorium (Th), uranium (U), sodium (Na), bromine (Br), rubidium (Rb), and zirconium (Zr). Ten-gram samples were split from dry, crushed, and pulverized samples and used for the NAA analyses. Interference between elements can contribute to varying and high detection limits for NAA, adversely affecting statistical summaries. Additionally, most samples were analyzed for copper and lead by aqua-regia extraction followed by atomic absorption (AA). Mercury was determined for most samples by aqua-regia extraction and cold-vapor AA. For selected samples, boron (B) and lithium (Li) were determined by AA and direct-current-plasma-emission spectroscopy, respectively. Aqua-regia extraction is a partial extraction method; reported analyses may be minimums.

Whole-rock analyses were performed on selected samples. Oxides of aluminum (Al_2O_3), calcium (CaO), iron (Fe_2O_3), potassium (K_2O), magnesium (MgO), manganese (MnO), sodium (Na_2O), phosphorus (P_2O_5), silicon (SiO_2), titanium (TiO_2), barium (BaO), and chromium oxide (Cr_2O_3) were all calculated from borate fusion and inductively coupled plasma analysis. Flux fusion is a complete digestion. Sulfur (S) was determined by Leco furnace analysis. Loss on ignition (LOI) was determined by gravimetric procedures. Whole-rock analyses are useful for identifying unusual rocks, for showing rock alteration, and for showing amounts of undesirable major oxides, such as alumina in diatomite.

Panned alluvial samples were taken at selected sites. Most of these reconnaissance-pan samples had a volume of one or two gold pans of 14-inch diameter. Most samples were dry screened to less than about 0.25 inch in the field. Pans and screens were of spun aluminum. The pans hold about 0.1 ft^3, when expansion of about 25 percent is assumed to occur during sample excavation. Large boulders and cobbles were discarded, affecting apparent amounts of gold in some samples. Fineness of gold was assumed to be 1,000 (pure), and gold price assumed to be $370/oz (Lucas, 1992, p. 74). Channel samples of alluvium were taken at several sites. At the WFOC placer laboratory, alluvial samples were screened to -14 mesh and processed over a laboratory-size, vibratory, riffled table, except for four (ETMM115-ETMM118), which were concentrated by panning. Free gold was removed from concentrates by picking and amalgamation. Heavy minerals were identified and concentrates were examined for radioactivity with a scintillometer and fluorescence under ultra-violet light. No significant radioactivity or fluorescence were noted in the concentrates. Splits of heavy minerals (mixed magnetic and nonmagnetic fractions) were additionally analyzed for the elements in the geochemical package by NAA. The concentrates contained from 10 to 1,000 times more heavy minerals than the gravel. Chemical analysis of the alluvial concentrates measures a combination of loose placer gold and gold in minerals usually unrecoverable by placer methods.

Only five alluvial samples (ETCR031, ETCR032, ETWH017, ETMM018, and ETMM038) contained visible placer gold (table A-4).

Splits of sample pulps will be archived at WFOC for several years.

Anomalous thresholds were calculated for the geochemical suite of elements, separately for rock and alluvial samples. Contents greater than an arbitrarily chosen, two-standard deviations greater than the mean content, using natural logs of the data, were considered anomalous (tables A-3 and A-5). One-half the lower detection limit was used for analyses less than the detection limit; upper measurement limit was used for analytical values greater than the upper measurement limit. No analyses less than the detection limit were considered anomalous. Some anomalous thresholds, as for iron, were calculated to be greater than the upper measurement level.

These thresholds are conservatively high, and are appropriate for the type of character sample taken. Anomalous contents are likely to be significant, although some significant, meaningful lower contents will be overlooked. The anomalous samples mainly are from well-known mineralized areas, and tend to show differences in geological terrains in the northwest and southeast parts of the study area. Anomalous samples are designated in analytical tables by asterisks. Occurrence of more than one anomalous elemental content in a sample is considered especially significant. Anomalous status does not imply economic classification.

Besides elements of direct economic interest, such as gold and silver, some elements determined during the analysis are so-called pathfinders. Pathfinder elements were defined by Levinson (1974, p. 53, 54) "as relatively mobile elements (or gases) occurring in close association with the element being sought, but which can be more easily found either because they form a broader halo, or because they can be detected more easily by present analytical methods." For example, arsenic, antimony, and mercury (Ashton, 1989) commonly occur with epithermal gold deposits. Anomalous amounts of pathfinder elements were used to help delimit mineralized areas. Pathfinder elements do not occur at all mineral deposits, nor do pathfinder elements guarantee the presence of a mineral deposit.

The samples indicate the primary commodities at a mineral locality and show related elements. They are not necessarily representative of the grade of the mineral locality. Statistical summaries developed using this type of sample are of restricted applicability. The samples characterize the type of mineralization. Veins, for example, were usually sampled and are traditionally viewed as concentrators of mineralization.

Cake diatomite was air-dried for 24 hours at 221 °F at WFOC. The hand-specimen-sized pieces were then weighed, waterproofed, immersed in water, and volumes measured by displacement of water.

A portable scintillometer was used for field observations of radioactivity. No commercial concentrations of radioactive minerals were observed in readings. Most elevated radioactivity was associated with organic, woody material in volcanic tuff.

Concepts of the mineral resource classification published by the U.S. Bureau of Mines and U.S. Geological Survey (1980) are used as guidelines in this report.

Estimates of percentages and identifications of rocks were based on observations of hand-specimens. Field identification of rock types is general and was usually not supported by chemical or petrographic work. Light-toned volcanic rocks, for example, are generally referred to as rhyolite or dacite, darker ones were called basalts, and intermediate ones were called andesite.

Strikes and dips, temperatures, and legal location descriptions are abbreviated in tables, but are used according to USGS guidelines in the text. Likewise, abbreviated discussions of geology, workings, production, and analytical information in tables are expanded in the text where pertinent.

MINERAL LOCALITY NOMENCLATURE

The term, mineral occurrence broadly includes all sites. Mining claims have recordations or indications in the field of mining claim location. Prospects have workings. Mines have had production. Mining districts typically encompass a number of mineral occurrences, although single-locality mining districts are not unusual. Small workings are typically 5 to 20 ft in maximum extent.

Alternate names, historical identifiers and geographic identifiers, are shown parenthetically (table A-1) for sites described. Ownership was not determined.

MILS DATA

Locational accuracy limits of USBM mineral industry location system (MILS) and USGS computer resource information bank (CRIB) and mineral resource data system (MRDS) databases are related to the following factors: inaccurate location due to poor maps or lack of maps; mechanical or human error; approximate location data; duplication of names; expansive claim groups; relocation of localities; amended locations; and use of nearby landmarks for locations.

Multiple reporting of mineral occurrences and use of dissimilar location data or erroneous data has resulted in dispersion of information and apparent presence of more localities than actually exist; these repetitive listings may have historical significance and should be retained.

Table A-1.--Mineral sites in the Emigrant Trail study area and vicinity, Humboldt, Pershing, and Washoe Counties, Nevada

[Map numbers on pl. 1; sample descriptions in tables A-2 and A-4; sample analyses in tables A-3 and A-5; list of chemical abbreviations in appendix section, "Sampling Procedures and Analytical Methods"; mineral site locational data in table A-8]

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
001	Bald Mountain prospects	Andesite, tuff, ash, and local rhyolite crop out (Tuchek and others, 1984, p. 104-106).	Four caved adits, two shafts, five cuts, thirty-six pits, and sixty trenches (Tuchek and others, 1984, p. 104-106).	Eighty-six samples, 1984): one contained 0.04 oz/ton Au; three contained 0.01 oz/ton Au. Another sample contained 3.30 oz/ton Ag. Maximum Hg content was 0.06% (Tuchek and others, 1984, p. 104-106).	Tuchek and Others, 1984, p. 104-106; USGS and USBM, 1984.
002	Antelope mines (LP; Harry Woods; Margaret Dee)	Andesite, rhyolite, basalt, breccia and tuff with argillic, silicic, and limonitic alteration; local cinnabar concentrations.	At least 113 pits and 39 trenches, four more than 100 ft long and 15 ft deep (partially filled with water); roasting equipment; small production (?).	ETMM086-091 and ETRD071-077; analyses for Hg, Sb, Eu, Cu, Yb, and Zr were anomalous (respective maximums of 83 ppm, 467 ppm, 6 ppm, 127 ppm, 20 ppm, and 1,500 ppm).	Greene, 1984; Plouff, 1984; Tuchek and others, 1984, p. 92, 102-103.
003	Unnamed occurrence (Fortynine Lake Playa)	Silty to sandy playa sediments.	None.	ETRD105, not anomalous.	
004	Unnamed occurrence (Middle Lake, Massacre Lake Playa)	Silty to sandy playa sediments.	None.	ETRD104, not anomalous.	
005	RH claims (Perlite)	Brecciated tuff and black, glassy, porphyritic perlite overlying a welded ash-flow tuff. Perlite contains abundant lithic and crystal fragments, and is brecciated.	None.	ETMM083 contained anomalous Eu (6 ppm). The perlite is too low-grade and too far from markets to mine.	

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
006	Cottonwood claims	Rhyolitic, welded ash-flow tuff with veins of opal and chalcedony in north-trending zone; abundant silica float in zone approximately 200 ft by 500 ft; local silica-cemented breccia and limonite.	None.	ETRD100, ETRD101, and ETRD102, not anomalous.	
007	Unnamed occurrence (Wall Canyon)	Agate and silicified wood, occurring as float in an area approximately 200 ft wide; argillic and limonitic tuffs and rhyolitic, welded ash-flow tuffs.	None.	ETMM102 and ETMM103; one contained anomalous Eu, (7 ppm).	
008	Unknown name prospect (Wall Canyon)	Rhyolitic, welded ash-flow tuff locally contains silicified breccia.	One small dozer trench.	ETMM104, not anomalous.	
009	Nut claims	Rhyolitic, welded ash-flow tuff and ashy tuff; brecciated, limonitic zone approximately 300 ft wide trends N20E and is locally silicified by opal and chalcedony.	None.	ETMM105, ETMM106, and ETRD103, not anomalous. A sample of silicified pumice contained 100 ppb Au (Knox, 1992).	Knox, 1992
010	Unknown name prospect (Sagehen Spring)	Rhyolitic, welded ash-flow tuff containing devitrified and orbicular structures; locally limonitic.	Four shallow dozer scrapes (20 ft by 20 ft) and three or more shallow drill holes.	ETRD068, ETRD069, ETMM080, ETMM081, and ETMM082. ETMM081 contained anomalous Ta (4 ppm).	

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
011	GC claims (Grassy Canyon, sec. 32)	Rhyolitic, welded ash-flow tuff overlying ashy tuff; in part brecciated and veined; cement and veins include opal, chalcedony, and limonite.	None.	ETRD070 and ETMM085, not anomalous.	
012	GC claims (Grassy Canyon, sec. 7)	Rhyolitic, welded ash-flow tuff overlying ashy tuff and containing chalcedony veins to at least 0.2 ft.	None.	ETMM084, not anomalous.	
013	GREE 100-103 prospect	Brecciated, rhyolitic, welded ash-flow tuff cemented and veined with chalcedony and opal; overlain by alluvium.	One small pit in alluvium.	ETRD067 and ETMM079, not anomalous.	
014	GC claims (Stevens Camp)	Brecciated, rhyolitic, welded ash-flow tuff with siliceous, tuffaceous matrix; silica veinlets; fossil hot-spring sinter and opal occur nearby in siliceous tuff.	None.	ETRD065 and ETRD066 (Adjacent to southeast), not anomalous.	
015	GRE 1-10 claims (Gold Plug; GC Group)	Silicified tuff and welded, ash-flow tuff breccia with opal and jasper cement and veins; locally limonitic.	None.	ETRD063 and ETRD064. ETRD063 contained anomalous Hg (> 50 ppm), Hf (42 ppm), Ta (6 ppm), and Zr (1200 ppm). Samples taken by Scott (1987) contained 120 to 300 ppm Hg and 0.510 ppm to 1.01 ppm Ag.	
016	GRE 101-103 claims (GC; Gold Plug)	Silicified, ashy tuff with local brecciation and limonite.	None.	ETRD062, not anomalous.	

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
017	GR 1-40 prospect (Grassy Ranch; Gold Plug)	Silicified ashy tuff, locally brecciated and limonitic, overlain by rhyolitic, welded ash-flow tuffs.	One pit and/or drill hole site.	ETRD060 and ETRD061, not anomalous.	
018	Gold Plug claims (Massacre; GR 1-40)	A north-trending, high-angle, subparallel system of silica veins produces an area of float at least 100 ft by 300 ft, in rhyolite and altered, limonitic, argillic tuff.	None.	ETMM074 (Adjacent to the south on Grassy Mtn.), and ETMM075-ETMM078 were taken. ETMM078 contained anomalous Lu (2 ppm).	
019	GC claims (Grassy Canyon)	Silicic, argillic tuff crops out in area of rhyolitic, welded ash-flow tuffs; opalized wood and silicified bog occur locally.	None.	ETMM072 and ETMM073. ETMM072 contained anomalous U (26 ppm).	
020	Amalgam prospect (SPDY; Gold Plug; GC)	Silicified, argillized, limonitic, rhyolitic tuffs containing lenses of opal, up to two ft thick, and thin perlite bodies; rhyolitic, welded ash-flow tuff caps the section.	Eight trenches (60 ft by 20 ft by 10 ft to 100 ft by 20 ft by 15 ft) and at least twelve small pits.	ETRD057-059 and ETMM070-ETMM071; ETMM070 contained anomalous Hg (34.780 ppm).	
021	Amalgam claims (Antimony Reservoir; Gold Plug)	Rhyolitic, welded ash-flow tuff and silicic, argillic tuff.	None.	ETMM068 and ETMM069, not anomalous; samples one or two miles east, near the mouth of Yellow Rock Canyon contained 1120 ppb to 1405 ppb Au and 0.380 to 0.770 ppm Ag (Scott, 1987, p. 16).	Scott, 1987, p.16.
022	Unknown name mine (Antelope Flat Gravel)	Interbedded sandy gravel and silty sand; gravels composed of volcanic rock.	Two large borrow pits.	No samples. Significant sand and gravel remain.	

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
023	Unnamed occurrence (Hart Camp perlite; MILS 0320310163 nearby)	Lenticular bodies of glassy, black perlite thinner than 10 ft in volcanic tuff: similar rocks in adjacent sections.	None.	No samples.	Bonham, Jr., and Papke, 1969, p. 127.
024	Conlon Camp area	Volcanic rocks with perlitic and opal-bearing zones (Schmauch, 1986, p. 6, 7; Scott, 1987, p. 9).	A shallow trench and a small pit (Schmauch, 1986, p. 6, 7; Scott, 1987, p. 9).	Samples taken in 1987 contained as much as 72 ppm As (Scott, 1987, p. 16-18).	Schmauch, 1986, p. 6-7; Scott, 1987, p. 9, 16-18.
025	Folio claims	Peralkaline, rhyolitic, welded ash-flow tuff, locally brecciated, folded , and faulted; sparse chalcedony and opal veins in silica-cemented breccia. Limonite occurs locally.	None.	ETRD095-ETRD097 were taken. Maximum anomalous analyses were Tb (5 ppm), Yb (35 ppm), Lu (5.1 ppm), Hf (43 ppm), Ta (6 ppm), and Zr (1500 ppm).	
026	Black Jack claim (Tollhouse)	Rhyolitic, welded ash-flow tuff, partly devitrified and orbicular, overlying ashy tuffs; alluvium along valley floor and in benches along valley slopes.	None, except for small water impoundment in valley bottom.	ETRD098-ETRD099; ETRD098 contained anomalous Tb (3 ppm), Lu (2 ppm), and Zr (700 ppm).	
027	Tellstar claim area	Limonitic, argillic, tuffaceous sedimentary rocks underlying basaltic caprock.	None.	ETMM101, not anomalous.	
028	MEMCO Fort claims	Porphyritic, rhyolitic, welded ash-flow tuff overlying tuffaceous sediments; locally silicified and limonitic.	None.	ETMM098 and ETMM099, not anomalous.	
029	NEMCO prospect (Slumgullion Canyon)	Tuffaceous sedimentary rock underlying rhyolitic tuffs.	Small dozer scrapes.	ETMM100, not anomalous.	

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
030	Unknown name prospect (Burke Group)	Rhyolitic, welded ash-flow tuff overlying ashy tuffs with thin lenses of perlite; silicification (opal and chalcedony) fills veins, cements localized breccias, replaces tuffs, and occurs as sinter; nearby hot springs.	At least eight small dozer trenches.	ETRD090-ETRD094 contained maximum, anomalous Hg (> 50 ppm), Mo (32 ppm), U (29 ppm), La (608 ppm), Ce (1100 ppm), Cs (52 ppm), Sm (98.2 ppm), Eu (7 ppm), Tb (14 ppm), Yb (29 ppm), Lu (3.9 ppm), Hf (27 ppm), and Zr (760 ppm).	
031	Lucky Kelso No. 1 prospect	Alluvial fan composed of volcanic detritus; argillic alteration; hot spring (107 degrees F) nearby.	One small pit.	ETMM035 and ETMM036, not anomalous.	
032	Soldier Meadow geothermal area (Hot springs, Soldier Meadow)	Volcanic rocks, primarily tuffs, are capped by rhyolitic rock. Hot springs of approximately 70 F and 126 F flow at rates of 500 gpm. A regional fault, trending N30-35E localizes the springs (Garside and Schilling, 1979, p. 38).	Small pools and tubs for bathing and swimming.	No samples. Well established KGRA. Most of the springs are on private property, being transferred to public ownership in 1992 and 1993. Lucky Kelso claims nearby.	Hose and Taylor, 1974, p. 12; White and Williams, 1975, p. 42-43; Garside and Schilling, 1979, p. 38.
033	Beautiful Glo (Lynn Dawn) claim	Silicified, quartz-rich, yellow-green rhyolite, in part brecciated, overlain by basalt; some associated welded ash-flow tuffs and thin impure perlite.	None.	A single sample, ETRD036, was anomalous in Cs (113 ppm).	
034	NEMCO 1-6 prospect	Porphyritic, rhyolitic tuff overlying tuffaceous lake sediments.	Two small dozer scrapes.	ETMM096 and ETMM097. ETMM097 contained anomalous Lu (1.6 ppm) and Zr (660 ppm).	

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
035	Bernice Flateman claim	Sandy alluvium and volcanic complex composed of basalt, tuffs, and volcanic breccias.	None.	ETMM037, not anomalous.	
036	Jack Young/Jason Brown claims	Sandy alluvium and a volcanic complex composed of basalt, tuffs, and volcanic breccias.	None.	ETRD037, not anomalous.	
037	Peter Delcano claim	Sandy alluvium and a volcanic complex composed of basalt, tuffs, and volcanic breccias.	None.	ETMM038 was not anomalous but contained about $0.60/yd^3 in placer Au ($370/oz Au price).	
038	Bradley Brown claim	Sandy alluvium and a volcanic complex composed of basalt, tuffs, and volcanic breccias.	None.	ETMM039, not anomalous.	
039	Cheryl Brown/Maria Delcano claims	Sandy alluvium and volcanic complex composed of basalt, tuffs, and volcanic breccias.	None.	ETRD038, not anomalous.	
040	Eagle claims (Razor Group)	Rhyolitic complex of devitrified, orbicular, welded ash-flow tuffs and ashy tuffs; locally silicified (opal and chalcedony) veins, breccia, amygdules, and wood; limonitic and argillic in part.	None.	ETRD107, ETRD108, ETRD109, and ETMM109, not anomalous. Knox (1992) reports seven samples, none of which exceed 15 ppb Au, 0.1 ppm Ag, 50 ppb mercury, or 125 ppm As.	Knox, 1992.
041	Unknown name claim (Little High Rock Reservoir area)	Rhyolitic, welded ash-flow tuffs interlayered with ashy tuffs containing petrified wood; local, silica cemented breccia and veins of chalcedony and opal; local devitrified, orbicular, welded tuff.	None.	ETMM108, not anomalous.	

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
042	Denio Ranch occurrence (Diatomite)	Interlayered, thin, lenticular, diatomaceous beds and tuffaceous,silty, sandy sediments; also in adjacent sections.	None.	No samples.	Peters and others, 1987, fig. 2.
043	Unknown name prospect (Petrified Forest)	Silicified, carbonized tree stumps in ash tuffs.	Small pits.	No samples.	
044	Ebony claims	Rhyolitic, welded ash-flow tuff overlying argillic, limonitic ashy tuff; welded tuff is locally argillic and limonitic; steeply dipping welded tuff trends N50E.	None.	ETMM060, ETMM061, ETMM062, and ETRD054, not anomalous.	
045	Hart 1-10 AB prospect (YMER; Weimer)	Argillic, silicic, and limonitic tuff; rhyolitic, welded ash-flow tuff; nearly vertical welded tuff ridges strike north.	Several drill holes.	ETRD055, ETMM065, and ETMM066, not anomalous.	
046	Ymer (Weimer) prospect	Silicic, argillic tuff and rhyolitic, welded ash-flow tuff; nearly vertical dipping ridges of faulted rhyolite trend north; opalized wood and jasper occur locally.	Several small pits.	ETMM067 and ETRD056. ETRD056 contained anomalous Yb (19 ppm), Lu (1.8 ppm), and Zr (850 ppm).	
047	Orion prospect (Ymer, or Weimer; Boar; Gillam)	Argillic, silicic, devitrified rhyolitic tuff and thin lenses of perlite.	Seven small pits and trenches.	ETMM063 contained anomalous, Cs (148 ppm).	
048	Gillam prospect (Boar Group)	Argillic, silicic, ashy tuff overlain by alluvium; locally silicified, woody, bog accumulations.	Three small pits.	ETMM064 contained anomalous Cs (70 ppm).	

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
049	Cottonwood Basin claims (Chester Lyons Spring)	Weakly silicic and argillic altered rhyolite with some opalization; rhyolitic flow-dome complex (Knox, 1992).	None.	"Limited sampling resulted in somewhat anomalous values in mercury and As" (Knox, 1992).	Knox, 1992.
050	Unknown name prospect (Diatomite)	Cake diatomite occurs in a bed at least three ft thick beneath three to six ft of alluvial fan overburden. Bed is lenticular.	An area approximately 140 ft by 500 ft has been stripped down to the diatomite.	ETRD052, not anomalous. A small amount of diatomite (25 ft by 100 ft by 3 ft) has been excavated at a gravel pit. The diatomite has low bulk density, but is argillic; most diatoms are broken.	
051	Albany prospect (Big Mtn. Gold; Big Mtn. Copper; Copper Canyon)	Fault zone (20-30 ft wide, N30W, 80SW) contains silicified volcanic and intrusive rocks; disseminated pyrite and limonite veinlets occur; argillic and silicic alteration is present; tactite occurs in overlying limestone.	At least four small prospects; a 300-ft-long adit, several smaller adits, and several small pits occur in the Copper Canyon area.	ETRD088 and ETRD089 contained maximum anomalous: Au (583 ppb), Ag (>300 ppm), Cu (2705 ppm), Pb (2752 ppm), Zn (>30000 ppm), Hg (31.240 ppm), Sb (6510 ppm), Cd (160 ppm), and Mo (296 ppm).	Olson, 1986, p. 10-14.
052	Trapper and Trapper No. 1 prospect	Fractured, mineralized basalt, limonitic tuff breccia, and ashy tuff.	One small pit.	Three samples (51-53; Olson, 1986, p. 16) contained 0.007 to 0.02 ppm Au and 0.64 to 2.53 ppm Ag.	Olson, 1986, p. 16.

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
053	Sunset prospect (Sundown; Redhill; JJ; Nemco)	Granitics and porphyritic volcanic rocks contain sheared lenses of fluorite, silica, limonite, and clay; tuffaceous rocks nearby contain carbonized wood.	At least four small pits.	ETRD086-ETRD087 had maximum anomalous As (1890 ppm) and Ba (14700 ppm). Other samples (54-56, Olson, 1986, p. 14) contained maximum 41.1% fluorite and 0.04 ppm Au. Carbonized wood contained 0.06% equivalent U3O8 (Garside, 1973, p. 58).	Olson, 1986, p. 14; Garside, 1973, p. 58.
054	NEMCO 1-6 prospect (?) (Clapper Creek Zone)	Metasedimentary rocks, tuffs, rhyolite, olivine basalt, dacite dikes, and silicified, rhyolite domes (?).	One small adit (5 ft long) and numerous pits reported by the BLM were not observed (Olson, 1986, p. 14).	Five samples (64-68, Olson, 1986, p. 14) contained 0.4 to 0.89 ppm Ag.	Olson, 1986, p. 14.
055	Royal Rainbow prospect (Big Jack)	Precious and common opal occur in vesicles and fractures in basalt (Neumann and Close, 1985, p. 12).	Numerous small dozer cuts from which 500 tons of basalt have been excavated. (Neumann and Close, 1985, p. 12).	A grab sample and four chip samples contained no economic metal concentrations (Neumann and Close, 1985, p. 12).	Neumann and Close, 1985, p. 12.
056	Alma prospect (Joy; DG Group)	Common opal fills vesicles in basalt interlayered in ash-flow tuffs. The opal is dehydrated at the surface (Neumann and Close, 1985, p. 12).	Three small pits (Neumann and Close, 1985, p. 12).	Four chip samples contained no economic metal concentrations; one sample contained 0.1 oz/ton Ag; no precious opal was observed (Neumann and Close, 1985, p. 12).	Neumann and Close, 1985, p.12.
057	Last Chance prospect (Calico Ridge; Joy)	Dehydrated opal in vesicular basalt; epidote and kaolinite noted (Neumann and Close, 1985, p. 12).	One small dozer trench (Neumann and Close, 1985, p. 12).	A grab sample (Neumann and Close, 1985, p. 12) contained 0.1 oz/ton Ag.	Neumann and Close, 1985, p. 12.

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
058	Bena prospect (JL; Willow Rainbow; JG; AM)	Opalized, platy, vesicular basalt (Neumann and Close, 1985, p. 12).	Small pits.	One grab sample taken in 1985 contained no economic metal concentrations; no precious opal was observed (Neumann and Close, 1985, p. 12).	Neumann and Close, 1985, p. 12.
059	Sinker 1-3 prospect (Digs 1-3; KB)	Sheared, jointed, vesicular basalt containing opal, limonite, and clay minerals in vesicles and along fractures.	Two small pits. Minor opal production has probably occurred.	ETMM034, not anomalous.	
060	Claim to Fame prospect (Big D)	Common opal in vesicles in basalt overlying ash-flow tuffs (Neumann and Close, 1985, p. 12).	One small pit (Neumann and Close, 1985, p. 12).	A chip sample and two grab samples taken in 1985 contained no significant metal concentrations (Neumann and Close, 1985, p. 12).	Neumann and Close, 1985, p. 12.
061	Little Joe mine (D.H.; Big Hoss; Lucky Louie; Elsie Are; Firecracker; B. and E.; Robin; H.E.R.D.; Sockye; Gimme; MILS 0320130491)	Opal occurs in fractures in basalt; associated fault zone; less than one percent of the opal is precious and most is dehydrated (Neumann and Close, 1985, p. 13).	Two open cuts from which more than 5,000 tons of basalt have been excavated. A 1,744 carat precious opal was mined in 1977 (Neumann and Close, 1985, p. 13).	Five chip samples taken in 1985 contained no economic metal concentrations; precious opal was unstable and dehydrated (Neumann and Close, 1985, p. 13).	Neumann and Close, 1985, p. 13.
062	JJ prospect (Will)	A two-ft-wide, malachite-stained, vertical, quartz vein strikes N10-20E in palagonite tuff and pyritic rhyolite (Neumann and Close, 1985, p. 13).	Two small pits and a small dozer trench (Neumann and Close, 1985, p. 13).	Three chip samples taken in 1985 contained no economic metal concentrations; one contained 0.1 oz/ton Ag and 0.005% Cu (Neumann and Close, 1985, p. 13).	Neumann and Close, 1985, p. 13.

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
063	Hog Ranch Creek prospects (uranium)	Tuffaceous sediments containing petrified wood; sediments extend into nearby sections.	Numerous small pits and trenches.	No samples. No U production.	Garside, 1973, p. 97-98.
064	Hog claims	Rhyolitic, welded ash-flow tuff overlying ashy tuff; locally silicified, limonitic, and argillic. Knox (1992) reported mineralization related to volcanic vents, domes, and pyroclastic rocks.	None.	ETMM058 and ETMM059, not anomalous.	Knox, 1992.
065	Stray claims	Rhyolitic, welded ash-flow tuff overlying ashy tuffs; locally silicified and brecciated; chalcedony and opal along fractures and in veins.	None.	ETRD053 and ETMM057, not anomalous.	
066	Big Doubt prospect (Uranium)	Tuffaceous sediments containing uraniferous, silicified wood fragments; 250 cps compared to 40-50 cps background on scintillometer (Peters and others, 1987, p. 13).	One short adit and at least twelve small pits (Peters and others, 1987, p. 13).	Ten samples taken in 1987 contained 28.0 to 84.0 ppm U (Peters and others, 1987, p. 13).	Peters and others, 1987, p. 13.
067	Unknown name prospect (Perlite)	A 25-ft-thick (average) basal chill zone in rhyolite extends approximately 2,600 ft in a belt 200 to 400 ft wide (Peters and others, 1987, p. 12, 14).	Four small trenches, but no production (Peters and others, 1987, p. 14).	Four perlite samples (refractive index of 1.496 +/- 0.004); one expanded to 10.7 lb/ft^3 with furnace yield of 97%, 11% sinkers and compacted density of 14 lb/ft^3; volume is about 2 million tons (Peters and others, 1987, p. 12).	Peters and others, 1987, fig. 2, p. 12, 14.

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
068	Hog Ranch mine (Western Mining Corp. USA)	Interlayered volcanic sediments, extrusive flows, and breccias with hot spring-epithermal Au mineralization in silicified, adularia-bearing, argillic, limonitic zones. The mineralization spread out from high angle faults (Smith, 1992).	Six open pits fed a heap leach operation and produced, as of 1991, 148,750 oz of Au, 10,600 oz of Ag (Bonham, Jr., and Hess, 1992, p. 25), and additional mercury (Nevada Bureau of Mines and Geology, 1992, p. 5).	No samples. In 1991, reserves were 1.1 million tons containing 0.05 oz/ton Au (Bonham, Jr., and Hess, 1992, p. 25), but by 1992, economic resources were nearly depleted (Smith, 1992).	Knox 1992; Bonham, Jr., and Hess, 1992, p. 25; Nevada Bureau of Mines and Geolgy, 1992, p. 5; Smith, 1992.
069	Unknown name prospect (Uranium)	Tuffaceous sediments containing silicified wood; sediments extend into nearby sections.	Numerous small pits and trenches.	No samples.	Peters and others, 1987, fig. 2; Garside, 1973, p. 97-98.
070	George W. Lund Memorial Petrified Forest prospect	Silicified, carbonized trees in ashy tuff are six ft across, or more; some are standing.	Several small pits.	No samples.	
071	JABO prospect	Rhyolite, rhyolitic tuff, and silicic cap rock; locally limonitic and argillic.	Drilling.	ETMM056, not anomalous.	
072	WG claim group (JABO; Willow Creek Reservoir)	Silicified tuffs and basalts; limonitic zone approxiametly 5 ft thick and 200 ft long.	None.	ETMM041 and ETMM042 contained a maximum, anomalous amount of Mo (43 ppm).	
073	Locality No. 7 prospect	Tuffaceous sediments containing silicified, carbonized wood.	Numerous (more than 30) small pits and trenches.	No samples.	Peters and others, 1987, fig. 2; Garside, 1973, p. 98.
074	H.C.S. (Hog Canyon South) claims	Gray, locally argillized tuff and volcanic breccia; spring nearby.	None.	ETMM040, not anomalous.	

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
075	Unknown name prospect (Uranium)	Limonitic, platy, rhyolitic tuff which is locally 10 to 20 % more radioactive than background (80-90 compared to 60-70 cps).	Three small pits and dozer scrapes.	ETMM055, anomalous in Ta (5 ppm).	
076	Unnamed occurrence (perlite)	Thin layers of black, glassy, porphyritic perlite in area containing rhyolite and tuffs.	None.	No samples.	
077	NEMCO 40 (?) claim	Yellow volcanic tuff with rhyolite and basalt.	None.	ETMM054 contained anomalous Co (41 ppm) and Lu (1.5 ppm).	
078	WEMCO claim group (?)	Argillic, limonitic volcanic breccia.	None.	ETMM053, not anomalous.	
079	Leadville mine (Tohoqua; Independence; Ajax; Contact, Chloride, Manzanita; Swingle)	A fault with lenticular and disseminated galena, sphalerite, pyrite, and chalcopyrite; gangue of quartz and calcite in gougey, limonitic, argillic, brecciated andesite, dacite, and other volcanics (Bonham, Jr., and Papke, 1969, p. 67-69)	Numerous adits, pits, and trenches; 2,000 ft of haulage tunnel; 800-ft-long, 75 degree incline. Eight or more levels. More than 1.3 million oz of Ag, 4.9 million lbs of Pb from the district, 1910 to 1927 (Peters and others, 1987).	No samples. Mineralization probably occurred at depth beneath the depleted stopes. Alteration occurs over at least two square miles nearby (Bonham, Jr., and Papke, 1969, p. 67-69).	Bonham, Jr., and Papke, 1969, p. 67-69; Bonham, Jr., and others, 1985, p. 91-93.
080	Prong claims (Leadville area)	Rhyolitic tuff, locally limonitic and argillic, overlain by welded tuff and rhyolitic flow deposits; minor, local silicification; adjacent to mines at Leadville.	None; adjacent to Leadville mining district.	ETRD106 and ETMM107 contained maximum, anomalous Zr (670 ppm)	
081	Swingle prospect (Leadville; Elk; Prong; Moose; Vent)	Mineralized fault in andesite and dacite (Bonham, Jr., and Papke, 1969, p. 67-69).	Numerous pits and trenches; a 400-ft, cross-cut adit and drifts (Bonham, Jr., and Papke, 1969).	No samples.	Bonham, Jr., and Papke, 1969, p. 67-69; Bonham, Jr., and others, 1985, p. 91-93.

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
082	Unknown name prospect (McCarty Spring)	Limonitic, ashy tuff overlain by rhyolite.	Two small pits.	ETRD051, not anomalous.	
083	Unknown name prospect (McCarty Spring Placer)	Alluvial fan deposit composed of volcanic and granitic detritus.	Two small backhoe trenches.	ETRD050, not anomalous.	
084	Razor mines (Ginny; Hermit; Division Peak; Donnelly; Raser)	Argillized, limonitic granodiorite containing quartz veins in shale and quartzite; silicic rhyolite, basalt and volcanic ash cap the nearby ridges. Pyrite, arsenopyrite (?), and galena occur in the quartz veins.	Old production from thirteen adits, one inclined shaft, and at least twenty-four small pits and trenches; at least 2,000 ft of workings (Vanderburg, 1938, p. 20-21); tailings of pulverized quartz vein material remain in small patches.	ETRD047-ETRD049 and ETMM047-ETMM052 contained maximum, anomalous Au (>10000 ppb), Ag (48 ppm), Hg (33.4 ppm), and Pb (1597 ppm).	Bonham, Jr., and others, 1985, p. 36-37.
085	Solar claims	Andesite breccia with minor argillic and limonitic zones.	None.	ETRD046 contained anomalous Eu (5 ppm).	
086	Unnamed occurrence (Copper Spring)	Green to blue, chloritic, limonitic, calcitic, opal- and chalcedony-bearing, volcanic breccia.	None.	ETRD042 and ETRD043, not anomalous.	
087	Bug claims	Basalt and tuffs which are locally argillized and limonitic.	None.	ETMM045 contained anomalous Co (39 ppm).	Knox, 1992.
088	T.M.A. prospect	Basalt and tuffs which are locally sheared, argillized, and limonitic.	One small pit; one inclined shaft (approx. 30 ft long); drilling.	ETMM043 and ETMM044, not anomalous.	
089	Unknown name prospect (Cane Spring Placer)	Silty, sandy alluvial fan deposit composed of volcanic detritus.	Two shallow backhoe trenches.	ETRD045, not anomalous.	

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
090	Bike prospect	Limonitic, argillic, silicic rhyolite/dacite breccia with basalt, andesite and tuffs; argillized and silicic zones are locallized along NE- and NW-trending faults (Knox, 1992).	Several shallow drill holes; six reverse-circulation drill holes on the Bike and Bug group of claims totaled 2,005 ft in 1992 (Knox, 1992).	ETMM046, not anomalous.	Knox, 1992.
091	Unknown name prospect (Bailey Ranch)	Silty, sandy alluvium.	Four small pits and one trench approximately 250 ft long.	No samples. Road fill and gravel.	
092	Unnamed occurrence (SW Copper Canyon Placer)	Yellow to brown, limonitic, partially cemented gravel (approximately 4 ft thick) underlying tuffs and basalts.	None.	ETRD044, not anomalous.	
093	Unknown name prospect (SW Copper Canyon)	Silicified, limonitic, argillic, rhyolite breccia and tuffs, containing minor lenses of perlite, and basalt.	Two shallow dozer scrapes.	ETRD040 and ETRD041, not anomalous.	
094	Little Granny/Lucky Jack claims	Argillic tuffs, rhyolite/dacite, andesite breccia, and basalt outcrops; locally contain thin calcite veins and argillic zones.	None found, and no indication of production.	ETMM022 contained anomalous Ba (3800 ppm).	
095	Unknown name prospect (Four Mounds)	Gray, silty to sandy playa sediments.	Four shallow dozer scrapes.	ETRD039, not anomalous.	

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
096	CH Group prospect (Dan Group)	Calcium carbonate cemented volcanic breccia and limonitic, silicified rhyolite/dacite; local, fossil hot-spring tufa and ferruginous limestone; all overlain by massive, red, silica cap rock.	One small pit, a small trench, and a short adit.	ETRD025-026 and ETMM027 contained maximum, anomalous W (31 ppm).	
097	Unknown name claim group (Calico Saddle)	Thick sequence of rhyolite breccia, basalt, and argillic tuffs, locally silicified, overlain by a silica cap approximately 10 ft thick and 500 ft across.	None.	ETMM023, ETMM024, and ETMM025, not anomalous.	
098	Cal claims	Brown playa sediments with caliche banding overlain by sand dunes.	None.	ETRD027 and ETRD084, not anomalous.	
099	Dan prospect (Cal; Calico; MDP; Dan Gold)	Interlayered volcanic tuffs, breccia, rhyolite, basalt, and andesite; locally argillic, silicic, and limonitic, especially near faults, shear zones, and fractures; siliceous sinter indicates fossil hot springs.	Four core holes of unknown length (Knox, 1992).	ETRD028-ETRD032; ETMM026, ETMM028-ETMM029, not anomalous. 246 samples (Sahli, 1964) contained averages of 81 ppb Au, 0.428 ppm Ag, 1,089 ppb mercury, and 139.5 ppm As.	Knox, 1992; Sahli, 1984.
100	MDP claims (Morman Dan Peak; CAL; Calico; Dan)	Volcanic complex composed of tuffs, breccias, and local, silicic, limonitic, and argillic basalts, rhyolites, and andesites; alteration and silicification prevalent along faults, fractures, and shear zones.	None.	ETRD033 and ETMM030-033 contained maximum, anomalous Ta (7 ppm).	

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
101	Unknown name prospect (Burro Spring Fan)	Alluvial fan composed of volcanic fragments.	One small trench.	ETRD085, not anomalous.	
102	Unknown name prospect (Petrified Canyon placer)	Alluvial fan composed of volcanic detritus.	Two small pits.	ETRD035, not anomalous.	
103	Unknown name prospect (Petrified Canyon)	Interlayered ashy tuffs and alluvial fan gravel overlain by volcanic breccia, rhyolite and basalt (minor); opaline and chalcedonic petrified wood occurs in the gravel. The petrified wood is yellow, red, and brown	At least twelve small pits and trenches; estimated production less than 10 tons of petrified wood.	ETRD034 contained anomalous Mo (95 ppm); may have petrified wood suitable for hobbyists and small-scale commercial purposes. The petrified wood is slightly more radioactive than surrounding tuffs (50 compared to 20 cps).	
104	Double Hot Spring	Hot springs (about 180 F) with estimated flow of more than 300 gpm from alluvial-fan and playa accumulations.	None.	ETMM001 and ETMM002 contained maximum, anomalous Hg (> 50 ppm).	Olmsted and others, 1975, p. 119-128; Muffler, 1978, p. 74-75; Garside and Schilling, 1979, p. 35-36, 58.
105	Double Hot 1-10 prospect	Limonitic, manganiferous, silicified, opal-bearing, bentonitic lake sediments and fanglomerate; silicified zones strike north, dip 20E, and are approx. 4 ft thick; down-dropped fault blocks or landslide blocks to the west.	Seven small pits and trenches.	ETMM003-ETMM004, not anomalous.	

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
106	Unknown name prospect (Four by Four)	Tuffaceous lake sediments and volcanic rocks containing thin, sparse, high-angle veins of chalcedony, jasper, manganiferous calcite (?), and opal.	Dozer roads and shallow cuts.	ETMM005 and ETMM006, not anomalous.	
107	NBRPP prospect	Hot-spring deposit; silica cemented rhyolite breccia overlying rhyolitic flow and basalt deposits; two, high, dry lake beds; wave-cut terraces of ancient Lake Lahontan are nearby.	Trench 20 ft by 225 ft.	ETRD001-ETRD006 contained maximum, anomalous Mo (24 ppm), Tb (3 ppm), Yb (44 ppm), Lu (6.6 ppm), and Zr (1100 ppm).	
108	Black Rock Hot Spring (MILS 0320130029?)	Hot spring (at least 140 F) with estimated flow of more than 40 gpm. Tufa to the west is composed of limonitic, organic, silty gray sand.	None.	ETMM007, not anomalous.	Muffler, 1978, p. 74-75; Garside and Schilling, 1979, p. 35-36, 58.
109	BRPP claims	Northeast-striking, near-vertical, bedded limestone, conglomerate, and sandstone; rhyolitic volcanics; tuffaceous lake sediments and lake terrace gravels to the south.	None.	ETMM009-010, ETMM110-119, and ETWH029-031 from the claims or adjacent to the north contained maximum, anomalous: Au (2710 ppb), Ba (>20000 ppm), Ni (480 ppm), Co (50 ppm), Hf (140 ppm), and Zr (5300 ppm).	
110	Unknown name claim (Black Ridge)	Black, coarsely porphyritic, pyroxene-rich basalt.	None.	ETMM008 contained anomalous Ni (110 ppm) and Co (49 ppm).	

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
111	Mithril prospect	Perlite deposit larger than 600 ft by 150 ft in siliceous rhyolite; contains thundereggs, agate, and jasper; minor limonite; considerable lithic and crystal fragment content.	One trench and one pit (40 ft by 250 ft).	ETRD007 and ETRD008, not anomalous.	
112	Amy claims	Principal host is rhyolite; zones of hydrothermal alteration are associated with rhyolitic domes in South Willow volcanic rocks (Knox, 1992).	None.	No samples.	Knox, 1992.
113	Fly Ranch Geothermal (Bailey Well, MILS 0320270632; Hualapai; The Geyser; Wards)	Geothermal area in playa and alluvial-fan accumulations.	Drill holes, mainly for agricultural irrigation water.	No samples.	Olmsted and others, 1975, p. 119-128; Crewdson, 1976, p. iii-iv, p. 155-160; Muffler, 1978, p. 76-77; Garside and Schilling, 1979, p. 72-74; Welch, 1985.
114	China Cat claims	Argillic, zeolitic, chloritic, porphyritic basalt in hydrothermally altered area approx. 1,000 ft by 2,000 ft, trending north; silicification as opal, jasper, and chalcedony to the west near Steamboat Rock.	None.	ETMM017, ETMM020, and ETMM021 contained maximum, anomalous W (82 ppm) and Br (66 ppm).	

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
115	Unknown name prospect (Steamboat Rock)	Limonitic, silicified rhyolite overlying ancient Lake Lahonton beach gravel composed of volcanic and granitic rocks; veins and brecciated zones contain opal, jasper, and chalcedony.	One 15-ft shaft and two small pits.	ETRD022, ETRD023, and ETRD024. ETRD024 contained anomalous La (250 ppm), Ce (560 ppm), Sm (40.8 ppm), and Hf (12 ppm).	
116	Cassidy mine (Cassetty; Buckhorn; Black Rock Gold)	North-trending, steeply dipping quartz veins with adjacent mineralized stockworks in metavolcanics and diorite; ancient Lake Lahonton beach gravels. Chlorite, epidote, limonite, amphibole, pyrite, arsenopyrite, and bornite occur.	Eleven shafts, nine adits, 65 small pits and trenches; one adit has approx. 500 ft of workings (Fred Solheim, 1992, written communication); some trenches were arranged to gather water for sluicing and small-scale placer washing.	ETRD018-021 and ETMM018-019 contained maximum, anomalous Au (>10000 ppb), Ag (38 ppm), and Pb (3190 ppm). Sample ETMM018 contained about $0.30/yd^3 in placer Au.	Bonham, Jr., and others, 1985, p. 188.
117	Unknown name mine (Gravel Pit South of Hualapai Flats)	Gray, subangular, basaltic gravel layers (10 to 20 ft thick) interbedded with tuffaceous sediments in a point bar of ancient Lake Lahonton.	Several pits in an area approximately 300 ft by 600 ft by 50 ft.	ETRD083 contained anomalous Pb (217 ppm).	
118	Gerlach Hot Springs (Great Boiling Spring; Gerlach area borate, MILS 0320310169, nearby)	Geothermal area in accumulations of alluvium and playa.	Drill holes and development for recreation and local uses.	No samples.	Olmsted and others, 1975, p. 119-149; Crewdson, 1976, p.iii-v, 160-162; Welch, 1985; Muffler, 1978, p. 50-51; Garside and Schilling, 1979, p. 74-78.
119	Unnamed occurrence (Black Rock Playa)	Silty to sandy playa sediments; SE end of Black Rock Desert.	None.	ETRD078, not anomalous.	

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
120	Arcturus mine prospect	Tactite lens (N60E, 42SE) in contact zone between granodiorite intrusive and metasedimentary rocks (mica schist and marble); aplitic veins (N45E, 30SE) in the granodiorite contain stringers of andradite garnet.	Two adits (caved) and an ore dump approximately 15 ft by 20 ft. A caved crosscut adit is 420 ft long (Bonham, Jr., and others, 1985, p. 188-189).	ETRD009-011 contained maximum, anomalous W (190 ppm).	Bonham, Jr., and others, 1985, p. 188; Stager and Tingley, 1985; 1988, p. 197-198.
121	Trego Hot Springs (Butte Springs Geothermal; Garrett Ranch well, MILS 0320270635 nearby)	Hot springs (180 F) flow at more than 400 gpm from at least three vents; notable hydrogen sulfide odor; minor tufa-cemented alluvium surrounds vents; small, gray to brown, minnow-like fish present.	A canal channels the spring flow away from the adjacent railroad tracks.	ETMM011 contained anomalous Hg (> 50 ppm).	Bonham, Jr., and others, 1985, p. 188; Muffler, 1978, p. 76-77; Garside and Schilling, 1979, p. 60.
122	JK/NK prospect (Desert Gold)	Relatively small granodiorite pluton with numerous thin, lenticular, mineralized quartz veins containing limonite, pyrite, chalcopyrite (?), and Au (?).	Three short adits, eight small pits, and one short caved shaft.	ETRD012 and ETRD013 contained maximum, anomalous Au (1950 ppb) and Th (122 ppm).	
123	Heather Arising prospect (Heather 1-4; J.D. Group; Last Chance; Black Star)	Granodiorite with quartz veins containing Cu oxides; limonitic, weathered granodiorite grades into diorite and overlies phyllite.	Two adits, one of which is caved, and a small (10 ft by 20 inches) ore dump associated with the caved adit; a cabin.	ETRD014 and ETRD015 contained maximum, anomalous Cu (11923 ppm) and Sb (1680 ppm).	
124	Dottie prospect	Metasedimentary and granitic rocks at sheared, argillized, limonitic, slightly silicic contact; arsenopyrite(?); bench and valley alluvium at site.	Six small trenches and twelve small pits.	ETRD016-ETRD017; and ETMM014-ETMM015 contained maximum, anomalous Au (>10000 ppb), Pb (1529 ppm), As (>10000 ppm), Sb (433 ppm), and Mo (130 ppm).	

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
125	J.D. mines (Finley Group; J.D. King; J.D. Princess; Black Star)	Steeply dipping metasedimentary rocks underlie granitics, lamprophyre, and simple pegmatite in a sheared contact zone. Limonitic veins and veins containing black amphiboles or tourmaline occur in fractured stockwork.	At least 23 small pits and trenches; four short shafts; four adits, one estimated to be 200 ft long with stopes and glory holes; production estimated at less than 200 tons (from tailings composed of washed, crushed quartz).	ETMM012 and ETMM013 contained maximum, anomalous Au (>10000 ppb) and Ni (110 ppm).	
126	Black Scorpio claim	Sandy stream-bed alluvium (approx. 50 ft wide), composed of granitic and metasedimentary rocks, is incised into Lake Lahonton playa sediments and terraces along Lava Beds Creek drainage.	None.	ETMM016 contained anomalous Th (182 ppm), U (31 ppm), La (250 ppm), Ce (570 ppm), Sm (49.6 ppm), and Ta (16 ppm).	
127	Unknown name prospect (SW Sulphur Hills)	Tuffaceous, siliceous sediments near basalt and small granitic outcrops.	Shallow drill hole.	ETMM095 and ETRD082, not anomalous.	
128	LH prospect (Constant Placer Group)	Silty to sandy, volcanic and metasedimentary alluvial fan and playa deposits.	One deep drill hole and numerous, shallow dozer trenches.	ETRD080 and ETRD081, not anomalous.	
129	Constant mine (?) (Black Eagle; MILS 0320270725; Barrel Springs gold placer, MILS 0320270611)	Sedimentary rocks, sand and gravel, partly consolidated, and volcanic rocks occur (Johnson, 1977, pl. 1).	An adit, several areas of intensive trenching, and more than 100 small pits and trenches.	No samples.	Johnson, 1977, pl. 1

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
130	Red Gulch mine (Oscar Claims; Rabbit Hole, MILS 0320270226?; Rabbithole 0320270333; Atlantis; Star and Anmorel).	Highly compact, limonitic alluvial gravels composed of volcanic and metasedimentary rocks with interlayered clay beds; four subdrainages between east-trending main drainages.	At least fourteen shafts, 20 ft to 25 ft deep; six adits; numerous trenches and pits. Production of unknown amount of placer Au likely.	ETWH004, ETWH005, ETWH028, and ETRD079. ETWH004 contained anomalous Au (3310 ppb), Sb (151 ppm), W (160 ppm), and Br (24 ppm).	Vanderburg, 1936a, p. 148-152, 1936b, p. 25-26; Johnson, 1973, p. 72-73; 1977, pl. 1, p. 76-77; Schilling, 1963; Knox, 1992; John A. Peterson, claimant, unpublished written commun., 1992.
131	Thompson Pit prospect	Placer gravel consists mostly of silt and fine pebbles and sediments smaller than 0.25 inch.	Three trenches and five pits; two to four outlying pits.	ETWH019, not anomalous.	
132	Barrel Springs prospect (Double O mine; Placeritas, MILS 0320270709?)	Terrace gravels; highly compacted below the two foot level; minerals present include cinnabar, cassiterite, scheelite and titanium-bearing magnetite (Johnson, 1977. p. 77).	Placer exploration (trenching) in a 30- to 50-ft-high terrace; evidence of a central washing plant; placer tailings; one old house and a medium-sized storage shed; surface workings only.	ETWH020 contained anomalous Se (24 ppm); An estimated 700,000 yd^3 of Au- and titanium-bearing gravel occur here.	Stager and Tingley, 1988, p. 185; Johnson, 1973, p. 72-73; 1977, p. 76-77; Schilling and Hall, 1980. p. 39; Vanderburg, 1936a, p. 148-152.
133	Rosebud Canyon montmorillinite mine (OL; Constant Group)	Montmorillonite; white to yellow-gray; fine to compact, earthy; siltstone above and below; volcanic glass inclusions; beds are 4 to 8 ft thick, strike N40E, and dip 20NW. Alluvium and colluvium are of phyllite, shale, schist, volcanics.	Several car loads of clay shipped to California. (Vanderburg, 1936b, p. 26); three dozer cuts at top of bench, three small pits at base of deposit.	ETWH022, not anomalous, contained major montmorillonite, minor kaolinite, and trace opaline silica(?).	Papke, 1970. p. 34; Vanderburg 1936b, p. 26.

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
134	Constant prospect (Rabbithole Springs)	Sandy alluvium in area of volcanic rock, slate, and minor milky quartz veins; abundant black heavy minerals (Johnson, 1977, pl. 1).	Numerous small trenches, a trench about 400 ft long, and small pits; at least one adit.	ETWH017 and ETWH018, not anomalous. ETWH017 contained about \$0.50/yd^3 in placer Au (\$370/oz Au price).	Johnson, 1973, p. 72-73; 1977, pl. 1, p. 76-77; Vanderburg, 1936a, p. 148-152; Bonham, Jr., and others, 1985, p. 126-127; Robbins, 1985, p. 36-37.
135	Unknown name prospect (Southeast of Barrel Springs; Rhomb)	Tuffaceous sediments and volcanic rocks intruded by diabasic sills overlie phyllites; alteration is silicic and propylitic, with a fault-bound graben nearby (Knox, 1992).	Eight small pits.	ETWH024, not anomalous.	Knox, 1992.
136	Constant prospects (Outlaw Spring; William Smith; MILS 0320270709)	Gravel and volcanic rocks crop out; quartzose boulders occur locally, and are partly limonitic.	Seventeen or more small pits and trenches.	ETCR050, not anomalous. Another sample (2940) from quartzose breccia contained 1,000 ppm Mn and 3,000 ppm Ba (Bonham, Jr., and others, 1985).	Bonham, Jr., and others, 1985, p. 126-127 and 138-139.
137	Unknown name prospect (sec. 8; South Rabbithole)	Limonitic quartz vein is concordant with phyllite/quartzite host rock; vein strikes N30W, dips 52SW.	One shaft estimated to be at least 100 ft deep.	ETCR051 contained anomalous Pb (> 10000 ppm), As (2980 ppm), and Br (91 ppm).	Bonham, Jr., and others, 1985.

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
138	Hycroft Resources and Development Sulphur mine (0320130098; 0320130476; 0320130149; 03201300272; 0320130072; 0320130152; 0320130150; Crofoot-Lewis; Nevada Sulfur; Walker Group; Brimstone; RFG; East China Pit; Santa Rosa; Cedar Hill)	Silicic, argillic, and chloritic conglomerates and sandstones with interbeds of pebbly sinter; conglomerate composed of subangular to rounded metasedimentary and volcanic rocks; mineralized veins in silicic zone (Knox, 1992).	As of 1991, 352,940 oz of Au and 384,553 oz of Ag (Bonham, Jr. and Hess, 1992, p. 21). Also, 40,000 tons of S, $100,000 of Ag, 500 tons of alunite, and 25 flasks of Hg (Vanderburg, 1938, p.44-47; Bailey and Phoenix, 1944, p. 107-108)	No samples. In 1992, 18.8 million tons containing 0.022 oz/ton Au (Northern Miner, Nov. 2, 1992); 25.5 million tons in Brimstone Pit; anomalous Ba, Ag, La, Pb, V, and Sb (Bonham, Jr., and others, 1985, p. 173).	Knox, 1992; Bonham, Jr., and others, 1985, p. 171-173; Vanderburg, 1938, p. 44-47; Bonham, Jr., and Hess, 1992, p. 21.
139	Nevada Sulphur Company mill site	Volcanic rocks and alluvium occur (Johnson, 1977, pl. 1).	None.	No samples.	Master Title Plat; Johnson, 1977, pl. 1.
140	Cold Sulphur prospect (Nevada Sulphur Company mine)	Volcanic rocks, conglomerate, and alluvium crop out (Johnson, 1977, pl. 1).	At least seven small pits, trenches, and other workings (Sulphur 7.5' topographic map).	No samples.	Master Title Plats; Johnson, 1977, pl. 1.
141	Rosebud mine (Brown Palace Group; Barrel Springs tungsten, MILS 0320270007; Rhoda; KM; GP; Big Six; Dreamland; Golden Juniper; Wedge; Red Top; Last Chance; Green Hill; Surprize; White Alps; Lucky Boy)	Volcanic rocks, including flows, breccias, and tuffs, overlie metasedimentary rocks. Hydrothermally altered, brecciated structures contain kaolin, quartz, and sulfides (Johnson, 1977, pl. 1).	At least 10 adits, 35 prospect pits, and three shafts. Production of 116,000 oz of Ag, 3,700 oz of Au, 18,700 lb of Cu, 4,600 lb of Pb between 1908 and 1947 (Knox, 1992).	No samples.	Johnson, 1977, pl. 1; Knox, 1992.

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
142	Rosebud prospect (LAC/Equinox; Fisher; Nevada Rattlesnake; Monterey; Rhoda; KM; Wildrose adjacent)	Mineralization is volcanic-hosted, in quartz-sericitized zones related to faults (Walck and others, 1992).	At least two old shafts, two adits, and more than 25 pits. Recent exploration and drilling (Walck anbd others, 1992)	No samples. 2.3 million tons grading 0.23 oz/ton Au (Jones, 1992, p. 16); about 500,000 oz of Au and 5 million oz of Ag (Walck and others, 1992).	Jones, 1992, p. 16; Walck and others, 1992, p. 56.
143	Oscar prospect (Bud; south of Rosebud Canyon)	Massive, silicified, limonitic volcanic and brecciated rhyolite rocks; hydrothermal alteration; epithermal quartz textures. Calcite, quartz, and siderite(?).	Fifteen prospect pits, two shafts, and thirteen drill holes (Johnson, 1977, p. 81; Bonham, Jr., and others, 1985, 138-139).	ETWH006-ETWH009, rock samples; ETWH010-ETWH016, reverse circulation chip samples. Maximum anomalous analyses were Au (871 ppb), Ag (47 ppm), Hg (29.31 ppm), Mo (47 ppm), Ni (410 ppm), Co (62 ppm).	Johnson, 1977, p. 81. Bonham, Jr., and others, 1985, p. 138-139.
144	Oscar prospect (Bud, Thorn, Rhoda, Rosebud Gulch; Rabbithole Springs)	Volcanic rocks and alluvium crop out (Johnson, 1977, pl. 1).	A shaft, five adits, and at least five small pits are shown on the Sulphur 7.5' topographic map; another shaft, in alluvium, is at least 200 ft deep.	No samples.	Johnson, 1977, pl. 1; Jones and others, 1931
145	Unknown name prospect (Rosebud Spring NE)	Slate, phyllite, hornfels, and quartzite with alluvium (Johnson, 1977, pl. 1).	An adit and pit on Sulphur 7.5' topographic map.	No samples.	Johnson, 1977, pl. 1.
146	Unknown name prospect (Rosebud Spring SE)	Slate, phyllite, hornfels, and quartzite with alluvium (Johnson, 1977, pl. 1).	Six prospect pits on Sulphur 7.5' topographic map.	No samples.	Johnson, 1977, pl. 1.

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
147	Unknown name prospect (Sulphur quadrangle; Oscar Claims ?)	Limonitic rhyolite and granodiorite sills and dikes; gray fault gouge is west and adjacent to the most altered dike. Knox (1992) reports host rock as silicic and argillic volcanic tuffs, flows, and conglomerates.	A small trench; Knox (1992) reported four reverse circulation holes in area.	ETCR048 and ETCR049. ETCR049 contained anomalous Ni (160 ppm) and Co (62 ppm).	Knox, 1992.
148	Blakenberg Dydcan prospect (Gold Nugget; Red Nugget; Rabbithole, MILS 0320270054 (?))	Rhyolitic volcanic rocks and phyllite, hornfels, and quartzite with areas of alluvium; east-trending faults, poorly defined, are associated with quartz veins and minor brecciation (Johnson, 1977, pl. 1; Knox, 1992).	Four shafts and thirteen pits, shown on Sulphur and Sawtooth Knob 7.5' topographic maps.	A sample (2801) taken in 1985 contained 0.7 ppm Ag, 100 ppm Cu, and 1,500 ppm Zn (Bonham, Jr., and others, 1985).	Bonham, Jr., and others, 1985; Johnson, 1977, pl. 1; Knox, 1992.
149	Wonder Metal prospect	Near the contact of volcanic rocks with slate, phyllite, hornfels, and quartzite (Johnson, 1977, pl. 1).	Two shafts, four prospect workings, and a large working.	Nevada Bureau of Mines and Geology analyses show a maximum Ti dioxide content of 1 % in samples (Beal, 1963, p. 23).	Beal, 1963, p. 23
150	Long Canyon prospects	Quartzite and phyllites are cut by quartz veins and intruded by a limonitic, rhyolitic porphyry plug or dome and associated felsic dikes (Knox, 1992).	Minor drilling (Knox, 1992); two mine symbols and one adit on the Long Canyon 7.5' quadrangle.	No samples. According to Knox (1992), Au is sporadically distributed along veins.	Knox, 1992.

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
151	Lantern prospect (Lantern 1-6; "Gold Boulder Area")	Au in quartz-veined boulders and alluvium. Probable hot-spring source. Contain quartz, adulararia, calcite, electrum, acanthite, cerargyrite, pyrite, marcasite, arsenopyrite, Cu minerals, and Fe oxides (Robbins, 1985)	Trenching, drilling, geophysics, geochemistry, and biogeochemistry; more than 40 drill holes totalling more than 21,000 ft since 1980 (Knox, 1992).	No samples. Analyses reported by Robbins (1985) for silicified sediments averaged about 0.13 oz/ton Au, 1.6 oz/ton Ag, 76 ppm As, and 4.6 ppm Hg. Mineralized boulders yielded about 0.33 oz/ton Au, 4.8 oz/ton Ag, 16 ppm As, and 14 ppm Hg.	Robbins, 1985; Knox, 1992.
152	Jim B. prospect (Reed)	Quartzose shear zones in metasediments are 3 to 30 ft wide, vuggy and limonitic, and strike N20W with dip 50-80 SW. Stockworks occur. Clay, pyrite, cinnabar, and galena were noted (Bonham, Jr., and others, 1985; Temkin, 1981)	Six pits and an adit are shown on topographic maps.	No samples. An Fe-rich sample of quartz vein (2802) taken by Bonham, Jr. and others (1985) contained 0.1 oz/ton Au and 350 ppm As.	Bonham, Jr., and others, 1985; Temkin, 1981.
153	Unknown name prospect (Mauds Well: Green Placer; Hawkeye mine, MILS 0320270622 nearby?)	Slate, phyllite, hornfels, and quartzite with alluvial cover (Johnson, 1977, pl. 1).	Numerous prospect pits.	ETCR041 and ETCR042, not anomalous.	Johnson, 1977, pl. 1.
154	Crossroads prospect	Alluvium-covered pediment in area of alluvium, older alluvium, phyllite, shale, hornfels, and quartzite (Johnson, 1977, pl. 1).	One small pit and a trench about 40 ft long.	No samples.	Johnson, 1977, pl. 1.

Table A-1.--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
155	SP Ridge prospect (Southern Pacific Ridge; Scossa; Lantern "Silver Zone", adjacent to west)	Precious-metal mineralization occurs along high-angle fractures and faults in Triassic-Jurassic bedrock and Tertiary-age gravel. Limonite-stained quartz-adularia veins and intrusive breccia are mineralized (Yambrick, 1992).	Ten-ft adit and a 10-ft by 5-ft cut, in addition to 2 shafts and 26 small pits (Scossa topographic map). Forty or more drill holes on the Lantern property; since 1980 , seven companies have extensively explored the property (Knox, 1992).	ETCR046 and ETCR047 contained maximum, anomalous Au (1390 ppb), Ag (280 ppm), As (1680 ppm), and Sb (223 ppm); Robbins (1985) reported western veins had about 0.02 oz/ton Au, eastern veins about 0.014 oz/ton Au. Several million tons of leach-grade Au, Ag resources (Parratt, 1993).	Knox, 1992; Bonham, Jr., and others, 1985, p. 150-151; Robbins, 1985.; Yambrick, 1992; Ron Parratt, Santa Fe Mining, Inc., geologist, oral commun., 1993.
156	Scossa mines (North Star Group, MILS 0320270233; Keough, MILS 0320270235; Hawk Eye, MILS 0320270622?; Olsen, MILS 0320270663; Dawes, Anaconda)	Limonitic, metasedimentary, granodioritic, and sericitic aplitic rocks and quartz veins; mineralization along joints and veins.	At least 18 shafts, 40 pits, and an adit are on the Scossa topographic map. One shaft is 400 ft deep with 1,000 ft of drifting, another 70 ft with 350 ft of drifts. Production of 489 oz of Au and 705 oz Ag (Johnson, 1977, p. 87).	ETCR043-ETCR045 contained anomalous maximum Au (4610 ppb) and Co (43 ppm).	Johnson, 1977, p. 87; Jones and others, 1931; Bonham, Jr., and others, 1985, p. 150-151; Vanderburg, 1936b, p. 36-37.
157	Pershing titanium prospect (Mohawk Group, MILS 0320270234)	Alluvium and weathered schist and slate (Johnson, pl. 1)	Numerous small pits on topographic map.	No USBM samples. Nevada Bureau of Mines and Geology samples reveal less than 1.6 % Ti dioxide (Beal, 1963, p. 22-23)	Johnson, 1977, pl. 1; Beal, 1963, p. 22-23.

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
158	Unknown name prospect (Scossa; Moonshine Spring; Cottonseed; Red Cinnabar)	Altered sandstone and shale with extensive limonite stain and silicification is adjacent to an aplitic dike or sill; all rock types are hydrothermally altered.	One dozer scrape approximately 50 ft long.	ETCR033-ETCR036 contained maximum anomalous: Hg (> 50 ppm), W (160 ppm), Ni (1100 ppm), Co (110 ppm), and Cr (1500 ppm); abundant Hg may be a high-level indication of a disseminated Au system (Knox, 1992).	Bonham, Jr., and others, 1985, p. 150-151; Knox, 1992.
159	Placerites mines (Ace; Angel; Blue Stallion; Dilly; Alice; Patty; Hilltop; Nevada Montana, MILS 0320270229; Noble, MILS 0320270238; MILS 0320270231; MILS 0320270228; MILS 0320270059; MILS 0320270230)	Alluvium covered pediment; reportedly overlies shale and slate (Bonham, Jr., and others, 1985, p. 117). Silicified and argillized volcanic and volcaniclastic rocks occur (A. Kizis, Jr., geologist, written commun., 1992).	A scraped area about 200 ft by 200 ft; a shaft; numerous small pits and trenches.	ETCR029, ETCR030, ETCR031, and ETCR032, not anomalous. Samples ETCR031 and ETCR032 contained about \$1.20/yd³ and \$0.75/yd³ in placer Au respectively (\$370/oz Au price). Very low gold and weakly to moderately anomalous As, Sb, and Hg (A. Kizis, Jr., geologist, written commun, 1992).	Bonham, Jr., and others, 1985, p. 117. Anthony Kisiz, Jr., geologist, Placer Dome, USA, written commun., 1992).
160	Old Noble prospect	Limonitic quartz vein in a one- to two-ft shear zone in quartzite; the strike of the near-vertical vein is N50W; vein length is approximately 350 ft. Minerals include sphalerite (?), stibnite (?), galena (?), ilmenite after pyrite.	One shaft approximately 12 ft by 9 ft and 60 ft deep.	ETCR008 contained anomalous Au (539 ppb), Ag (>300 ppm), Cu (764 ppm), Pb (>10000 ppm), Zn (10000 ppm), As (7100 ppm), Sb (362 ppm), Cd (140 ppm), and Co (62 ppm).	
161	Nevada Hills	Quartz veinlets up to two inches thick in a limonitic shear zone in metasedimentary rock; strike and dip of shear zone is N10W, 75SW.	One adit 5 ft by 4 ft by 30 ft and one shaft 10 ft by 7 ft by 25 ft.	ETCR009 and ETCR010, not anomalous.	

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
162	Gold Ribbon Rock prospect (Extension to Golden Molly)	A limonitic fracture zone strikes N49E and dips 37NW through phyllite and contains about 3 ft of hydrothermally altered rock between a quartz vein about 3 ft thick and a 1-ft-thick gouge zone.	A shaft about 100 ft deep and four others on strike. The mineralized zone was stoped around the 100 ft shaft, but amount of production, if any, is unknown.	ETCR037-ETCR039. ETCR039 contained anomalous Zr (1100 ppm).	
163	Golden Molly prospect (Extension to Gold Ribbon Rock)	An iron oxide-stained structure strikes northeast and dips northwest; it contains quartz veins about one foot thick with associated gouge and altered rock; has extension to Gold Ribbon Rock claim to southwest.	A cut about 300 ft long, 20 ft wide, and 8 ft deep.	ETCR040 contained anomalous Au (666 ppb) and Eu (4 ppm).	
164	Nevada Superior mine (adjacent to Silver King/Iron Mask; Nevada Superior, MILS 0320270239)	Shear zone in phyllite contains limonitic veins; fault breccia and mineralized veinlets are also found in the vertical shear zone, which strikes N40W; strike and dip of the host rock is N70E, 70NW.	An adit, 2 shafts, many pits, a trench (300 ft by 7 ft by 7 ft). Knox (1992) estimated 80,000 tons and 2,400-4,800 oz of Au, 562,500-1,125,000 oz of Ag, 6-12 million lb of Pb, 0.5-1 million lb of Cu, and 2.4-4.8 million lb of Zn produced.	ETCR003-ETCR007 contained maximum anomalous: Ag (87 ppm), Cu (1315 ppm), Pb (>10000 ppm), Zn (>30000 ppm), Cd (100 ppm), Ni (99 ppm), and Co (47 ppm). Unevaluated mineral resources may remain (Knox, 1992).	Knox, 1992.
165	Iron Mask mine (Silver King mine, MILS 0320270699)	Quartzite and phyllite are cut by northeast- and northwest-striking faults and shears containing limonitic quartz veins, gouge, and breccia; host rock is intensely altered.	Three shafts, three adits, and dozens of small pits on Scossa 7.5' topographic map. Significant production occurred.	ETCR011-ETCR021 contained maximum anomalous Ag (>300 ppm), Cu (1221 ppm), Pb (>10000 ppm), Zn (>30000 ppm), As (4260 ppm), Sb (490 ppm), Cd (270 ppm), Co (71 ppm), and Lu (1.8 ppm).	Johnson, 1977, p. 44.

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
166	Antelope prospect (Also Antelope Springs mine, MILS 0320270613 and Antelope Spring, 0320270710)	A limonitic, gouge-filled shear zone in phyllite and quartzite; bedding is contorted near the shear zone, which strikes N80E and dips 70NW.	One, steel-tracked, timbered adit 6 ft by 7 ft, caved at 30 ft. Four levels (unpublished report to Griff Mines, Inc., 1942).	ETCR022-026 contained maximum anomalous Ag: (>300 ppm), Cu (7105 ppm), Pb (>10000 ppm), Zn (>30000 ppm), As (6650 ppm), Cd (330 ppm), Se (15 ppm), W (29 ppm), Ni (99 ppm), Co (87 ppm), and Br (125 ppm).	
167	Unknown name prospect (Little Antelope Spring)	A limonitic shear zone striking N60E and dipping 45NW in phyllite and quartzite; boxwork occurs in some of the quartzitic rock.	One caved adit.	ETCR027 contained anomalous Ag (200 ppm), Cu (1100 ppm), Pb (>10000 ppm), Zn (4500 ppm), and Cd (35 ppm).	Bonham, Jr., and others, 1985.
168	Davis prospect	Shale, phyllite, hornfels, and quartzite crop out (Johnson, 1977, pl. 1).	One shaft (Scossa 7.5' topographic map).	No samples.	Johnson, 1977, pl. 1
169	Molly prospect	Shale, hornfels, phyllite, and quartzite near a contact with granodiorite (Johnson, 1977, pl. 1).	Six prospect pits on topographic map.	No samples.	Johnson, 1977, pl. 1.
170	Willow prospect (FMC Willow; Firstmiss Co. Willow)	Shale with minor quartzite and limestone intruded by rhyolite dikes; silicification and quartz veining occurred, and carbonaceous clay gouge is found.	Thirteen trenches and five drill holes.	Firstmiss Gold, Inc., assays to 25 ft of 0.013 oz/ton Au, two or three with 5 to 10 ft containing 0.01 to 0.02 oz/ton Au. Best drill intercept 25 ft with 0.01 oz/ton Au (Martin, 1992).	Martin, 1992.

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
171	Unknown name prospect (Willow Springs)	Limonitic quartzite with quartz veins (two generations) near old hot springs; silica, epidote, chlorite, calcite, clay, pyrite(?) alteration; limonitic gravels are composed of quartzite, slate, quartz, and volcanics.	Small pits and trenches.	ETWH021, ETWH025, ETWH026, ETWH027, ETMM092, ETMM093, and ETMM094, not anomalous.	
172	De Soto mine (Arsenic King, MILS 03202700242; Majuba Arsenic, MILS 0320270122)	Metasedimentary, intrusive volcanic, and granitic rocks; numerous shear zones and quartz/chalcedony veins; weathered stibnite, arsenopyrite, chalcopyrite, pyrite, and galena(?) occur.	At least six inclines, two shafts, and ten pits and trenches. In 1924 As-Ag ore containing 20 % As and 6.0 oz/ton Ag was produced (Mackenzie and Bookstrom, 1976, p. 22-23; Johnson, 1977, p. 44-48).	ETWH001-ETWH003, ETWH023, and ETCR002 contained anomalous maximum Ag (250 ppm), Cu (>20000 ppm), Pb (3706 ppm), Zn (2700 ppm), As (>10000 ppm), Sb (274 ppm), Cd (210 ppm), Mo (50 ppm), Ni (260 ppm), Eu (0.5 ppm), and Lu (2 ppm).	Mackenzie and Bookstrom, 1976, p. 22-23; Johnson, 1977, p. 44-48
173	MA prospect (Dilly; Julie; Noramex; Majuba; Emerald; Prospector; Wayward; Pershing Star Turquoise)	Shale, phyllite, hornfels, and quartzite near the contact of the Majuba Mountain rhyolite and rhyolite breccia were intruded by volcanic rocks. Alluvium accumulated along valleys (Johnson, 1977, pl. 1).	Two adits and six prospects on Majuba Mountain 7.5' topographic map.	No samples.	Johnson, 1977, pl. 1.
174	Western Mines prospect	Slate, phyllite, hornfels, and quartzite near intrusive contact of Majuba volcanic complex. Local alluvial cover (Johnson, 1977, pl. 1)	Three prospect pits on topographic map.	No samples.	Johnson, 1977, pl. 1.

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
175	Majuba Hill mine (Nightmare mine, MILS 0320270155; Majuba Mountain geothermal, MILS 0320270636; Gilmet Majuba Mountain mine)	Sedimentary rocks, rhyolite porphyry, and related rocks cut by the Majuba fault; silica, clay, sericite, fluorite, and tourmaline occur, mostly in brecciated porphyry, and contain Au, Ag, Cu, Sn, Mo, As, Cd, Be, and U.	Three adits include at least 4,650 ft of workings. Production was at least 2,849,000 lb of Cu and 21,000 lb of tin. At least 13 drill holes (Johnson, 1977, p. 44-48; Knox, 1992)	No samples.	Smith and Gianella, 1942; Matson, 1948; Vanderburg, 1936b, p. 10; Trites and Thurson, 1958; Bonham, Jr., and others, 1985, p. 2; Berry and others, 1982; Mackenzie and Bookstrom, 1976; Johnson, 1977, p. 44-47; Jensen, 1985; Knox, 1992.
176	Unknown name prospect adit	Slate, phyllite, hornfels, quartzite and volcanic rocks in vicinity of Majuba volcanic center.	One adit shown on Majuba Mountain 7.5' topographic map.	No samples.	
177	Unknown name prospect (Patent Survey)	Slate, phyllite, hornfels, quartzite, and volcanic rocks near contact with Majuba volcanic center.	Survey of mining claim.	No samples.	
178	Last Chance prospect (South of Majuba Mountain, in sec. 11)	Shale, phyllite, hornfels, and quartzite are near the contact of the Majuba Mountain rhyolite and rhyolite porphyry. Alluvium occurs along valleys (Johnson, 1977, pl. 1).	An adit, shown on the topographic map.	No samples.	Johnson, 1977, pl. 1.

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
179	Last Chance mine (?) (South of Majuba Mountain, in sec. 1; Pflum mine; Majuba-Fresno Silver mine; Majuba Hill prospect; Julie; Dilly; MA; Pershing Star; Possible)	Northwest-trending shear zone along andesite dike in slate; three veins, average 4 ft in thickness.	Adit 830 ft long, 100-ft shaft with levels at 40 and 100 ft, 400-ft-long incline, and ten small pits; total development of 1,600 ft. 1,000 tons between 1908 and 1928 contained 40 oz/ton Ag and 8 % Pb (Vanderburg, 1936a, p. 8).	No samples.	Mackenzie and Bookstrom, 1976, p. 22; Johnson, 1977, p. 47; Vanderburg, 1936b, p. 8; Stager and Tingley, 1988, p. 158.
180	Unknown name claim (Rye Patch N.Quad)	Alluvium composed of volcanic and metasedimentary detritus.	A rock cairn near a prospect shown on Rye Patch North 7.5' topographic map.	ETCR001 contained anomalous Cu (157 ppm), Pb (332 ppm), As (447 ppm), and Hf (130 ppm).	
181	Unknown name prospect (Silver occurrence, MILS 0320270474, adjacent)	Slate, phyllite, hornfels, and quartzite at or near contact with basalt and granodiorite (Johnson, 1977, pl. 1).	Five small prospects.	No samples.	Johnson, 1977, pl. 1.
182	Imlay View prospect (DV Claims; Silver Occurrence, MILS 0320270455; Temple, MILS 0320270654)	Argillic, limonite-rich shale and siltstone with strong north-trending color anomalies; sedimentary rocks cut by barren, northeast-trending quartz veins and small rhyolitic porphyry stocks (Knox, 1992).	Several short shafts, adits, and pits.	No USBM samples. According to Knox (1992), anomalous Au, Hg, As, and Pb occur; low Au potential is due to probable alkaline nature of hydrothermal system (Knox, 1992).	Stager and Tingley, 1988, p. 175; Knox, 1992.
183	Unknown name prospect (Silver occurrence)	Slate, phyllite, hornfels, and quartzite at or near contact with basalt and granodiorite (Johnson, 1977, pl. 1).	A shaft and three small prospect workings.	No samples.	Johnson, 1977, pl. 1.

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
184	Fifty-Six (56) copper mine	Shear zone in granodiorite contains kaolin, pyrite, and Cu sulfides.	An adit driven S70E for 225 ft has a raise to the surface; a winze is sunk to 30 ft.	No samples.	Bonham, Jr., and others, 1985.
185	Dusty mines (Majuba Placers, MILS 0320270244; Saundra Lee/Phase II, MILS 0320270724; Rio Grande, MILS 0320270245)	Metasedimentary rocks intruded by rhyolitic dikes and sills with overlying alluvium. Most of the (unevaluated) resource is in the alluvium, although Au occurs in bedrock (Knox, 1992).	An undetermined amount of Au was produced from the historic Majuba Placers (Knox, 1992); at least 70 prospect pits cover several square miles. L. E. Speir did gravity flotation work in 1991 (Hess and Castor, 1992, p. 38).	No samples.	Knox, 1992; Bonham, Jr., and others, 1985; Hess and Castor, 1992, p. 38.
186	Poker Brown mine	Granitic rocks intruded slate, phyllite, hornfels, quartzite, and limestone in the region (Johnson, 1977). Steep-to-moderate dipping veins are limonitic and contain galena and arsenopyrite (Bonham, Jr., and others, 1985, p. 117).	At least 6 adits, 6 shafts, and 27 pits (Poker Brown 7.5' map); small production of argentiferous galena has occurred (Bonham, Jr., and others, 1985, p. 147-148).	No USBM samples. Anomalous Zn, Pb, Sb, Cd, and B and 0.25 to 0.8 ppm Au (Bonham, Jr., and others, 1985, p. 147-148).	Bonham, Jr., and others, 1985, p. 147-148; Johnson, 1977, pl. 1
187	Reno Joe prospect (Corral Spring)	Alluvium-covered pediment.	A small pit.	ETCR028, not anomalous. Other samples have been reported to contain 0.4 to 1.0 oz/ton gold (Frank Russell, claimant, written commun., 1992).	
188	Poker Brown occurrence (Perlite; Cherokee; Thunderbird; Redcap; MILS 0320270538)		Small pits and trenches.	No samples.	Elevatorski, 1973, p. 39

Table A-1--Mineral sites in the Emigrant Trail study area--Continued

Map No.	Name (Alternate Name)	Geologic Description	Workings and Production	Samples and Resources	References
189	Wildcat Gold prospect	Silicified volcaniclastic breccias and rhyolitic tuffs overlie sedimentary rocks and granite. Ore-grade Au values occur in zones of silicification, sulfide veining, and stockworks (Knox, 1992).	Thirty-one reverse circulation holes (unknown footage); estimated historic production of 20,000 tons containing 0.5 oz/ton Au (Knox, 1992).	No samples. Resources are estimated to be between 2.3 and 10.9 million tons grading 0.045 and 0.021 oz/ton Au, respectively (Knox, 1992).	Knox, 1992.
190	NER prospect (Farrell Site)	Volcanic tuffs and breccias tilted by a rhombic pattern of NE- and NW-trending normal faults; alteration is strong silicic with subsidiary strong argillic (Knox, 1992).	Numerous pits, trenches, and shafts on Rocky Canyon 7.5' quadrangle.	No samples. According to Knox (1992) Au occurs with silicified and argillized(?) stratabound tuff breccias (values up to 7.5 ppm) in the northern part of the property and with hydrothermal breccias in the south (values up to 1.06 ppm).	Knox, 1992.

Table A-2.--Descriptions of rock samples from the Emigrant Trail study area and vicinity, Humboldt, Pershing, and Washoe Counties, Nevada

[Map numbers on pl. 1; sample analyses in table A-3]

Map No.	Sample	Type	Size	Description
002	ETMM086	Grab	NA	Yellow, brown, and red chalcedony veinlets with vugs and fine black sulfides.
002	ETMM087	Grab	NA	Red and brown, argillized volcanics.
002	ETMM088	Grab	NA	Yellow to red, vuggy, limonitic, chalcedony vein material.
002	ETMM089	Grab	NA	Red, brown, massive, limonitic, argillized volcanics.
002	ETMM090	Grab	NA	Gray, earthy, weathered andesite.
002	ETMM091	Grab	NA	Limonitic, vuggy, argillic andesite.
002	ETRD072	Grab	NA	White, gray, and tan, silicified, ashy tuff; limonitic.
002	ETRD073	Grab	NA	Red, gray, and white, siliceous, opaline vein material containing cinnabar (?).
002	ETRD074	Grab	NA	Red, yellow, and tan, slightly silicified tuff breccia/lapilli tuff; limonite, goethite, and cinnabar.
002	ETRD075	Grab	NA	White and gray, silicified ashy tuff; limonite, goethite, and cinnabar.
002	ETRD077	Grab	NA	White and tan ashy tuff containing cinnabar, limonite, and goethite.
003	ETRD105	Grab	NA	Brown, silty to sandy playa sediments.
004	ETRD104	Grab	NA	Brown, silty lake sediments.
005	ETMM083	Grab	NA	Black porphyritic perlite.
006	ETRD100	Grab	NA	White, red, and yellow massive opal and chalcedony float.
006	ETRD101	Grab	NA	White, tan, and gray, silicic and opaline rhyolite.
006	ETRD102	Grab	NA	White and tan, silicified and opalized rhyolite.
007	ETMM102	Grab	NA	Brown, black, yellow, and red massive agate and petrified wood occurring as float.
007	ETMM103	Grab	NA	Brown argillized tuff.
008	ETMM104	Grab	NA	Gray, massive, welded rhyolitic ash-flow tuff; partially brecciated and opalized; minor limonite.
009	ETMM105	Grab	NA	Gray to yellow, welded rhyolitic ash-flow tuff; locally brecciated; opaline and chalcedonic cement; minor limonite.

Table A-2.--Descriptions of rock samples from the Emigrant Trail study area and vicinity--Continued

Map No.	Sample	Type	Size	Description
009	ETMM106	Grab	NA	Yellow, fractured, limonitic, partially brecciated, and silica cemented rhyolitic tuff.
009	ETRD103	Grab	NA	Gray, red, and white, silicified ashy tuff with minor, opaline fracture coatings.
010	ETMM080	Grab	NA	Gray to yellow, devitrified, orbicular, limonitic, welded rhyolitic ash-flow tuff.
010	ETMM081	Grab	NA	Gray drillhole cuttings.
010	ETMM082	Grab	NA	Gray to yellow, devitrified, orbicular, limonitic, welded rhyolitic tuff.
010	ETRD068	Grab	NA	Red and gray, siliceous tuff; limonitic.
010	ETRD069	Grab	NA	Gray and black, slightly silicified ashy tuff.
011	ETMM085	Grab	NA	White, yellow, brown, and pink opal-cemented breccia composed of welded rhyolitic ash-flow tuff.
011	ETRD070	Grab	NA	Gray and red, silicified ashy tuff; limonitic.
012	ETMM084	Grab	NA	Gray to yellow, vuggy, partly subhedral quartz, agate, and opal vein float.
013	ETMM079	Grab	NA	Yellow, brown, and white opal and chalcedony in a gray, welded rhyolitic ash-flow tuff.
014	ETRD065	Grab	NA	Red, white, and gray, silicified, brecciated tuff; matrix contains jasper.
014	ETRD066	Grab	NA	Red and tan, silicified, opalized sinter.
015	ETRD063	Grab	NA	White and gray, silicified, opalized ashy tuff.
015	ETRD064	Grab	NA	Red, white, and gray, silicified volcanic breccia; jasper, limonite, and minor opal.
016	ETRD062	Grab	NA	Red, white, and tan, slightly silicified, brecciated ashy tuff; limonitic.
017	ETRD060	Grab	NA	Red, white, gray, tan, silicified lapilli tuff; limonite and opal.
017	ETRD061	Grab	NA	White and purple, silicified, limonitic ashy tuff; minor opal.
018	ETMM074	Grab	NA	Brown, massive chalcedony or jasper in a welded, rhyolitic ash-flow tuff.
018	ETMM075	Grab	NA	Gray, opalized tuff.
018	ETMM076	Grab	NA	Red and brown, limonitic, argillic tuff.

Table A-2.--Descriptions of rock samples from the Emigrant Trail study area and vicinity--Continued

Map No.	Sample	Type	Size	Description
018	ETMM077	Grab	NA	Gray chalcedony with red and black bands, minor opal, and quartz filled vugs; occurring as float.
018	ETMM078	Grab	NA	Orange to red rhyolite.
019	ETMM072	Grab	NA	Yellow to green, silicified and opalized wood.
019	ETMM073	Grab	NA	Black, gray, and yellow opalized and silicified wood.
020	ETMM070	Chip	0.3	Gray and brown opal in rhyolitic tuff.
020	ETMM071	Chip	1.0	Gray, brecciated, silica-cemented, welded rhyolitic ash-flow tuff; uraniferous (?).
020	ETRD057	Grab	NA	Tan and white siliceous pods in a tephra deposit; minor opal.
020	ETRD058	Grab	NA	Gray, red, and tan silicified tuff; perlite; minor opal.
020	ETRD059	Grab	NA	White, tan, and gray opaque opal in a tephra deposit.
021	ETMM068	Grab	NA	Brown, massive, opaline, silty, rhyolitic tuff.
021	ETMM069	Grab	NA	Brown, silicified, massive rhyolitic tuff with minor opal.
025	ETRD095	Grab	NA	Red, tan, and white, slightly silicified, uraniferous (?) rhyolite.
025	ETRD096	Chip	2.1	Red, purple, and white, silicified, rhyolite breccia; chalcedonic and opaline matrix.
025	ETRD097	Grab	NA	Red, purple, and white, silicified, rhyolite breccia; chalcedonic and opaline matrix.
026	ETRD098	Grab	NA	Gray, silicified, ashy tuff.
027	ETMM101	Chip	6.0	Yellow to red, limonitic, argillic tuff.
028	ETMM098	Grab	NA	Gray, dense, silicic ash-flow tuff.
028	ETMM099	Grab	NA	Yellow-stained, porphyritic, rhyolitic ash-flow tuff.
029	ETMM100	Grab	NA	Yellow to brown, uraniferous (?), silty to sandy, tuffaceous sedimentary rock.
030	ETRD090	Grab	NA	Tan, white, and gray, uraniferous (?) ashy tuff.
030	ETRD091	Grab	NA	Tan, white, and gray, silicic and opaline volcanic breccia.
030	ETRD092	Grab	NA	White, silicic and opaline ashy tuff.
030	ETRD093	Grab	NA	White, uraniferous (?) ashy tuff.
030	ETRD094	Grab	NA	Dark brown, silicified ash/lapilli tuff.
031	ETMM035	Grab	NA	Gray, argillic, hot spring deposit.

Table A-2.--Descriptions of rock samples from the Emigrant Trail study area and vicinity--Continued

Map No.	Sample	Type	Size	Description
033	ETRD036	Grab	NA	Green and white silicified rhyolite with opaline fracture coatings.
034	ETMM097	Grab	NA	Gray to green, limonitic rhyolite/dacite.
040	ETMM109	Grab	NA	Yellow to brown, silicic and opaline breccia filling, amygdules, and veins in a welded rhyolitic ash-flow tuff.
040	ETRD107	Grab	NA	Red, tan, and gray, silicified and opalized, welded ashy tuff.
040	ETRD108	Grab	NA	Red, gray, and tan, silicified rhyolitic tuff with veins and fracture coatings of white, yellow, and tan opal.
040	ETRD109	Grab	NA	Opalized wood in a silicified ashy tuff.
041	ETMM108	Grab	NA	Yellow, gray, and black opal, chalcedony, and silicified wood in rhyolitic volcanics.
044	ETMM060	Grab	NA	Yellow, brown, brecciated, welded rhyolitic ash-flow tuff cemented by brown jasper and opal.
044	ETMM061	Grab	NA	Yellow to brown, limonitic, rhyolitic welded ash-flow tuff.
044	ETMM062	Grab	NA	Gray to yellow, vuggy, limonitic, silicified, rhyolitic welded ash-flow tuff.
044	ETRD054	Grab	NA	Gray, brown, red, silicified ashy tuff; botryoidal, spherulitic, and massive silica; minor opal.
045	ETMM065	Grab	NA	Gray, silty to sandy, tuffaceous drill hole cuttings.
045	ETMM066	Chip	0.7	Gray to tan opal and jasper in devitrified, orbicular, banded, welded rhyolitic ash-flow tuff.
045	ETRD055	Grab	NA	Red, brown, and black, silicified, opalized, welded ashy tuff.
046	ETMM067	Grab	NA	Red, brown, and black opal and jasper in montmorillonitic tuffs.
046	ETRD056	Grab	NA	Red, brown, and gray, silicified, opalized, welded ashy tuff.
047	ETMM063	Chip	4.0	Yellow, green, argillic, silicic tuff with lenses of perlite.
048	ETMM064	Grab	NA	Gray to yellow, limonitic, argillic tuff and opalized wood.
051	ETRD088	Grab	NA	Red, black, and gray limonitic rock in a limestone outcrop.
051	ETRD089	Grab	NA	Red, gray, and green, limonitic meta-diorite containing copper oxides.
053	ETRD086	Grab	NA	Opaque, purple and white fluorite in a dioritic pluton.

Table A-2.--Descriptions of rock samples from the Emigrant Trail study area and vicinity--Continued

Map No.	Sample	Type	Size	Description
053	ETRD087	Grab	NA	Red, white, tan, and purple, argillized, brecciated, silicic vein material; limonite stained and fluorite bearing.
059	ETMM034	Grab	NA	Gray to yellow, opaline, chalcedonic, and limonitic veins, fracture coatings, and amygdules in vesicular basalt.
064	ETMM058	Grab	NA	Yellow and brown chalcedony and opal in a welded rhyolitic ash-flow tuff.
064	ETMM059	Grab	NA	Yellow and brown chalcedony and opal in a welded rhyolitic ash-flow tuff.
065	ETMM057	Grab	NA	Gray rhyolite containing veinlets of opal and jasper; minor argillization.
065	ETRD053	Grab	NA	Red and black, laminated, silicified, opalized welded tuff.
071	ETMM056	Grab	NA	Red, brown, limonitic, argillically altered tuff.
072	ETMM041	Grab	NA	Yellow to brown, scoriaceous, silicified, limonitic basalt and banded opal in fossil sinter.
072	ETMM042	Chip	0.7	Gray, massive, coarse-grained tuff with obsidian fragments.
074	ETMM040	Grab	NA	Gray, argillic, coarse, angular rhyolitic tuff.
075	ETMM055	Grab	NA	Yellow, limonitic, uraniferous rhyolitic tuff.
077	ETMM054	Grab	NA	Yellow, silty to sandy tuff.
078	ETMM053	Grab	NA	Yellow, brown, limonitic, argillic volcanic breccia.
080	ETMM107	Grab	NA	Tan to gray, silty to sandy tuff; minor limonite; minor argillization.
080	ETRD106	Grab	NA	Gray and white, argillized lapilli/ashy tuff.
082	ETRD051	Grab	NA	White and gray ashy tuff with minor limonitic alteration.
084	ETMM047	Chip	4.3	Yellow-brown quartz veins containing limonite, pyrite, and arsenopyrite in granitic outcrop.
084	ETMM048	Grab	NA	Yellow to brown, limonitic quartz vein containing pyrite and arsenopyrite.
084	ETMM049	Grab	NA	Limonitic, vuggy, sheared quartz vein containing pyrite and arsenopyrite.
084	ETMM050	Grab	NA	Yellow, limonitic, and argillic granitic grus with minor chlorite.
084	ETMM051	Chip	11.0	Yellow to brown, sheared, fractured, limonitic, argillic, and silicified rhyolite.

Table A-2.--Descriptions of rock samples from the Emigrant Trail study area and vicinity--Continued

Map No.	Sample	Type	Size	Description
084	ETMM052	Grab	NA	Yellow to brown quartz vein containing pyrite and minor galena.
084	ETRD047	Grab	NA	Quartz vein material containing pyrite; limonitic fracture coatings.
084	ETRD048	Grab	NA	Quartz vein material containing pyrite; limonitic fracture coatings.
085	ETRD046	Grab	NA	Red and black, limonitic and argillized mafic andesite.
086	ETRD042	Grab	NA	Blue-green, diabasic, chloritic andesite; minor chalcedony, calcite, and limonite
086	ETRD043	Chip	2.0	Blue-green, chloritic, silica-veined, porphyritic andesite; partially brecciated; contains chalcedony.
087	ETMM045	Chip	0.5	Yellow to brown, argillic, limonitic tuff.
088	ETMM043	Grab	NA	Yellow to brown, limonitic, argillic, brecciated tuff.
088	ETMM044	Chip	Random	Yellow, argillic, and limonitic basalt, granitics, and tuffs in a sheared zone.
090	ETMM046	Grab	NA	Yellow to brown, limonitic, silicified rhyolite breccia.
093	ETRD040	Grab	NA	Gray and red silicified rhyolite; cinnabar (?).
093	ETRD041	Grab	NA	Gray, yellow, and red, opalized, silicified, argillized, brecciated and sheared rhyolite.
094	ETMM022	Chip	6.0	Brown to yellow argillized, calcite-veined basalt.
095	ETRD039	Auger	3.2	Tan, silty to sandy playa sediments.
096	ETMM027	Grab	NA	Gray, silicified rhyolite breccia with minor limonite stain.
096	ETRD025	Grab	NA	Red, brown, and white calcium carbonate-cemented rhyolitic tuff breccia; massive limonite-stained quartz, limonite.
096	ETRD026	Grab	NA	Red, gray, green silicified volcanic breccia containing pyrite; limonitic.
097	ETMM023	Grab	NA	Yellow, intensely fractured, silicified, limonitic rhyolite.
097	ETMM024	Grab	NA	Red, yellow, and brown jasper, opal, and chalcedony veins in altered rhyolite.
097	ETMM025	Grab	NA	Gray to yellow, massive, silicified rhyolite breccia.
098	ETRD027	Grab	NA	Brown, gray tufa.
098	ETRD084	Grab	NA	Brown, silty to sandy, alkaline playa sediments.

Table A-2.--Descriptions of rock samples from the Emigrant Trail study area and vicinity--Continued

Map No.	Sample	Type	Size	Description
099	ETMM026	Chip	4.3	Yellow, brown, limonitic, silica-cemented rhyolitic tuff breccia.
099	ETMM028	Chip	3.0	Brown, argillized basalt.
099	ETMM029	Grab	NA	Gray, opalized rhyolite breccia.
099	ETRD028	Grab	NA	Red, yellow, tan, and white ash/lapilli tuff; minor silicification and opal; dendritic manganese oxides; limonitic.
099	ETRD029	Chip	5.0	White and brown opal.
099	ETRD030	Chip	3.3	Red, yellow, and green lapilli tuff with limonitic and chloritic alteration at veins.
099	ETRD032	Grab	NA	Red, golden, green, brown, argillic ashy tuff with minor calcium carbonate veins; limonitic.
100	ETMM030	Grab	NA	White to yellow-brown, coarsely crystalline calcite vein in brown basalt.
100	ETMM031	Chip	2.5	Yellow to brown, argillized basalt.
100	ETMM032	Chip	0.7	Yellow, brown to black, quartz-rich, limonitic altered rhyolite.
100	ETMM033	Grab	NA	Yellow, brown, sheared, argillic, limonitic, and silicified rhyolite breccia; minor opal.
100	ETRD033	Grab	NA	Red, brown silicified welded tuff with minor opaline fracture coatings, pyrite, and limonite.
103	ETRD034	Grab	NA	Brown, white uraniferous (?) petrified wood; opal and dendritic manganese oxides.
104	ETMM001	Grab	NA	Gray, limonitic, alkaline sand near hot spring.
104	ETMM002	Grab	NA	Limonitic silt, sand, and tufa; fine pyrite.
105	ETMM003	Grab	NA	Limonitic, manganiferous, opal-veined fanglomerate; minor copper oxides.
105	ETMM004	Grab	NA	Limonitic, hematitic, laminated silica (chalcedony and devitrified opal).
106	ETMM005	Grab	NA	Lake sediments with chalcedony and jasper veinlets; minor manganiferous calcite veins; limonitic.
106	ETMM006	Chip	1.0	Gray, manganiferous calcite veins with limonitic boxwork in basalt.
107	ETRD001	Grab	NA	Tan, gray slightly damp lake sediments.
107	ETRD002	Chip	3.0	White to gray, argillaceous, limonitic siltstone.

Table A-2.--Descriptions of rock samples from the Emigrant Trail study area and vicinity--Continued

Map No.	Sample	Type	Size	Description
107	ETRD003	Grab	NA	Gray and tan, damp, silty lake sediments.
107	ETRD005	Grab	NA	Yellow, green siliceous nontronite(?), uraniferous(?) fracture coatings in rhyolitic breccia.
107	ETRD006	Chip	2.8	White and brown opal/silica matrix surrounding angular rhyolitic clasts.
108	ETMM007	Grab	NA	Limonitic concretions and gray silty sand in hot spring.
109	ETMM009	Chip	3.0	Green, gray, chloritic breccia with epidote along slickenside surfaces.
109	ETMM110	Grab	NA	Green to white, brecciated calcite/quartz/adularia(?)/epidote veins to 0.5 ft thick striking N20E and N40W dipping nearly vertical in green, chloritic, porphyritic basalt (?).
109	ETMM111	Random Chip	NA	Yellow, purple, and red, scoriaceous, argillic, sulfurous (?) andesite/dacite breccia with blocks of yellow, siliceous rhyolite.
109	ETMM112	Grab	NA	Yellow-brown, weathered, flaky, silicic, fine-grained rhyolitic tuff.
109	ETMM113	Chip	12.0	Yellow-brown, black, and white calcite-cemented dacite tuff breccia; veins of calcite trend north mostly at high angles, giving a stockwork appearance.
109	ETMM114	Chip	3.0	Yellow-brown, limonitic, quartz- and calcite-veined, argillically altered dacite/basalt.
109	ETMM119	R.Chip		Pale green, slightly limonitic veins composed of calcite, quartz, epidote, and chlorite in stockwork in porphyritic, chloritic, limy basalt breccia.
109	ETWH029	Chip	5.0	Gray to yellow, fossiliferous, silicified, brecciated, massive limestone veined by quartz, epidote, and chlorite. Veining trends N40E. Traces of yellow-weathering metallic minerals.
109	ETWH030	Grab	NA	Gray, red-weathering, montmorillonitic volcanic breccia containing chlorite, epidote, iron oxides, and gypsum.
109	ETWH031	Chip	0.8	Yellow-brown-weathering, white to black vein containing quartz (some chalcedonic), jarosite (?), limonite, and barite (?). Veinlets 0.25 inch to 0.5 inch thick over at least 10 ft.
110	ETMM008	Grab	NA	Black, coarsely porphyritic, partly glassy basalt.
111	ETRD007	Grab	NA	Gray, glassy, conchoidal, perlite with limonitic fracture coatings and agate thunderegg inclusions.
111	ETRD008	Grab	NA	Red, brown, and black agate thunderegg in gray massive perlite.

Table A-2.--Descriptions of rock samples from the Emigrant Trail study area and vicinity--Continued

Map No.	Sample	Type	Size	Description
114	ETMM017	Grab	NA	Quartz with minor epidote stringers and black veinlets occurring as float on alluvium.
114	ETMM020	Grab	NA	White to yellow veins of aragonite or zeolite in limonitic and argillic tephra; minor sulfur.
114	ETMM021	Chip	1.0	Gray, green, red, argillic, and limonitic rhyolite.
115	ETRD022	Grab	NA	Rhyolite with limonitic fracture coatings.
115	ETRD023	Grab	NA	Brown and red jasper and opal with minor white chalcedony.
116	ETMM019	Grab	NA	Yellow, brown, black, and white brecciated vein material comprised of quartz, limonite, manganese oxides, amphibole, pyrite, and arsenopyrite.
116	ETRD018	Grab	NA	Red, gray, and green, silicified rhyolite/dacite with quartz veinlets. Limonite and calcium carbonate fracture coatings.
116	ETRD020	Grab	NA	Red, gray, and green, silicified rhyolite/dacite with minor epidote and quartz veinlets.
116	ETRD021	Grab	NA	Milky white quartz containing pyrite and bornite; limonite stain along fractures.
119	ETRD078	Grab	NA	Brown, slightly moist, silty to sandy, alkaline playa sediments.
120	ETRD009	Chip	5.0	Tactite with andradite garnet and scheelite (?).
120	ETRD010	Chip	2.0	Gray to white granitic rock (aplite ?) containing andradite garnet.
120	ETRD011	Grab	NA	Brown, gray tactite and mica schist.
121	ETMM011	Chip	1.0	Yellow, brown, calcium carbonate cemented (tufa) alluvium near hot spring.
122	ETRD012	Grab	NA	Quartz vein containing pyrite, minor copper oxides, and chalcopyrite (?); limonitic fracture coatings.
123	ETRD014	Grab	NA	Quartz vein containing copper oxides (malachite), chalcopyrite (?), and pyrite; limonitic fracture coatings.
123	ETRD015	Grab	NA	Limonitic, intensely weathered granodiorite.
124	ETMM014	Grab	NA	Yellow, purple, and white sheared diorite and metasedimentary rock containing limonite, clay, minor quartz veins, selenite, and chlorite.
124	ETRD017	Grab	NA	Gray to black basalt with minor silicification; dendritic manganese oxides in aplitic intrusives; skutterudite (?) locally.

Table A-2.--Descriptions of rock samples from the Emigrant Trail study area and vicinity--Continued

Map No.	Sample	Type	Size	Description
125	ETMM012	Grab	NA	White, yellow, and black vein comprised of quartz, limonite, manganese oxide stringers, and minor copper carbonate.
125	ETMM013	Grab	NA	White, yellow, and black vein comprised of quartz, amphibolite, pyrite/(arsenopyrite?), and limonite.
127	ETMM095	Grab	NA	Gray, yellow, and white drillhole cuttings comprised of weakly limonitic shale.
127	ETRD082	Grab	NA	Gray, tan, and red, silicic, opaline ashy tuff.
128	ETRD080	Grab	NA	Brown, silty to sandy, playa sediments.
128	ETRD081	Grab	NA	Brown, gray, and red, sandy to pebbly playa sediments; pebbles are volcanic and granitic (?).
133	ETWH022	Grab	NA	Yellow to gray, alkaline, limonite-stained, bentonitic clay after volcanics.
136	ETCR050	Chip	1.0	Quartz float with minor boxwork and minor limonite stain.
137	ETCR051	Grab	NA	Limonitic quartz from vein in phyllite and quartzite.
143	ETWH006	Chip	25.0	Limonitic, silicified, light gray volcanics containing epidote or chlorite.
143	ETWH007	Chip	45.0	Gray to white rhyolite breccia with minor quartz veinlets and epidote or chlorite.
143	ETWH008	Grab	NA	Pale yellow bentonitic clay with thin layer of lignite.
143	ETWH009	Grab	NA	Limonitic, silicified volcanics containing siderite and chlorite or epidote.
143	ETWH010	Grab	NA	Drill hole cuttings; sample depth - 110 ft.
143	ETWH011	Grab	NA	Drill hole cuttings; sample depth - 75 ft.
143	ETWH012	Grab	NA	Drill hole cuttings; sample depth - 210 ft.
143	ETWH013	Grab	NA	Drill hole cuttings; sample depth - 215 ft.
143	ETWH014	Grab	NA	Drill hole cuttings; sample depth - 145 ft.
143	ETWH015	Grab	NA	Drill hole cuttings; sample depth - 135 ft.
143	ETWH016	Grab	NA	Drill hole cuttings; sample depth - 55 ft.
147	ETCR048	Chip	20.0	Limonitic, altered rhyolite sill.
147	ETCR049	Chip	10.0	Dark gray gouge adjacent to altered rhyolitic sill.
151	ETRD052	Grab	NA	White diatomite.

Table A-2.--Descriptions of rock samples from the Emigrant Trail study area and vicinity--Continued

Map No.	Sample	Type	Size	Description
155	ETCR046	Grab	NA	Limonitic quartz from brecciated shear zone in shale/slate host rock.
155	ETCR047	Grab	NA	Limonitic, silicic, intrusive breccia with rhyolitic matrix containing shale clasts.
156	ETCR043	Chip	1.0	Limonitic slate with minor mineralization on joint planes.
156	ETCR044	Chip	10.0	Limonitic quartz veinlets in a sericitically altered aplite dike in granodiorite.
156	ETCR045	Chip	10.0	Hydrothermally altered granodiorite.
158	ETCR033	Chip	2.0	Limonitic, silicic, hydrothermally altered shale near a rhyolitic dike or sill.
158	ETCR034	Chip	3.0	Propyllitically altered, rhyolitic dike or sill.
158	ETCR035	Chip	10.0	Limonitic shale and sandstone.
158	ETCR036	Chip	30.0	Thermally altered shale and sandstone.
160	ETCR008	Grab	NA	Limonitic quartz vein with ilmenite, sphalerite(?), and stibnite(?).
161	ETCR009	Chip	4.0	Limonitic shear zone in metasediments contains quartz veinlets.
161	ETCR010	Chip	3.0	Limonitic shear zone in metasediments contains quartz veinlets.
162	ETCR037	Chip	1.0	Limonitic fracture zone cutting hydrothermally altered phyllite; sample of quartz vein in fracture zone.
162	ETCR038	Chip	1.0	Limonitic fracture zone cutting hydrothermally altered phyllite; gouge zone sampled.
162	ETCR039	Chip	3.0	Limonitic fracture zone cutting hydrothermally altered phyllite; altered phyllite sampled.
163	ETCR040	Chip	50.0	Limonitic fracture zone cutting hydrothermally altered phyllite; sample of altered phyllite and quartz veins.
164	ETCR003	Chip	3.0	Limonitic quartz vein in a shear zone in phyllite.
164	ETCR004	Grab	NA	Limonitic quartz vein and hydrothermally altered host rock (phyllite).
164	ETCR005	Grab	NA	Quartz vein with mineralized veinlets; ilmenite after pyrite; near contact between phyllite and quartzite.
164	ETCR006	Chip	1.0	Limonitic quartz vein in phyllite; ilmenite.
164	ETCR007	Grab	NA	Limonitic, silicic, fault breccia.

Table A-2.--Descriptions of rock samples from the Emigrant Trail study area and vicinity--Continued

Map No.	Sample	Type	Size	Description
165	ETCR011	Chip	10.0	Limonitic, silty to sandy, fault gouge; in quartzite and phyllite.
165	ETCR012	Chip	1.0	Mineralized lens in fault gouge.
165	ETCR013	Chip	5.0	Intensely altered, clayey material 5 ft above fault.
165	ETCR014	Chip	5.0	Altered quartzite 10 ft above fault.
165	ETCR015	Chip	5.0	Limonitic, brecciated quartzite 15 ft above fault.
165	ETCR016	Chip	5.0	Altered rock in footwall.
165	ETCR017	Grab	NA	Limonitic phyllite with minor quartz veins.
165	ETCR018	Chip	12.0	Limonitic quartzite and phyllite; footwall sampled.
165	ETCR019	Chip	3.0	Limonitic quartzite and phyllite; gouge sampled.
165	ETCR020	Chip	20.0	Limonitic quartzite and phyllite; hanging wall sampled.
165	ETCR021	Chip	3.0	Limonitic quartz vein in quartzite and phyllite.
166	ETCR022	Chip	10.0	Limonitic quartzite and phyllite from the shear zone into the footwall.
166	ETCR023	Chip	3.0	Limonitic quartzite and phyllite; fault gouge sampled.
166	ETCR024	Chip	5.0	Limonitic quartzite and phyllite; hanging wall sampled.
166	ETCR025	Grab	NA	Limonitic quartzite and phyllite; stockpile sampled.
166	ETCR026	Grab	NA	Limonitic quartzite and phyllite; tailings sampled.
167	ETCR027	Grab	NA	White quartzitic rock with boxwork; heavily limonitic stained; from shear zone in gray quartzite and phyllite.
171	ETMM092	Grab	NA	Yellow to brown, quartz vein float containing calcite or siderite and pyrite.
171	ETMM093	Grab	NA	Yellow to brown, argillized shale with calcite/aragonite veins.
171	ETMM094	Grab	NA	Yellow to brown, brecciated, fractured, vuggy quartz veins containing calcite or siderite.
171	ETWH021	Grab	NA	Vein quartz with calcite and minor epidote in shale/slate containing hematite after pyrite.
171	ETWH025	Chip	1.0	Calcite vein in a red, argillaceous shale.
171	ETWH026	Chip	12.0	Quartzite and shale containing quartz veins.
172	ETCR002	Chip	2.0	Limonitic quartz veins in slate.

Table A-2.--Descriptions of rock samples from the Emigrant Trail study area and vicinity--Continued

Map No.	Sample	Type	Size	Description
172	ETWH001	Chip	4.0	Gray fault gouge and fractured slate containing secondary light blue-green copper carbonates.
172	ETWH002	Grab	NA	Quartzite with copper oxide-stained chalcedony; contains stibnite, pyrite, and chalcopyrite; sample from stockpile.
172	ETWH003	Grab	NA	Quartz vein containing chalcopyrite, malachite, and minor stibnite in a quartzite/slate host.
172	ETWH023	Chip	4.5	Limonitic, chloritic slate with quartz veinlets interbedded with pyrite-bearing quartzite.

Table A-3.--Analyses of rock samples from the Emigrant Trail Study area and vicinity, Humboldt, Pershing, and Washoe Counties, Nevada

[All ppm except Au, ppb, and Fe and Na, %; <, less than; >, greater than; *, anomalous analyses and samples; anomalous thresholds in parentheses below element; Ir, Te, and Sn all below detection limits; map nos. on pl. 1; samples sorted by map number; chemical-element abbreviations in appendix, "Sampling Procedures and Analytical Methods"; sample descriptions in table A-2]

Map No.	Sample	Latitude (North)	Longitude (West)	Au (370)	Ag (30)	Cu (640)	Pb (970)	Zn (2500)	Hg (19)	As (1490)	Sb (212)	Cd (33)	Se (13)	Ba (3640)	Mo (27)	W (25)	Ni (94)	Co (38)	Fe (20)	Cr (740)	Th (75)	U (26)	Na (18)	Br (58)	Cs (49)	La (151)	Ce (380)	Sm (33)	Eu (3.3)	Tb (2.01)	Yb (17.1)	Lu (1.3)	Sc (61)	Hf (26)	Ta (3.2)	Rb (980)	Zr (635)
002	*ETMM086	41.8075	119.5689	<21	<5	4	<2	<200	*83.000	269	*394.0	<26	<24	450	<5	5	<20	<10	0.8	570	3.0	<1	<0.05	37	5	<5	<44	1.0	*5	<1	<5	<0.5	0.9	<4	<1	<34	<500
002	*ETMM087	41.8075	119.5689	<28	<13	23	16	<200	*38.000	487	*467.0	<37	<32	650	<6	16	<72	<10	10.0	<130	5.0	5.1	0.17	41	*127	87	110	17.0	<6	2	*20	0.9	20.0	<7	<1	430	<1200
002	ETMM088	41.8075	119.5689	<5	<5	5	<2	<200	4.000	5	1.5	<10	<10	360	<2	<2	<20	<10	0.7	670	<0.5	1.0	<0.05	<1	<1	19	19	2.6	<2	<1	<5	<0.5	<0.5	<2	<1	<10	<500
002	*ETMM089	41.8089	119.5889	<5	<5	10	9	410	*43.000	159	2.2	<10	<10	2000	<2	<2	32	<10	>10.0	<50	2.8	17.0	0.14	3	8	7	<10	1.8	<2	<1	6	<0.5	8.7	4	<1	35	<500
002	*ETMM090	41.8050	119.6117	<5	<5	7	11	<200	7.000	41	32.9	<10	<10	1600	<2	<2	<20	<10	2.6	71	7.3	2.8	1.40	5	5	40	94	10.0	*4	1	5	0.9	14.0	8	1	140	*1500
002	ETMM091	41.8006	119.6117	<5	<5	6	11	240	18.000	97	52.8	<10	<10	200	<2	7	<20	<10	4.0	100	5.0	2.8	0.13	5	13	37	95	6.1	<2	1	7	<0.5	12.0	<2	<1	26	<500
002	*ETRD072	41.8081	119.5719	<5	<5	4	<2	<200	*28.000	3	5.4	<10	<10	1900	3	13	<20	<10	<0.5	140	5.5	3.3	0.17	<1	<1	35	110	16.0	*6	1	5	0.7	29.0	7	<1	18	*770
002	ETRD073	41.8078	119.5831	<12	<5	5	<2	<200	6.000	280	144.0	<10	<10	610	11	<2	<20	<10	1.3	590	1.5	1.7	0.10	15	10	9	19	1.7	<2	<1	7	<0.5	1.8	<2	<1	51	<500
002	*ETRD074	41.8078	119.6053	<5	<5	38	6	<200	*27.000	56	3.7	<10	<10	1400	<2	<2	<20	<10	5.9	71	11.0	4.5	0.10	<1	<1	56	140	12.0	*4	1	<5	<0.5	15.0	11	1	13	*1100
002	*ETRD075	41.8089	119.6053	<5	<5	11	<2	<200	7.000	7	3.9	<10	<10	1800	<2	9	<20	<10	<0.5	81	5.0	2.2	0.43	<1	<1	29	69	15.0	*6	<1	7	0.7	25.0	5	<1	<10	<500
002	*ETRD077	41.8047	119.6150	10	<5	3	9	<200	*25.000	3	0.4	<10	<10	3600	5	<2	30	<10	2.1	110	6.3	2.6	0.38	<1	<1	30	69	7.7	<2	<1	6	<0.5	13.0	9	<1	150	<500
003	ETRD105	41.5719	119.8203	<5	<5	59	12	300	0.028	8	1.0	<10	<10	560	<2	3	44	21	6.1	60	9.4	2.2	3.10	9	4	32	68	6.4	<2	<1	<5	0.6	21.0	5	1	100	<500
004	ETRD104	41.6222	119.6306	7	<5	47	12	250	0.043	9	1.4	<10	<10	640	<2	<2	58	20	6.0	<50	10.0	2.1	2.30	2	5	35	95	7.7	2	2	6	0.8	21.0	7	<1	110	<500
005	*ETMM083	41.5975	119.5656	<5	<5	5	<2	<200	0.045	8	1.4	<10	<10	2500	<2	3	36	<10	3.0	<50	13.0	5.2	3.60	<1	4	49	110	11.0	*6	1	11	0.6	16.0	8	3	180	<500
006	ETRD100	41.5847	119.3028	<5	<5	5	19	<200	0.025	10	8.8	<10	<10	<100	2	<2	<20	<10	<0.5	550	3.7	4.3	<0.05	<1	<1	<5	<10	0.4	<2	<1	<5	<0.5	<0.5	3	1	<10	<500
006	ETRD101	41.5883	119.3036	<5	<5	3	19	<200	0.013	27	14.0	<10	<10	250	5	<2	<20	<10	0.9	160	0.5	1.8	<0.05	1	1	<5	<10	0.6	<2	<1	<5	<0.5	<0.5	<2	1	<10	<500
006	ETRD102	41.5778	119.3039	<5	<5	5	3	<200	0.018	14	7.5	<10	<10	250	3	3	<20	<10	<0.5	600	2.1	2.4	<0.05	<1	<1	<5	13	0.6	<2	<1	<5	<0.5	<0.5	<2	<1	<10	<500
007	ETMM102	41.5519	119.3328	<5	<5	11	12	<200	0.030	19	10.0	<10	<10	610	3	<2	<20	<10	0.6	390	3.0	1.4	0.51	<1	13	10	25	1.9	<2	<1	<5	<0.5	1.4	<2	<1	45	<500
007	*ETMM103	41.5519	119.3328	<5	<5	5	9	310	0.023	34	14.0	<10	<10	1200	<2	4	<20	11	6.9	<50	5.7	2.2	0.50	2	17	39	92	8.6	*7	1	6	0.7	28.0	4	<1	51	<500
008	ETMM104	41.5619	119.3575	<5	<5	5	9	<200	0.020	12	14.0	<10	<10	150	<2	<2	<20	<10	1.0	200	9.4	3.7	1.70	1	4	24	51	4.1	<2	<1	6	0.8	1.0	8	1	130	<500
009	ETMM105	41.5500	119.4172	<5	<5	5	10	<200	0.044	20	7.8	<10	<10	<100	3	<2	<20	<10	1.6	130	17.0	10.0	2.50	<1	4	30	80	7.6	<2	1	8	0.6	4.6	10	1	220	<500
009	ETMM106	41.5519	119.4181	<5	<5	6	5	<200	0.188	38	9.1	<10	<10	570	<2	2	<20	<10	1.1	98	21.0	9.4	2.70	<1	8	37	83	5.0	<2	<1	<5	<0.5	3.0	5	2	230	<500
009	ETRD103	41.5561	119.4111	<5	<5	3	<2	<200	0.358	11	1.7	<10	<10	320	3	2	<20	<10	1.1	100	19.0	18.0	2.30	<1	5	33	80	4.4	<2	<1	<5	<0.5	2.8	4	1	210	<500
010	ETMM080	41.5344	119.4633	<5	<5	4	8	<200	0.053	10	2.8	<10	<10	<100	4	2	<20	<10	1.5	99	27.0	11.0	4.10	<1	7	40	89	10.0	<2	2	14	0.6	5.4	16	3	380	<500
010	*ETMM081	41.5344	119.4633	<5	<5	6	10	<200	0.361	14	3.2	<10	<10	130	15	9	<20	<10	1.7	160	26.0	11.0	3.90	1	7	40	120	11.0	<2	2	10	0.7	6.2	16	*4	310	<500
010	ETMM082	41.5500	119.4483	<5	<5	4	8	390	0.031	10	2.8	<10	<10	190	7	2	<20	<10	1.7	120	25.0	11.0	3.60	<1	6	48	110	13.0	<2	2	15	1.0	5.4	14	2	360	<500
010	ETRD068	41.5422	119.4611	<5	<5	4	10	<200	0.048	11	3.2	<10	<10	<100	4	<2	31	<10	1.6	200	26.0	11.0	3.80	2	6	44	96	12.0	<2	2	15	<0.5	5.0	14	3	370	<500
010	ETRD069	41.5406	119.4561	<5	<5	3	10	<200	0.040	8	2.4	<10	<10	<100	6	<2	26	<10	2.4	<50	26.0	10.0	3.90	<1	6	59	140	10.0	<2	1	10	0.8	8.3	16	3	270	<500
011	ETMM085	41.5042	119.5222	<5	<5	2	15	<200	0.068	10	3.7	<10	<10	<100	8	3	<20	<10	<0.5	100	12.0	15.0	1.00	<1	3	12	50	1.3	<2	<1	5	<0.5	2.2	10	2	94	<500
011	ETRD070	41.5047	119.5267	<5	<5	4	13	<200	0.049	7	2.0	<10	<10	320	6	3	<20	<10	1.3	110	22.0	8.7	2.90	<1	3	54	120	9.1	<2	2	7	<0.5	4.4	13	2	260	<500
012	ETMM084	41.4833	119.5414	<5	<5	4	<2	<200	0.021	4	5.4	<10	<10	120	<2	<2	<20	<10	<0.5	550	3.9	8.1	0.21	<1	<1	10	21	1.2	<2	<1	<5	<0.5	<0.5	<2	<1	<10	<500
013	ETMM079	41.4983	119.4803	<5	<5	5	18	270	0.318	9	2.3	<10	<10	<100	<2	<2	<20	<10	1.6	150	18.0	8.3	2.40	<1	4	41	93	10.0	<2	2	9	0.6	4.7	11	2	230	<500
014	ETRD065	41.4881	119.4986	<5	<5	4	7	<200	0.364	6	1.7	<10	<10	350	<2	<2	<20	<10	1.0	190	20.0	7.6	2.50	<1	5	41	90	8.0	<2	2	9	<0.5	4.7	11	3	260	<500
014	ETRD066	41.4872	119.4925	<5	<5	2	5	<200	15.114	6	9.0	<10	<10	290	<2	3	<20	<10	1.4	100	10.0	2.3	0.07	<1	7	20	38	1.4	<2	<1	<5	<0.5	2.9	6	1	<10	<500
015	*ETRD063	41.4758	119.5061	9	<5	4	<2	<200	*>50.000	18	26.4	<10	<10	<100	15	10	<20	<10	<0.5	380	28.0	10.0	<0.05	3	<1	<5	<10	0.9	<2	<1	10	<0.5	10.0	*42	*6	<10	*1200
015	ETRD064	41.4778	119.5086	<5	<5	6	6	<200	0.751	28	8.3	<10	<10	<100	3	5	<20	<10	>10.0	140	9.1	8.7	0.82	<1	2	27	45	4.5	<2	2	9	<0.5	4.7	10	<1	120	<500
016	ETRD062	41.4719	119.5147	<5	<5	6	14	<200	3.245	35	16.0	<10	<10	240	<2	4	<20	<10	2.6	85	23.0	7.7	1.10	2	3	66	100	6.5	<2	1	8	0.5	10.0	15	3	110	<500
017	ETRD060	41.4567	119.5447	<5	<5	8	5	<200	0.833	13	11.0	<10	<10	470	<2	3	<20	<10	0.8	<50	14.0	5.0	0.06	2	3	30	82	5.4	<2	<1	8	0.6	9.1	10	1	<10	<500
017	ETRD061	41.4564	119.5442	<5	<5	58	12	<200	3.657	101	32.4	<10	<10	700	10	4	<20	<10	5.1	<50	11.0	5.2	0.07	4	4	37	95	6.9	<2	1	5	<0.5	9.3	10	2	23	<500
018	ETMM074	41.4400	119.5306	<5	<5	7	6	<200	0.086	11	5.1	<10	<10	200	14	7	<20	<10	1.5	490	<0.5	15.0	<0.05	<1	7	<5	<10	<0.2	<2	<1	<5	<0.5	<0.5	<2	<1	<10	<500
018	ETMM075	41.4550	119.5269	<5	<5	2	<2	<200	1.122	8	3.1	<10	<10	820	<2	5	<20	<10	<0.5	72	23.0	7.0	0.35	<1	8	94	220	11.0	<2	<1	<5	<0.5	10.0	14	2	15	<500
018	ETMM076	41.4561	119.5286	<5	<5	68	11	270	0.258	11	3.2	<10	<10	670	3	4	54	35	6.3	66	12.0	4.5	0.84	2	6	46	120	9.4	<2	2	6	0.5	25.0	9	2	39	<500
018	ETMM077	41.4558	119.5256	<5	<5	5	<2	<200	0.500	14	61.6	<10	<10	490	5	2	<20	<10	0.6	540	<0.5	4.6	<0.05	5	2	11	<10	1.2	<2	<1	<5	<0.5	<0.5	<2	<1	<10	<500
018	*ETMM078	41.4558	119.5228	8	<5	8	23	<200	0.380	16	24.2	<10	<10	1600	6	8	<20	<10	1.9	230	30.0	4.2	2.00	2	15	95	160	13.0	<2	3	16	*2.0	10.0	20	3	570	<500
019	*ETMM072	41.4197	119.5383	<5	<5	5	<2	<200	0.111	14	2.5	<10	<10	540	3	3	<20	<10	2.9	74	<0.5	*26.0	<0.05	<1	<1	9	20	<0.8	<2	<1	<5	<0.5	<0.5	<2	<1	13	<500
019	ETMM073	41.4164	119.5444	<5	<5	4	<2	<200	0.192	33	14.0	<10	<10	1300	<2	<2	<20	<10	<0.5	110	<0.5	3.2	0.07	2	13	<5	<10	0.4	<2	<1	<5	<0.5	0.7	<2	<1	<10	<500
020	*ETMM070	41.3928	119.5217	<5	<5	4	<2	<200	*34.780	58	164.0	<10	<10	420	9	3	<20	<10	<0.5	<110	<1.4	2.2	0.06	16	8	<5	21	0.4	<2	<1	<5	<0.5	1.3	<2	<1	<26	<500
020	ETMM071	41.3975	119.5069	6	<5	4	8	<200	0.024	8	0.9	<10	<10	170	3	<2	<20	<10	1.6	59	11.0	7.5	1.00	7	3	43	100	7.5	<2	<1	6	<0.5	1.5	7	1	200	<500
020	ETRD057	41.3925	119.5214	<5	<5	4	<2	<200	0.301	74	105.0	<10	<10	410	13	20	<20	<10	<0.5	<50	<0.5	5.3	0.08	3	7	<5	<10	0.4	<2	<1	<5	<0.5	2.7	<2	<1	50	<500
020	ETRD058	41.3892	119.5244	<5	<5	6	10	<200	0.129	16	2.0	<10	<10	120	4	<2	<20	<10	1.6	<50	21.0	10.0	3.20	7	8	72	150	13.0	<2	2	13	0.5	1.6	15	1	270	<500
020	ETRD059	41.3931	119.5328	<5	<5	2	<2	<200	0.190	6	9.4	<10	<10	<100	4	<2	<20	<10	<0.5	73	<0.5	23.0	<0.05	<1	1	<5	15	<0.5	<2	<1	<5	<0.5	<0.5	<2	<1	<10	<500
021	ETMM068	41.3667	119.4992	<5	12	4	14	300	0.085	10	2.8	<10	<10	<100	4	<2	<20	<10	1.7	73	22.0	6.7	1.90	<1	5	39	140	5.9	<2	1	8	<0.5	7.2	16	3	270	<500
021	ETMM069	41.3781	119.5033	<5	<5	3	19	<200	0.228	19	4.8	<10	<10	320	<2	5	<20	<10	1.9	94	22.0	6.3	2.10	1	5	45	140	7.0	<2	<1	8	<0.5	6.8	18	3	290	<500
025	*ETRD095	41.4814	119.1811	<5	<5	5	30	290	0.199	9	4.8	<10	<10	<100	<2	2	<20	<10	2.4	130	51.2	17.0	3.00	1	3	110	200	28.2	<2	*5	*35	*4.8	4.3	*43	*6	560	*1500
025	*ETRD096	41.4811	119.1814	<5	<5	5	14	240	0.132	16	15.0	<10	<10	160	<2	4	<20	<10	1.7	150	55.5	10.0	1.90	1	10	70	230	13.0	<2	*3	*34	*5.1	2.9	*32	*5	640	*1500
025	*ETRD097	41.4811	119.1789	<5	<5	6	30	330	0.150	38	4.6	<10	<10	740	<2	3	<20	<10	2.1	150	34.0	17.0	2.50	1	8	79	180	17.0	<2	*3	*22	*2.7	2.8	*28	*4	370	*870
026	*ETRD098	41.4772	119.1072	<5	<5	3	13	260	0.016	10	2.5	<10	<10	<100	<2	3	<20	<10	1.7	73	29.0	11.0	4.00	1	7	37	95	13.0	2	*3	15	*2.0	6.7	17	3	360	*700
027	ETMM101	41.4464	119.0644	<5	<5	5	3	210	0.023	12	1.3	<10	<10	460	<2	<2	37	13	10.0	55	13.0	3.2	0.29	3	4	32	210	4.4	<2	<1	<5	<0.5	33.0	12	2	12	570
028	ETMM098	41.4058	119.0975	<5	<5	14	8	<200	0.022	2	0.6	<10	<10	900	<2	<2	<20	<10	1.3	<50	18.0	6.2	2.50	<1	4	31	66	5.3	<2	<1	<5	<0.5	5.2	7	1	230	<500
028	ETMM099	41.4081	119.0961	<5	<5	12	5	<200	0.029	7	1.4	<10	<10	1000	<2	<2	<20	<10	2.5	<50	18.0	6.7	2.90	<1	5	27	56	4.0	<2	<1	<5	<0.5	6.1	8	<1	200	<500
029	ETMM100	41.3983	119.0661	<5	<5	66	23	270	0.140	13	2.0	<10	<10	860	4	3	<20	15	4.2	56	17.0	7.0	2.80	7	8	51	120	10.0	2	2	10	1.1	14.0	12	2	200	540
030	*ETRD090	41.3939	119.1692	<5	<5	10	34	780	*40.160	274	42.5	<10	<10	740	*32	11	<20	<10	>10.0	<50	8.8	*29.0	0.45	6	35	*220	*490	*38.5	3	*6	17	*1.7	11.0	6	<1	240	<500
030	*ETRD091	41.3939	119.1692	<5	<5	16	30	830	*>50.000	126	32.7	<10	<10	1300	<2	7	<20	17	6.7	160	13.0	25.0	0.10	4	33	*608	*1100	*98.2	*7	*14	*29	*3.9	5.9	*27	1	200	<500
030	ETRD092	41.4175	119.1625	<5	<5	3	6	<200	0.097	39	4.4	<10	<10	<100	10	<2	<20	<10	1.2	290	12.0	14.0	0.35	<1	2	12	45	2.2	<2	<1	<5	<0.5	4.1	9	1	50	<500
030	*ETRD093	41.4175	119.1625	<5	<5	3	25	<200	0.726	5	2.7	<10	<10	<100	<2	<2	<20	<10	2.1	<50	30.0	5.9	2.72	<1	7	35	180	7.1	<2	1	7	0.8	10.0	21	3	120	*760
030	*ETRD094	41.4153	119.1664	<5	<5	<1	8	290	0.079	13	3.0	<10	<10	<100	5	3	<20	<10	1.9	<50	24.0	10.0	2.10	2	*52	67	160	13.0	<2	2	15	*1.9	8.1	15	3	460	610
031	ETMM035	41.3656	119.2222	<5	<5	<1	6	230	5.171	18	5.0	<10	<10	650	2	11	<20	<10	2.7	69	5.8	2.7	3.70	11	41	23	48	4.4	<2	<1	<5	<0.5	8.2	5	<1	97	<500
033	*ETRD036	41.3442	119.2644	<5	<5	<1	13	<200	0.059	5	1.2	<10	<10	<100	<2	<2	<20	<10	1.1	80	10.0	9.0	0.88	<1	*113	32	69	5.9	<2	1	6	<0.5	3.2	<2	1	150	<500
034	*ETMM097	41.3206	119.1758	<5	<5	17	18	310	0.022	9	1.5	<10	<10	470	<2	<2	<20	<10	3.6	140	20.0	4.5	3.30	<1	5	63	160	13.0	<2	2	12	*1.6	13.0	15	2	240	*660
040	ETMM109	41.2628	119.4228	<5	<5	3	12	<200	0.018	210	6.2	<10	<10	<100	9	<2	<20	<10	1.2	170	10.0	5.6	2.30	3	7	36	92	6.7	<2	<1	6	0.5	0.8	7	<1	150	<500
040	ETMM107	41.2550	119.4406	<5	<5	4	11	<200	<0.010	29	3.8	<10	<10	370	4	2	<20	<10	1.0	150	16.0	7.0	3.40	7	7	59	150	11.0	<2	2	9	0.8	1.6	10	1	220	560
040	ETRD108	41.2630	119.4344	<5	<5	5	12	<200	0.020	23	5.7	<10	<10	220	4	<2	<20	<10	1.0	120	14.0	6.3	2.80	2	11	40	110	7.7	<2	1	6	<0.5	1.3	9	1	210	<500
040	ETRD109	41.2594	119.4342	<5	<5	6	8	300	0.033	856	5.3	<10	<10	160	9	3	<20	<10	4.4	<50	3.8	18.0	1.30	9	25	26	44	3.9	<2	<1	8	<0.5	7.7	<2	<1	47	<500
041	ETMM108	41.2661	119.4581	<5	<5	6	10	<200	0.019	32	4.5	<10	<10	470	<2	4	22	<10	1.4	180	14.0	5.9	3.20	<1	6	61	120	11.0	<2	1	7	0.7	1.0	10	1	220	560
044	ETMM060	41.2578	119.5133	<5	<5	7	41	<200	0.142	46	42.0	<10	<10	230	7	3	<20	<10	1.4	140	10.0	5.7	2.20	3	15	39	97	5.4	<2	<1	<5	<0.5	0.7	7	<1	150	<500
044	ETMM061	41.2619	119.5043	<17	<5	7	52	370	2.705	1120	105.0	<23	<21	650	12	15	<57	<10	6.7	<50	14.0	11.0	3.30	38	7	44	110	7.7	<2	<1	10	<0.5	1.5	<5	<1	140	<500
044	ETMM062	41.2619	119.5042	<5	<5	4	12	<200	0.303	80	16.0	<10	<10	290	7	18	<20	<10	0.6	180	15.0	3.1	3.50	2	4	42	110	7.6	<2	2	7	0.7	1.2	11	2	210	<500
044	ETRD054	41.2606	119.4767	<5	<5	5	13	300	0.023	35	7.2	<10	<10	<100	11	<2	<20	<10	1.6	250	14.0	7.2	3.00	1	8	46	120	8.2	<2	1	7	<0.5	1.1	9	<1	150	<500
045	ETMM065	41.2594	119.5350	<5	<5	14	29	<200	0.162	20	4.0	<10	<10	<100	5	18	52	<10	1.5	57	15.0	6.0	3.60	<1	7	56	140	9.5	<2	1	7	0.6	1.0	12	2	210	<500
045	ETMM066	41.2606	119.5361	10	<5	5	11	<200	0.054	8	3.6	<10	<10	710	4	6	<20	<10	0.9	130	8.3	6.6	1.80	<1	7	48	100	7.8	<2	1	6	<0.5	1.2	6	1	120	<500

A-3.--Analyses of rock samples, Emigrant Trail study area and vicinity--Continued

[All ppm except Au, ppb, and Fe and Na, %; <, less than; >, greater than; *, anomalous analyses and samples; anomalous thresholds in parentheses below element; Ir, Te, and Sn all below detection limits; map nos. on pl. 1; samples sorted by map number; chemical-element abbreviations in appendix, "Sampling Procedures and Analytical Methods"; sample descriptions in table A-2]

Map No.	Sample	Latitude (North)	Longitude (West)	Au (370)	Ag (30)	Cu (640)	Pb (970)	Zn (2500)	Hg (19)	As (1490)	Sb (212)	Cd (33)	Se (13)	Ba (3640)	Mo (27)	W (25)	Ni (94)	Co (38)	Fe (20)	Cr (740)	Th (75)	U (26)	Na (18)	Br (58)	Cs (49)	La (151)	Ce (380)	Sm (33)	Eu (3.3)	Tb (2.01)	Yb (17.1)	Lu (1.3)	Sc (61)	Hf (26)	Ta (3.2)	Rb (980)	Zr (635) Table
045	ETRO055	41.2569	119.5356	<5	<5	3	14	<200	1.103	13	22.0	<10	<10	120	4	<2	<20	<10	1.1	160	7.9	4.9	2.20	1	10	26	59	4.4	2	<1	<5	<0.5	1.3	5	1	160	<500
046	ETMM067	41.2581	119.5456	<5	<5	4	<2	<200	0.022	28	45.9	<10	<10	<100	<2	4	<20	<10	1.5	330	<0.5	1.9	0.05	4	11	<5	<10	<0.2	<2	<1	<5	<0.5	0.6	<2	<1	<10	<500
046	*ETRO056	41.2569	119.5436	<5	<5	5	69	<200	0.199	77	72.9	<10	<10	180	10	8	<20	<10	3.2	100	10.0	7.0	2.40	9	15	42	99	7.0	<2	2	*19	*1.8	1.1	5	2	99	*850
047	*ETMM063	41.2539	119.5575	10	<5	3	15	220	0.434	4	3.5	<10	<10	190	<2	<2	<20	<10	1.5	<50	13.0	3.5	0.45	<1	*148	64	160	11.0	<2	<1	5	<0.5	0.7	3	<1	170	<500
048	*ETMM064	41.2478	119.5583	<5	<5	5	<2	<200	0.559	68	88.4	<10	<10	280	9	<2	<20	<10	0.9	250	<0.5	2.1	0.26	7	*70	<5	<10	0.8	<2	<1	<5	<0.5	1.8	<2	<1	14	<500
050	ETRO052	41.2172	119.4761	<5	<5	13	8	<200	0.885	27	11.0	<10	<10	160	4	8	<20	<10	2.2	99	3.9	0.9	0.60	3	28	15	23	3.3	3	<1	<5	<0.5	6.2	<2	1	47	<500
051	*ETRO088	41.2919	119.1269	83	8	487	10	*>30000	0.164	252	34.7	*160	<10	<100	*296	7	<20	13	>10.0	<50	1.2	10.0	<0.05	8	2	<5	<10	1.0	<2	<1	<5	<0.5	3.7	<2	<1	<10	<500
051	*ETRO089	41.2931	119.1264	*583	*>300	*2705	*2752	*24200	*31.240	<3480	*6510.0	<150	<180	<1500	<39	<120	<280	<31	>10.0	<700	<13	<8.2	<0.56	<392	<7	<5	<350	<1.1	<23	<3	<160	<5.2	<2.1	<25	<4	<180	<4300
053	*ETRO086	41.2639	119.0909	<5	<5	6	6	<200	0.215	43	5.7	<10	<10	*14700	<2	<2	<20	<10	0.6	55	0.9	<0.5	<0.05	<1	2	<5	<10	2.9	2	1	<5	0.7	2.6	<2	<1	18	<500
053	*ETRO087	41.2611	119.1050	300	<5	16	9	<200	9.243	*1890	113.0	<10	<10	830	24	4	<20	<10	5.4	220	3.0	6.8	0.15	42	5	12	22	2.6	<2	<1	7	<0.5	4.5	<2	<1	68	<500
059	ETMM034	41.2078	119.1600	<5	<5	2	3	<200	0.012	87	3.8	<10	<10	850	5	10	<20	15	10.0	120	0.9	7.0	0.22	1	6	<5	<10	0.6	<2	<1	<5	<0.5	2.9	<2	<1	36	<500
064	ETMM058	41.1908	119.4281	<5	<5	2	9	<200	0.382	13	2.3	<10	<10	<100	11	<2	<20	<10	0.5	190	13.0	4.6	3.30	<1	7	23	45	3.7	<2	<1	<5	<0.5	0.8	9	<1	160	<500
064	ETMM059	41.2119	119.4367	<5	<5	3	9	<200	0.027	59	8.1	<10	<10	<100	5	<2	<20	<10	1.0	210	11.0	5.0	2.20	2	5	26	76	5.3	<2	<1	7	<0.5	<0.5	6	1	160	<500
065	ETMM057	41.1914	119.3975	<5	<5	6	35	<200	0.033	44	12.0	<10	<10	240	6	<2	<20	<10	1.5	130	12.0	4.1	2.90	1	5	45	100	8.0	<2	<1	6	<0.5	1.0	9	<1	150	<500
065	ETRO053	41.1914	119.4011	<5	<5	4	9	260	0.035	42	8.1	<10	<10	170	4	<2	<20	<10	1.0	94	15.0	5.7	3.20	1	6	54	150	11.0	<2	2	9	<0.5	0.9	10	2	190	<500
071	ETMM056	41.1658	119.3983	<5	<5	94	15	260	<0.010	38	5.5	<10	<10	190	3	<2	<20	<10	>10.0	86	9.1	7.1	0.40	2	6	22	60	5.3	<2	<1	6	<0.5	34.0	8	2	70	<500
072	*ETMM041	41.1578	119.4044	<5	<5	24	10	630	0.038	714	1.7	<10	<10	820	*43	<2	<20	15	>10.0	<50	5.6	6.6	0.15	18	<1	31	64	9.5	<2	1	10	1.1	5.6	5	<1	<10	<500
072	ETMM042	41.1342	119.3756	<5	<5	<1	4	<200	0.015	17	0.3	<10	<10	1200	3	<2	<20	<10	1.3	260	2.4	0.9	1.90	2	<1	9	17	1.2	<2	<1	<5	<0.5	1.1	3	<1	140	<500
074	ETMM040	41.1394	119.3817	6	<5	21	3	<200	0.013	9	1.3	<10	<10	1400	7	<2	40	17	3.9	180	19.0	7.5	3.60	1	9	34	89	4.2	<2	<1	<5	<0.5	12.0	6	<1	220	<500
075	*ETMM055	41.1469	119.3533	<5	<5	5	20	450	<0.010	5	0.9	<10	<10	<100	8	<2	<20	<10	1.0	<50	31.0	8.1	3.30	<1	11	7	10	8.0	<2	2	8	<0.5	<0.5	10	*5	620	<500
077	*ETMM054	41.1500	119.3006	54	<5	55	10	330	0.092	8	1.1	<10	<10	820	<2	<2	26	*41	7.9	55	5.4	8.5	1.30	<1	4	35	41	7.0	<2	2	17	*1.5	29.0	4	<1	65	<500
078	ETMM053	41.1278	119.3125	13	<5	99	21	<200	0.051	21	0.8	<10	<10	480	<2	<2	34	27	>10.0	78	6.4	1.8	0.29	18	3	29	50	5.9	3	2	6	<0.5	33.0	8	<1	49	<500
080	*ETMM107	41.0942	119.3717	<5	<5	45	22	240	0.019	7	1.5	<10	<10	320	<2	3	43	21	5.0	55	20.0	5.8	1.40	<1	5	41	160	9.2	2	1	7	0.6	20.0	15	2	70	*670
080	ETRO106	41.0967	119.3786	10	<5	68	15	<200	0.028	4	1.1	<10	<10	380	<2	<2	60	24	6.3	110	16.0	6.8	0.24	<1	4	24	140	6.8	2	<1	<5	<0.5	20.0	7	1	41	600
082	ETRO051	41.1183	119.2667	<5	<5	2	7	<200	0.044	3	0.6	<10	<10	<100	4	2	<20	<10	1.3	<50	16.0	8.8	4.80	<1	2	28	52	6.1	<2	<1	<5	<0.5	0.6	8	3	320	<500
084	*ETMM047	41.0964	119.2747	*851	<5	6	20	<200	0.033	12	3.0	<10	<10	470	<2	4	<20	<10	0.9	330	7.1	1.4	0.13	<1	2	17	23	3.2	<2	<1	<5	0.6	3.3	5	<1	94	<500
084	*ETMM048	41.0961	119.2744	*2600	<5	8	40	<200	0.076	37	2.6	<10	<10	250	<2	8	<20	<10	1.5	450	0.9	<0.5	<0.05	<1	<1	<5	<10	0.6	<2	<1	<5	<0.5	2.8	<2	<1	22	<500
084	*ETMM049	41.0950	119.2739	*9070	6	12	91	<200	0.266	88	3.0	<10	<10	530	14	5	<20	<10	2.7	420	<0.5	<0.5	<0.05	<1	<1	<5	<10	0.4	<2	<1	<5	<0.5	1.2	<2	<1	<10	<500
084	*ETMM050	41.0950	119.2739	*410	<5	17	43	400	0.234	13	3.1	<10	<10	1400	<2	10	<20	14	4.7	180	8.1	1.6	1.50	<1	3	24	43	4.8	3	<1	<5	<0.5	14.0	5	1	210	<500
084	ETMM051	41.0917	119.2775	<5	<5	72	27	270	0.666	36	13.0	<10	<10	1200	5	5	32	15	3.9	200	7.1	2.7	0.66	2	5	26	55	4.4	3	<1	<5	<0.5	12.0	6	1	130	<500
084	*ETMM052	41.0919	119.2778	*>10000	*48	12	*1597	1000	0.794	231	5.9	<10	<33	<100	<7	6	<20	<10	3.5	360	<1.9	<1.7	<0.05	5	<1	7	<72	0.9	<2	<1	<5	<1.1	2.4	<2	<1	37	<500
084	*ETRO047	41.0867	119.2786	*4010	<5	11	92	360	0.095	451	4.4	<10	<10	350	9	11	47	22	5.6	340	<0.5	0.8	<0.05	7	<1	6	<10	1.1	<2	<1	<5	<0.5	6.6	<2	<1	61	<500
084	*ETRO048	41.0858	119.2769	*1090	<5	16	473	710	0.143	285	8.8	<10	<10	400	7	23	<20	11	3.9	430	2.2	0.7	<0.05	4	2	9	<10	1.6	<2	<1	<5	<0.5	10.0	3	<1	83	<500
085	*ETRO046	41.0639	119.3094	<5	<5	22	7	280	0.034	3	0.5	<10	<10	1400	<2	<2	38	34	7.1	51	8.8	2.4	2.40	<1	4	37	74	6.5	*5	<1	<5	<0.5	17.0	5	<1	82	<500
086	ETRO042	41.0031	119.2258	<5	<5	18	3	<200	0.042	4	0.6	<10	<10	2100	<2	<2	33	<10	4.2	75	9.3	3.0	3.70	<1	4	34	76	4.6	<2	<1	<5	<0.5	11.0	5	<1	190	<500
086	ETRO043	40.9956	119.2275	<5	<5	15	5	<200	0.033	3	3.4	<10	<10	1400	9	3	<20	<10	3.1	200	6.2	2.2	2.70	<1	3	28	68	3.6	3	<1	<5	<0.5	9.3	4	<1	110	<500
087	*ETMM045	41.0444	119.3550	<5	<5	54	8	<200	2.565	8	0.8	<10	<10	1400	<2	<2	<20	*39	5.9	120	7.5	2.8	2.40	5	4	37	64	6.3	2	<1	<5	<0.5	18.0	4	1	77	<500
088	ETMM043	41.0439	119.3422	7	<5	44	89	<200	4.099	96	20.0	<10	<10	690	10	<2	<20	<10	4.4	310	5.6	2.7	0.71	3	<1	21	40	3.3	<2	<1	<5	<0.5	8.1	4	<1	<10	<500
088	ETMM044	41.0436	119.3481	<5	<5	21	6	240	3.882	5	0.3	<10	<10	1200	2	<2	<20	22	5.2	110	9.1	2.8	2.90	5	3	41	84	7.1	<2	1	<5	<0.5	17.0	6	<1	130	<500
090	ETMM046	41.0042	119.3092	7	<5	<1	5	<200	0.054	31	7.9	<10	<10	1100	4	4	<20	<10	1.2	180	8.7	3.1	0.78	1	<1	29	52	2.7	<2	<1	<5	<0.5	3.8	5	<1	55	<500
093	ETRO040	40.9608	119.2708	<5	<5	2	8	<200	0.036	4	0.7	<10	<10	<100	6	<2	<20	<10	<0.5	150	14.0	3.7	2.90	<1	3	22	65	3.3	<2	<1	<5	<0.5	2.5	3	1	210	<500
093	ETRO041	40.9642	119.2714	<5	<5	5	4	<200	0.020	3	0.6	<10	<10	<100	8	<2	34	<10	0.9	97	14.0	10.0	3.00	<1	3	22	62	2.4	<2	<1	<5	<0.5	2.8	5	2	210	<500
094	*ETMM022	40.9242	119.2542	20	<5	34	9	270	0.014	5	1.2	<10	<10	*3800	4	<2	52	16	4.9	86	9.4	3.4	3.00	<1	12	28	65	5.3	<2	<1	<5	<0.5	14.0	4	<1	94	<500
095	ETRO039	40.9119	119.2800	<5	<5	25	10	<200	0.067	14	1.3	<10	<10	1000	<2	3	<20	22	4.8	92	7.2	2.9	2.60	2	7	27	66	4.5	<2	<1	<5	<0.5	13.0	<2	<1	130	<500
096	ETMM027	40.9214	119.2269	10	<5	7	5	<200	<0.010	16	0.7	<10	<10	1800	<2	3	<20	<10	0.7	<50	2.1	3.0	0.46	3	1	6	16	1.3	<2	<1	<5	<0.5	2.0	<2	<1	15	<500
096	*ETRO025	40.8958	119.2639	6	<5	89	14	<200	0.847	48	23.3	<10	<10	1100	<2	*31	<20	<10	3.7	340	2.3	2.0	0.09	3	4	12	<10	3.5	<2	<1	<5	<0.5	8.2	<2	<1	22	<500
096	ETRO026	40.8989	119.2692	9	<5	19	9	<200	0.026	35	2.8	<10	<10	360	8	2	25	<10	2.2	310	1.5	1.2	<0.05	<1	<1	10	22	2.5	<2	<1	<5	<0.5	3.5	<2	<1	26	<500
097	ETMM023	40.9147	119.2531	<5	<5	1	4	<200	<0.010	24	0.9	<10	<10	140	5	5	<20	<10	0.8	84	14.0	5.5	3.60	1	4	26	66	3.5	<2	<1	<5	<0.5	3.5	6	2	210	<500
097	ETMM024	40.9158	119.2544	6	<5	15	5	<200	<0.010	20	1.8	<10	<10	150	2	3	58	13	6.4	410	1.3	0.8	0.35	<1	<1	<5	<10	0.7	<2	<1	<5	<0.5	10.0	<2	<1	13	<500
097	ETMM025	40.9158	119.2556	10	<5	<1	4	<200	0.010	5	0.6	<10	<10	150	7	<2	<20	<10	<0.5	120	13.0	4.6	3.20	<1	4	22	51	3.1	<2	<1	<5	<0.5	2.5	4	2	220	<500
098	ETRO027	40.8764	119.2528	<5	<5	<1	6	<200	0.289	23	18.0	<10	<10	1000	3	4	<20	<10	0.6	170	14.0	5.7	3.20	2	4	39	87	4.6	<2	<1	<5	<0.5	2.9	7	1	290	<500
098	ETRO084	40.8825	119.2189	<5	<5	38	11	210	0.029	20	2.0	<10	<10	870	14	3	27	13	3.6	54	8.3	8.4	2.70	4	9	26	61	4.2	<2	<1	<5	<0.5	10.0	4	<1	120	<500
099	ETMM026	40.9397	119.2286	9	<5	16	23	<200	1.182	247	46.2	<10	<10	150	13	12	<20	<10	9.3	88	18.0	7.2	0.31	9	6	20	39	3.6	<2	<1	<5	<0.5	8.6	4	2	21	<500
099	ETMM027	40.9397	119.1994	9	<5	23	12	<200	0.559	14	1.0	<10	<10	290	4	3	70	21	5.8	50	10.0	13.0	2.00	<1	24	29	63	5.3	<2	<1	<5	<0.5	18.0	3	<1	66	<500
099	ETMM029	40.9333	119.1950	8	<5	<1	12	<200	0.015	4	0.7	<10	<10	520	7	<2	<20	<10	0.7	120	14.0	6.4	3.40	1	29	25	62	3.1	<2	<1	<5	<0.5	3.1	4	1	210	<500
099	ETRO028	40.8989	119.2103	<5	<5	7	12	210	0.551	59	15.0	<10	<10	1100	6	8	<20	<10	4.5	76	12.0	5.7	2.20	3	6	32	62	6.5	<2	<1	5	<0.5	11.0	7	1	200	<500
099	ETRO029	40.9286	119.2069	<5	<5	<1	2	<200	0.013	2	0.7	<10	<10	<100	4	4	<20	<10	<0.5	130	1.4	1.7	0.18	<1	5	<5	17	0.8	2	<1	<5	<0.5	1.0	<2	<1	<10	<500
099	ETRO030	40.9378	119.2122	<5	<5	15	18	330	0.070	40	3.3	<10	<10	450	7	<2	<20	16	5.2	<50	13.0	12.0	2.30	3	14	30	63	4.4	2	<1	<5	<0.5	10.0	6	1	230	<500
099	ETRO032	40.9536	119.1867	<5	<5	34	7	250	0.038	6	0.2	<10	<10	620	20	<2	<20	27	6.1	110	5.8	1.9	3.00	9	27	32	68	5.1	<2	<1	<5	<0.5	17.0	4	<1	<10	<500
100	ETMM030	40.9614	119.1900	<5	<5	<1	3	<200	<0.010	<1	<0.2	<10	<10	<100	<2	<2	<20	<10	1.3	<50	<0.5	<0.5	<0.05	<1	1	6	13	1.4	<2	<1	<5	<0.5	1.9	<2	<1	<10	<500
100	ETMM031	40.9614	119.1900	<5	<5	52	3	350	0.240	37	17.0	<10	<10	1000	3	3	55	25	6.0	140	5.4	2.8	3.50	10	30	33	61	6.1	<2	<1	<5	<0.5	23.0	4	1	350	<500
100	*ETMM032	40.9625	119.1872	6	<5	<1	34	<200	0.366	20	3.4	<10	<10	440	14	14	<20	<10	1.7	73	41.0	16.0	1.90	<1	43	13	36	7.0	<2	2	12	1.0	4.9	6	*7	890	<500
100	ETMM033	40.9719	119.1803	<5	<5	<1	5	<200	0.029	5	0.6	<10	<10	1200	<2	2	<20	<10	2.8	66	13.0	5.1	4.10	<1	5	41	81	4.6	<2	<1	<5	<0.5	4.1	8	1	200	<500
100	ETRO033	40.9825	119.1772	<5	<5	1	3	<200	<0.010	8	0.5	<10	<10	230	6	<2	<20	<10	1.4	150	14.0	5.1	3.50	<1	3	25	59	3.5	<2	<1	<5	<0.5	2.7	4	2	240	<500
103	*ETRO034	41.0364	119.1736	<5	<5	<1	4	<200	0.105	159	3.6	<10	<10	140	*95	<2	<20	<10	3.1	260	0.7	13.0	0.06	2	<1	<5	<10	<0.2	<2	<1	<5	<0.5	1.7	<2	<1	<10	<500
104	ETMM001	41.0508	119.0258	9	<5	19	8	<200	<0.010	14	1.9	<10	<10	940	6	5	<20	13	2.9	130	9.4	2.7	3.40	6	5	30	68	5.0	<2	<1	<5	<0.5	10.0	4	1	76	<500
104	*ETMM002	41.0508	119.0258	<5	<5	17	8	<200	*>50.000	15	10.0	<10	<10	1200	<2	3	<20	<10	2.8	140	8.0	1.8	2.30	3	36	24	61	4.4	<2	<1	<5	<0.5	8.4	4	1	130	<500
105	ETMM003	41.0456	119.0139	<5	<5	5	8	<200	0.040	53	1.8	<10	<10	520	10	<2	<20	21	3.4	67	13.0	17.0	3.70	<1	4	36	87	6.1	<2	1	5	<0.5	1.7	7	2	210	<500
105	ETMM004	41.0456	119.0139	6	<5	4	<2	<200	0.243	13	3.7	<10	<10	<100	4	<2	<20	<10	<0.5	450	<0.5	2.7	0.26	<1	3	<5	<10	<0.2	<2	<1	<5	<0.5	0.7	<2	<1	<10	<500
106	ETMM005	41.0292	118.9981	9	<5	87	4	<200	<0.010	21	3.1	<10	<10	130	4	4	38	<10	5.0	270	<0.5	2.4	0.40	<1	<1	<5	<10	0.8	<2	<1	<5	<0.5	4.3	<2	<1	27	<500
106	ETMM006	41.0292	118.9981	10	<5	47	3	<200	<0.010	5	0.4	<10	<10	<100	6	<2	<20	<10	2.6	<50	<0.5	18.0	0.45	<1	<1	<5	<10	<0.4	<2	<1	<5	<0.5	2.0	<2	<1	<10	<500
107	ETRO001	40.9922	118.9664	12	<5	38	13	360	0.013	15	2.7	<10	<10	810	<2	5	<20	15	4.7	<50	11.0	3.1	2.30	3	11	30	53	5.1	<2	1	<5	<0.5	14.0	6	1	180	<500
107	ETRO002	40.9936	118.9911	<5	<5	3	3	<200	0.024	166	3.6	<10	<10	1200	4	2	<20	<10	2.2	<50	13.0	12.0	3.10	2	9	35	75	3.9	<2	<1	6	<0.5	3.1	11	1	180	<500
107	ETRO003	40.9900	118.9858	7	<5	34	13	620	<0.010	14	3.1	<10	<10	880	<2	5	<20	17	4.6	<50	12.0	3.2	3.50	3	11	33	79	5.6	<2	<1	<5	<0.5	14.0	5	2	150	<500
107	*ETRO005	41.0028	118.9894	11	<5	8	10	230	<0.010	27	2.6	<10	<10	<100	4	4	<20	<10	8.3	190	<0.5	8.1	0.54	<1	10	19	43	6.0	<2	*3	*44	*6.6	4.5	<2	<1	71	<500

A-3.--Analyses of rock samples, Emigrant Trail study area and vicinity--Continued

[All ppm except Au, ppb, and Fe and Na, %; <, less than; >, greater than; *, anomalous analyses and samples; anomalous thresholds in parentheses below element; Ir, Te, and Sn all below detection limits; map nos. on pl. 1; samples sorted by map number; chemical-element abbreviations in appendix, "Sampling Procedures and Analytical Methods"; sample descriptions in table A-2]

Map No.	Sample	Latitude (North)	Longitude (West)	Au (370)	Ag (30)	Cu (640)	Pb (970)	Zn (2500)	Hg (19)	As (1490)	Sb (212)	Cd (33)	Se (13)	Ba (3640)	Mo (27)	W (25)	Ni (94)	Co (38)	Fe (20)	Cr (740)	Th (75)	U (26)	Na (18)	Br (58)	Cs (49)	La (151)	Ce (380)	Sm (33)	Eu (3.3)	Tb (2.01)	Yb (17.1)	Lu (1.3)	Sc (61)	Hf (26)	Ta (3.2)	Rb (980)	Zr (635)Table
107	*ETRD006	41.0028	118.9894	12	<5	4	4	<200	0.016	7	0.5	<10	<10	160	3	<2	<20	<10	1.8	190	3.8	13.0	1.90	<1	2	20	44	2.9	3	<1	<5	<0.5	3.8	7	<1	49	*1100
108	ETMM007	40.9739	119.0072	<5	<5	3	2	<200	3.960	21	19.0	<10	<10	770	<2	3	<20	<10	<0.5	<50	<0.5	<0.5	0.14	7	2	<5	<10	<0.2	<2	<1	<5	<0.5	0.8	<2	<1	<10	<500
109	ETMM009	40.9678	119.0019	8	<5	108	5	390	<0.010	6	0.3	<10	<10	160	4	<2	<20	27	9.1	<50	1.2	1.3	3.70	<1	<1	16	38	5.6	<2	<1	<5	<0.5	31.0	3	2	<10	<500
109	ETMM110	40.9717	118.9978	<5	<5	53	6	<200	0.013	5	0.3	<10	<10	<100	7	<2	<20	20	5.8	150	1.1	0.5	1.30	1	<1	6	21	2.6	<2	<1	<5	<0.5	23.0	<2	<1	25	<500
109	ETMM111	40.9708	118.9867	<5	<5	2	3	230	<0.010	11	6.6	<10	<10	1300	5	5	<20	<10	3.7	150	14.0	6.7	3.90	<1	12	38	74	5.5	<2	<1	<5	<0.5	3.3	9	2	220	<500
109	ETMM112	40.9719	118.9886	<5	<5	3	4	<200	0.073	16	6.9	<10	<10	1600	5	4	<20	<10	2.7	94	17.0	8.0	4.60	<1	7	44	100	6.2	<2	<1	<5	<0.5	3.8	9	2	290	<500
109	*ETMM113	40.9717	118.9925	<5	<5	38	5	270	<0.010	7	0.3	<10	<10	1100	3	<2	*130	25	5.1	370	4.4	2.1	2.60	<1	4	21	50	4.0	2	<1	<5	<0.5	20.0	3	<1	68	<500
109	*ETMM114	40.9706	118.9928	<5	<5	31	3	<200	0.020	11	0.6	<10	<10	1100	3	<2	*260	29	6.4	500	4.5	1.2	>10.00	25	9	26	72	5.2	3	<1	<5	<0.5	22.0	3	2	110	<500
109	ETMM119	40.9719	119.0036	<5	<5	99	3	280	0.016	5	1.0	<10	<10	340	5	2	64	37	7.7	540	1.9	0.9	3.10	1	<1	9	24	4.2	<2	<1	<5	<0.5	39.0	3	<1	39	<500
109	ETWH029	40.9714	118.9986	<5	<5	30	4	<200	0.014	4	0.3	<10	<10	130	<2	<2	<20	<10	2.4	<50	<0.5	0.5	0.34	<1	<1	6	<10	1.3	<2	<1	<5	<0.5	7.8	<2	<1	24	<500
109	*ETWH030	40.9717	118.9922	<5	<5	51	5	500	0.014	7	0.6	<10	<10	1600	<2	<2	*110	*50	8.1	530	5.8	2.2	>10.00	27	11	28	48	5.2	<2	<1	<5	<0.5	24.0	<2	<1	81	<500
109	ETWH031	40.9706	118.9928	<5	<5	9	4	<200	<0.010	1	<0.2	<10	<10	680	<2	<2	<20	<10	1.0	61	<0.5	2.4	0.10	<1	<1	<5	<10	1.1	<2	<1	<5	<0.5	1.6	<2	<1	<10	<500
110	*ETMM008	40.9419	118.9842	<5	<5	131	4	310	<0.010	4	0.6	<10	<10	410	<2	<2	*110	*49	9.2	120	1.7	0.8	3.00	<1	<1	16	<10	5.4	<2	<1	<5	<0.5	30.0	3	<1	35	<500
111	ETRD007	41.0644	118.9425	8	<5	3	<2	250	<0.010	2	0.5	<10	<10	350	5	3	<20	<10	1.0	56	22.0	8.8	3.00	1	10	46	110	5.8	<2	<1	<5	<0.5	<0.5	8	2	330	<500
111	ETRD008	41.0644	118.9425	<5	<5	3	9	<200	<0.010	7	1.0	<10	<10	220	4	6	<20	<10	1.7	280	16.0	10.0	2.80	<1	7	50	120	6.9	<2	<1	<5	<0.5	<0.5	4	2	190	<500
114	*ETMM017	40.8403	119.2186	17	<5	<1	4	<200	<0.010	19	0.6	<10	<10	<100	10	*82	<20	<10	0.5	280	<0.5	<0.5	<0.05	<1	<1	<5	<10	<0.2	<2	<1	<5	<0.5	<0.5	<2	<1	<10	<500
114	ETMM020	40.8469	119.2169	11	<5	2	12	<200	<0.010	15	0.4	<10	<10	400	<2	<2	<20	<10	0.7	<50	<0.5	2.9	0.13	<1	<1	13	18	3.4	<2	<1	<5	<0.5	1.9	<2	<1	<10	<500
114	*ETMM021	40.8469	119.2169	6	<5	26	10	380	<0.010	9	0.5	<10	<10	1100	8	<2	54	<10	2.3	270	4.7	1.5	8.95	*66	3	31	48	4.4	<2	<1	<5	<0.5	10.0	5	<1	100	<500
115	ETRD022	40.8444	119.2250	6	<5	2	3	<200	<0.010	11	1.4	<10	<10	2300	3	5	<20	<10	2.8	65	12.0	5.1	3.60	<1	6	38	74	5.6	<2	<1	<5	<0.5	4.7	9	1	220	<500
115	ETRD023	40.8475	119.2211	<5	<5	<1	3	<200	<0.010	27	4.6	<10	<10	<100	16	24	<20	<10	3.5	380	<0.5	1.6	0.06	<1	<1	<5	<10	0.3	<2	<1	<5	<0.5	0.8	<2	<1	<10	<500
116	*ETMM019	40.8283	119.2311	*>10000	*38	170	*3190	220	0.136	749	103.0	<10	<10	200	15	15	<20	<10	8.9	200	<0.5	1.3	<0.05	46	<1	<5	<28	0.5	<2	<1	<5	0.5	4.0	<2	<1	<10	<500
116	ETRD018	40.8178	119.2311	41	<5	324	7	200	0.017	158	54.3	<10	<10	830	2	11	<20	26	10.0	100	1.5	0.6	0.49	8	5	15	36	3.7	<2	<1	<5	<0.5	22.0	<2	<1	120	<500
116	ETRD020	40.8194	119.2328	330	<5	45	85	250	0.148	779	10.0	<10	<10	450	7	4	44	16	4.4	160	1.0	1.0	1.50	26	2	5	<10	1.6	<2	<1	<5	<0.5	11.0	<2	<1	23	<500
116	ETRD021	40.8181	119.2425	23	<5	49	4	<200	0.018	75	11.0	<10	<10	<100	3	13	<20	<10	2.2	280	<0.5	<0.5	0.37	2	<1	<5	<10	0.5	<2	<1	<5	<0.5	2.1	<2	<1	11	<500
119	ETRD078	40.7181	119.2717	10	<5	49	15	420	0.024	29	3.9	<10	<10	730	<2	6	<20	16	5.3	52	14.0	3.6	4.10	28	14	33	80	5.8	<2	1	<5	<0.5	15.0	4	1	190	<500
120	ETRD009	40.7061	119.2278	7	<5	5	<2	420	<0.010	35	7.0	<10	<10	<100	3	10	<20	33	>10.0	140	4.2	5.3	0.16	<1	<1	11	19	2.0	<2	<1	<5	<0.5	11.0	3	<1	<10	<500
120	ETRD010	40.7067	119.2292	15	<5	114	<2	<200	<0.010	59	3.6	<10	<10	250	<2	5	<20	12	8.2	140	3.6	2.0	1.30	<1	5	19	31	3.6	<2	<1	<5	<0.5	13.0	<2	<1	67	<500
120	*ETRD011	40.7083	119.2297	<5	<5	9	3	410	<0.010	35	7.0	<10	<10	<100	7	*190	<20	20	>10.0	150	4.1	5.1	0.19	3	<1	12	<10	2.6	<2	<1	<5	<0.5	12.0	7	<1	<10	<500
121	*ETMM011	40.7719	119.1156	<5	<5	6	3	<200	*>50.000	14	1.9	<10	<10	350	<2	<2	<20	<10	0.6	<50	2.7	1.0	0.93	5	5	7	24	1.5	<2	<1	<5	<0.5	2.2	<2	<1	39	<500
122	*ETRD012	40.7758	119.0314	*1950	<5	389	23	<200	0.083	91	56.6	<10	<10	260	4	9	<20	<10	2.0	310	1.0	1.5	<0.05	6	<1	<5	<10	0.4	<2	<1	<5	<0.5	0.9	<2	<1	19	<500
123	*ETRD014	40.7772	119.0069	220	<38	*11923	332	<200	1.237	<1270	*1680.0	<46	<40	<390	<9	<34	<69	<10	4.1	<300	<2.8	4.2	0.40	<137	<1	<5	<74	1.5	<6	<1	<40	<1.2	2.3	<6	<1	<48	<1100
123	ETRD015	40.7764	119.0072	5	<5	50	4	280	0.011	9	2.6	<10	<10	1100	4	3	<20	13	4.9	120	6.0	2.7	3.40	<1	4	19	43	4.3	<2	<1	<5	<0.5	15.0	5	<1	82	<500
124	*ETMM014	40.7867	119.0047	*>10000	<20	172	*1529	<880	0.323	*>10000	*433.0	<64	<56	<540	*130	<9	<130	<10	7.0	<320	<3.9	<2.9	0.26	<915	<3	<5	<120	1.8	<6	<1	<46	<1.8	1.9	<9	<1	<81	<1900
124	ETRD017	40.7892	119.0075	7	<5	67	4	<200	<0.010	15	10.0	<10	<10	160	7	<2	<20	15	4.2	74	3.2	2.4	1.80	<1	2	11	22	3.3	<2	<1	<5	<0.5	15.0	3	<1	69	<500
125	*ETMM012	40.7786	118.9994	*7230	<5	15	24	<200	0.085	8	3.8	<10	<10	<100	<2	9	<20	26	1.1	380	<0.5	1.0	0.52	1	<1	<5	<10	0.5	<2	<1	<5	<0.5	4.8	<2	<1	<10	<500
125	*ETMM013	40.7783	119.0028	*>10000	<5	157	55	<200	0.080	177	29.2	<10	<10	<100	11	3	*110	30	3.6	310	<0.5	1.4	0.07	7	<1	<5	<27	<0.2	<2	<1	<5	<0.5	2.0	<2	<1	<10	<500
127	ETMM095	40.7783	118.9344	<5	<5	29	24	<200	0.050	17	2.7	<10	<10	630	7	6	<20	13	3.7	73	11.0	5.5	1.90	2	10	35	85	6.2	<2	<1	<5	<0.5	11.0	6	1	150	<500
127	ETRD082	40.7969	118.9453	<5	<5	9	<2	<200	0.017	2	0.9	<10	<10	230	<2	3	<20	<10	0.8	200	0.8	2.2	0.35	<1	11	<5	<10	0.6	<2	<1	<5	<0.5	1.8	<2	<1	26	<500
128	ETRD080	40.8550	118.7497	<5	<5	24	10	220	0.027	17	3.7	<10	<10	1200	<2	5	<20	11	3.4	80	11.0	3.0	2.90	10	8	30	73	5.5	<2	<1	<5	<0.5	11.0	6	1	130	<500
128	ETRD081	40.8428	118.7556	<5	<5	11	16	250	0.092	19	8.4	<10	<10	890	4	6	<20	<10	2.8	89	10.0	4.1	2.10	<1	9	31	76	5.5	<2	<1	<5	<0.5	6.3	6	1	180	<500
133	ETWH022	40.7731	118.7122	7	<5	6	26	<200	0.017	12	0.5	<10	<10	<100	4	3	<41	<10	2.5	<50	33.0	12.0	3.70	18	2	95	240	12.0	<2	2	9	<0.5	5.5	15	3	35	<500
136	ETCR050	40.7478	118.7306	<5	<5	4	5	<200	<0.010	4	0.4	<10	<10	<100	<2	<2	<20	<10	<0.5	390	<0.5	<0.5	<0.05	<1	<1	<5	<10	<0.2	<2	<1	<5	<0.5	<0.5	<2	<1	<10	<500
137	*ETCR051	40.7367	118.7467	250	<11	27	*>10000	1100	2.627	*2980	211.0	<35	<27	<300	<6	11	<68	<10	3.4	350	<2	<1.3	0.30	*91	<1	6	<50	1.4	<4	<1	<5	<0.5	3.5	<5	<1	<43	<500
143	ETWH006	40.7758	118.6833	66	<5	162	17	<200	0.140	783	160.0	<21	<10	1100	<5	6	<47	<10	7.9	<50	1.8	2.0	1.90	30	10	20	38	4.8	<2	1	<5	<0.5	27.0	<4	<1	150	<500
143	*ETWH007	40.7758	118.6833	50	<5	34	11	<200	0.123	253	112.0	<10	<10	1000	*47	<2	<20	<10	3.4	170	2.6	2.2	0.55	12	14	18	46	2.6	<2	<1	5	<0.5	21.0	5	<1	180	<500
143	*ETWH008	40.7792	118.6828	<16	<5	35	15	<200	0.459	243	195.0	<21	<20	1200	*45	6	<46	21	4.2	<50	12.0	4.7	1.40	20	18	35	92	8.8	*5	<1	10	0.6	7.7	<2	1	240	<500
143	*ETWH009	40.7839	118.6767	*871	*47	29	6	<200	*19.595	296	90.8	<10	<10	1000	<2	<2	31	10	4.3	100	2.5	4.9	0.11	13	7	8	25	3.3	<2	1	<5	<0.5	3.6	<2	<1	67	<500
143	*ETWH010	40.7847	118.6769	270	24	21	61	250	6.968	207	59.2	<10	*32	1300	<2	5	<20	<10	3.7	180	5.8	3.4	0.36	9	15	16	28	4.2	3	<1	<5	<0.5	6.2	<2	<1	120	<500
143	*ETWH011	40.7847	118.6769	*515	9	11	9	290	*29.31	272	84.0	<10	*77	920	4	6	<20	13	4.4	<50	2.1	3.0	<0.05	11	9	10	29	4.2	<2	1	<5	<0.5	1.7	<2	<1	53	<500
143	*ETWH012	40.7847	118.6769	<5	6	44	25	290	0.237	47	4.9	<10	<10	2500	10	<2	*410	*62	6.7	450	5.6	3.1	2.40	<1	14	31	77	6.4	3	1	<5	<0.5	22.0	3	<1	94	<500
143	*ETWH013	40.7847	118.6769	16	<5	46	16	<200	0.239	21	4.4	<10	<10	1100	4	3	*210	37	6.6	440	5.3	2.0	2.80	<1	16	28	55	5.9	<2	<1	<5	<0.5	21.0	4	<1	88	<500
143	*ETWH014	40.7844	118.6764	<5	<5	47	15	<200	0.037	10	2.4	<10	<10	1600	<2	<2	*230	33	5.8	420	10.0	2.9	2.40	<1	11	72	190	12.0	3	<1	<5	<0.5	16.0	7	<1	93	<500
143	*ETWH015	40.7844	118.6764	<5	<5	41	10	370	0.012	4	2.2	<10	<10	1600	<2	<2	*260	27	6.3	440	11.0	2.4	2.50	<1	13	79	180	13.0	<2	<1	<5	<0.5	17.0	6	<1	130	<500
143	*ETWH016	40.7839	118.6767	220	*34	9	30	<200	3.081	109	32.6	<10	<10	1100	<2	4	<20	<10	0.9	150	1.9	0.8	0.09	4	8	6	<10	1.1	<2	<1	<5	<0.5	1.2	<2	<1	79	<500
147	ETCR048	40.7658	118.6817	<5	<5	3	21	270	0.169	13	7.4	<10	<10	1400	6	<2	<20	<10	2.4	94	14.0	7.0	2.90	1	7	26	69	6.1	2	1	<5	<0.5	7.3	6	3	230	<500
147	*ETCR049	40.7658	118.6817	<5	<5	43	10	<200	0.133	46	17.0	<10	<10	620	<2	<2	*160	*62	>10.0	380	2.6	2.2	2.70	3	10	22	51	5.2	<2	<1	<5	<0.5	24.0	3	<1	71	<500
155	*ETCR046	40.7406	118.6236	*1390	*280	45	8	<200	1.295	*1680	*223.0	<31	*73	770	<5	<6	<63	<10	5.4	140	10.0	1.9	<0.05	<53	5	15	<45	3.8	<2	<1	<5	<0.5	5.5	<4	<1	150	<500
155	*ETCR047	40.7406	118.6236	*480	*34	8	12	<200	0.582	229	63.8	<10	<10	750	4	10	<20	<10	0.9	180	4.8	2.0	0.06	10	7	17	57	2.9	<2	<1	<5	<0.5	6.0	<2	<1	130	<500
156	ETCR043	40.7347	118.5889	21	<5	30	27	340	0.080	12	1.0	<10	<10	890	<2	<2	52	26	5.7	98	13.0	3.1	2.30	<1	10	46	110	7.3	<2	<1	7	<0.5	18.0	6	1	170	<500
156	*ETCR044	40.7347	118.5889	*4610	6	17	8	240	0.031	354	15.0	<10	<10	470	<2	<2	<20	20	4.4	110	2.6	1.8	0.29	9	8	17	37	3.3	<2	<1	<5	<0.5	13.0	<2	<1	150	<500
156	*ETCR045	40.7347	118.5889	13	<5	15	7	240	0.040	9	1.3	<10	<10	890	<2	<2	47	*43	9.3	<50	3.9	1.4	3.20	<1	4	24	35	5.8	<2	1	<5	<0.5	26.0	4	<1	110	<500
158	*ETCR033	40.7222	118.5775	<5	<5	49	189	<200	7.154	463	10.0	<10	<10	<100	<2	*43	*1100	*110	9.2	*1500	2.6	1.7	0.16	7	2	21	42	4.9	2	<1	<5	<0.5	32.0	<2	<1	16	<500
158	*ETCR034	40.7222	118.5775	<5	<5	39	37	320	*36.479	86	8.9	<10	<10	740	<2	*160	*95	12	>10.0	61	4.2	1.3	0.09	2	7	26	48	7.4	2	<1	6	0.7	43.0	8	1	54	<500
158	*ETCR035	40.7222	118.5775	6	<5	13	50	<200	*35.257	40	3.2	<10	<10	240	<2	24	25	<10	1.7	240	7.8	1.9	0.07	<1	3	29	69	4.7	<2	<1	5	<0.5	5.7	11	<1	55	<500
158	*ETCR036	40.7222	118.5775	27	<5	56	27	<200	*>50.000	177	8.0	<10	<10	450	<2	*86	<20	<10	6.6	160	10.0	3.5	0.20	3	9	39	84	6.5	3	<1	6	<0.5	15.0	7	1	160	<500
160	*ETCR008	40.7019	118.5631	*539	*>300	*764	*>10000	*10000	1.832	*7100	*362.0	*140	<10	<100	10	<20	<20	*62	5.7	230	1.2	3.0	<0.05	<206	<1	37	84	7.1	3	<1	<15	1.2	<0.5	<2	<1	31	<500
161	ETCR009	40.7047	118.5519	<5	<5	13	72	<200	0.014	85	1.6	<10	<10	210	<2	4	<20	<10	1.8	310	6.6	1.5	0.94	2	4	25	65	4.7	2	<1	<5	<0.5	6.5	11	<1	93	<500
161	ETCR010	40.7042	118.5519	11	<5	14	103	<200	0.023	73	2.0	<10	<10	<100	<2	<2	<20	<10	0.8	360	1.4	<0.5	0.34	1	<1	6	23	1.9	<2	<1	<5	<0.5	1.3	<2	<1	<10	<500
162	ETCR037	40.7228	118.5281	220	<5	19	20	<200	0.170	767	3.1	<10	<10	170	4	5	<20	<10	1.8	290	2.4	<0.5	0.24	11	3	8	29	2.4	<2	<1	<5	<0.5	3.5	<2	<1	59	<500
162	ETCR038	40.7228	118.5281	25	<5	28	10	<200	0.413	276	5.8	<10	<10	690	<2	<2	35	21	6.0	220	15.0	3.2	1.10	7	14	48	120	8.1	2	1	7	<0.5	19.0	7	<1	230	<500
162	*ETCR039	40.7228	118.5281	120	<5	17	16	<200	0.153	262	3.8	<10	<10	630	<2	8	88	25	6.1	140	16.0	3.6	2.10	5	8	56	130	8.9	<2	<1	5	0.7	23.0	7	2	240	*1100
163	*ETCR040	40.7228	118.5281	*666	<5	29	27	300	0.057	911	7.0	<10	<10	570	<2	7	33	20	5.4	190	13.0	2.3	1.20	17	12	46	110	7.1	*4	<1	<5	1.0	17.0	<2	2	220	<500
164	ETCR005	40.6922	118.5544	7	<5	8	38	200	<0.010	16	1.0	<10	<10	<100	<2	<2	<20	<10	2.8	380	1.3	<0.5	0.06	<1	<1	6	<10	1.7	<2	<1	<5	<0.5	4.4	<2	<1	<10	<500
164	*ETCR003	40.6928	118.5497	<5	*51	235	*2280	*>30000	0.619	40	4.2	*66	<10	<100	4	6	28	*42	10.0	300	4.9	1.4	0.05	2	<1	19	51	3.8	<2	<1	<5	<0.5	7.1	<2	<1	13	<500
164	*ETCR004	40.6928	118.5497	<5	*87	*1315	*>10000	*16000	2.314	98	34.6	*100	<10	<100	9	<2	*99	*47	>10.0	190	4.1	3.3	<0.05	7	4	19	33	3.5	<2	<1	<5	<0.5	5.9	<2	<1	26	<500
164	ETCR006	40.6944	118.5544	<5	<5	9	69	<200	0.016	12	0.7	<10	<10	110	<2	<2	35	<10	2.7	280	2.5	0.7	0.09	<1	2	8	17	2.1	<2	<1	<5	<0.5	2.6	4	<1	33	<500
164	*ETCR007	40.6953	118.5550	<11	19	*657	*>10000	*11000	0.650	270	184.0	*41	<10	<100	18	8	<37	16	>10.0	92	6.8	4.5	0.06	22	5	18	36	2.7	<2	<1	<5	<0.5	9.0	<2	<1	96	<500
165	*ETCR011	40.6950	118.5442	17	*62	291	*7552	*18000	0.726	870	27.8	*42	<10	<100	<2	7	74	35	6.6	150	4.2	1.4	0.14	21	12	16	29	3.7	<2	<1	6	<0.5	17.0	<2	<1	97	<500
165	*ETCR012	40.6950	118.5442	<23	*>300	*1221	*>10000	*>30000	6.649	*2810	*490.0	*240	<10	<100	7	<20	<58	*71	>10.0	<50	<0.5	4.5	<0.7	<155	2	13	<25	4.1	<2	<1	<13	0.9	6.9	<2	<1	<32	<500
165	*ETCR013	40.6950	118.5442	<17	*47	178	*>10000	*7100	0.421	*2560	61.2	26	<10	<100	<4	<2	<53	<10	2.7	210	7.1	8.7	0.10	<73	6	24	<37	2.8	<2	<1	11	<0.5	4.9	4	<1	67	<1100
165	*ETCR014	40.6950	118.5442	7	5	28	*1442	1400	0.310	39	5.6	12	<10	360	<2	3	<20	<10	2.3	310	6.3	1.6	0.13	1	7	27	58	4.3	<2	<1	<5	<0.5	5.4	8	<1	100	<500

A-3.--Analyses of rock samples, Emigrant Trail study area and vicinity--Continued
[All ppm except Au, ppb, and Fe and Na, %; <, less than; >, greater than; *, anomalous analyses and samples; anomalous thresholds in parentheses below element; Ir, Te, and Sn all below detection limits; map nos. on pl. 1; samples sorted by map number; chemical-element abbreviations in appendix, "Sampling Procedures and Analytical Methods"; sample descriptions in table A-2]

Map No.	Sample	Latitude (North)	Longitude (West)	Au (370)	Ag (30)	Cu (640)	Pb (970)	Zn (2500)	Hg (19)	As (1490)	Sb (212)	Cd (33)	Se (13)	Ba (3640)	Mo (27)	W (25)	Ni (94)	Co (38)	Fe (20)	Cr (740)	Th (75)	U (26)	Na (18)	Br (58)	Cs (49)	La (151)	Ce (380)	Sm (33)	Eu (3.3)	Tb (2.01)	Yb (17.1)	Lu (1.3)	Sc (61)	Hf (26)	Ta (3.2)	Rb (980)	Zr (635)Table
165	ETCR015	40.6950	118.5442	<5	<5	11	291	420	<0.010	10	1.8	<10	<10	<100	<2	<2	<20	<10	0.6	310	<0.5	<0.5	<0.05	<1	<1	<5	<10	0.8	<2	<1	<5	<0.5	0.6	<2	<1	11	<500
165	*ETCR016	40.6950	118.5442	<20	18	282	*>10000	*10000	0.629	*3540	37.4	*170	<23	290	10	<4	<69	<10	9.3	190	4.3	1.1	0.09	<96	13	26	<53	4.4	<2	<1	9	<0.5	9.3	<4	<1	120	<1000
165	*ETCR017	40.6972	118.5447	<24	*34	377	*>10000	2400	0.326	*4260	103.0	*71	<27	<300	<6	<6	<76	<10	9.0	170	9.2	<1.2	0.55	<150	5	25	<62	4.2	<2	<1	11	*1.8	8.9	<5	<1	100	<1100
165	*ETCR018	40.6967	118.5456	<12	22	32	459	*6900	0.270	1330	17.0	*270	<10	300	<2	10	<50	*58	>10.0	92	<1.1	<0.5	0.15	26	15	13	24	5.2	*6	<1	8	1.1	34.0	<2	<1	220	<500
165	*ETCR019	40.6967	118.5456	<5	<5	359	921	*8100	0.566	556	10.0	*36	<10	560	<2	<2	36	12	4.7	120	14.0	2.4	0.36	10	10	41	83	5.8	<2	<1	6	<0.5	15.0	4	1	210	<500
165	*ETCR020	40.6967	118.5456	<5	11	61	399	*6600	0.137	181	5.2	*67	<10	390	<2	5	25	37	6.4	78	6.9	1.2	0.37	3	9	29	56	5.7	<2	<1	<5	<0.5	25.0	4	2	120	<500
165	ETCR021	40.7011	118.5408	<5	6	138	28	<200	0.166	72	15.0	<10	<10	<100	<2	<2	60	17	5.3	390	2.7	0.8	<0.05	3	<1	<5	<10	0.6	<2	<1	<5	<0.5	1.2	<2	<1	<10	<500
166	ETCR022	40.6875	118.5394	20	<5	40	31	200	<0.010	43	2.5	<10	<10	580	<2	2	<20	17	4.5	140	14.0	2.6	0.67	1	11	48	93	8.2	3	<1	6	<0.5	17.0	8	2	210	<500
166	*ETCR023	40.6875	118.5394	<5	<5	36	19	<200	0.016	61	2.7	<10	<10	650	<2	<2	*99	19	6.1	110	13.0	2.5	0.49	1	14	45	110	7.9	3	1	5	<0.5	19.0	5	2	230	<500
166	ETCR024	40.6875	118.5394	13	<5	44	33	<200	<0.010	56	2.7	<10	<10	800	<2	3	51	21	5.4	140	13.0	2.6	0.49	<1	9	42	120	7.4	<2	<1	<5	0.7	17.0	5	2	190	<500
166	*ETCR025	40.6875	118.5394	<5	*61	*2381	*4239	*>30000	0.397	429	21.0	*330	<10	<100	<2	<2	41	*87	>10.0	64	6.0	2.3	0.07	9	5	21	40	4.2	<2	<1	<5	0.7	9.4	<2	<1	76	<500
166	*ETCR026	40.6875	118.5394	<16	*>300	*7105	*>10000	*11000	3.063	*6650	123.0	*84	*15	170	<2	*29	<20	<10	>10.0	82	3.5	1.6	<0.32	*125	3	19	34	2.6	<2	<1	<5	0.8	2.1	<2	<1	60	<500
167	*ETCR027	40.6819	118.5214	<14	*200	*1100	*>10000	*4500	0.240	133	163.0	*35	<10	<100	<2	<2	42	<10	10.0	320	3.5	1.4	0.06	15	2	17	<36	2.2	<2	<1	6	0.5	1.2	3	<1	34	<500
171	ETMM092	40.7192	118.4631	<5	<5	11	16	<200	0.022	15	12.0	<10	<10	<100	2	<2	<20	<10	2.2	310	1.4	<0.5	0.13	<1	<1	10	17	3.9	<2	<1	<5	<0.5	2.2	<2	<1	<10	<500
171	ETMM093	40.7172	118.4617	<5	<5	4	12	<200	0.066	3	0.3	<10	<10	130	<2	<2	<20	<10	<0.5	<50	3.8	1.2	<0.05	<1	8	7	17	0.7	<2	<1	<5	<0.5	<0.5	<2	<1	50	<500
171	ETMM094	40.7172	118.4617	<5	<5	8	14	<200	0.034	15	3.8	<10	<10	<100	<2	<2	<20	<10	1.7	290	3.2	0.9	0.41	<1	<1	12	32	3.9	<2	<1	<5	<0.5	4.2	3	<1	18	<500
171	ETWH021	40.7192	118.4692	<5	<5	30	17	<200	0.033	10	1.5	<10	<10	<100	2	<2	<20	<10	2.3	250	4.2	0.8	0.79	<1	<1	15	42	3.8	<2	<1	<5	<0.5	3.3	3	<1	34	<500
171	ETWH025	40.7192	118.4672	<5	<5	11	6	<200	0.162	27	3.6	<10	<10	<100	<2	<2	<20	<10	1.5	140	2.6	1.6	0.83	3	2	9	17	1.8	<2	<1	<5	<0.5	3.7	<2	<1	52	<500
171	ETWH026	40.7147	118.4639	<5	<5	11	6	<200	0.035	32	1.1	<10	<10	<100	2	<2	<20	<10	0.9	300	2.0	<0.5	1.10	1	<1	8	22	1.1	<2	<1	<5	<0.5	1.4	2	<1	16	<500
172	ETCR002	40.6797	118.4800	<5	<5	4	5	<200	<0.010	25	0.7	<10	<10	<100	<2	<2	<20	<10	<0.5	340	1.6	<0.5	<0.05	<1	<1	17	46	2.6	<2	<1	<5	<0.5	<0.5	<2	<1	<10	<500
172	*ETWH001	40.6769	118.4847	<63	<17	*2526	445	2100	0.037	*>10000	126.0	*110	<38	540	21	<32	<130	<10	>10.0	<180	16.0	<3.4	<0.66	<3380	9	50	<80	6.1	*5	<1	<55	*2.0	17.0	<9	<1	250	<1600
172	*ETWH002	40.6769	118.4847	<120	<28	*6648	*3706	*2700	0.260	*>10000	*274.0	*210	<81	<830	*50	<53	*260	<10	>10.0	<370	<5.7	<7.3	<1.1	<2200	4	<5	<190	<0.6	<8	<1	<93	<3.5	<1.5	<14	<3	<110	<2700
172	*ETWH003	40.6753	118.4858	35	*250	*>20000	180	320	0.100	523	41.7	<10	<10	<100	<2	<2	<20	14	4.8	230	1.5	5.7	<0.05	11	<1	8	15	1.5	<2	<1	<5	<0.5	<0.5	<2	<1	<10	<500
172	*ETWH023	40.6767	118.4911	<29	<14	*1446	91	570	0.074	*7670	8.3	<41	<31	<350	10	<6	<91	<10	>10.0	<130	8.2	<1.5	0.18	<272	3	28	<60	4.0	<2	<1	17	<0.5	9.5	<6	<1	120	<1300

Table A-4.--Descriptions of alluvial samples from the Emigrant Trail study area and vicinity, Humboldt, Pershing, and Washoe Counties, Nevada

[Map numbers on pl. 1; all sample volumes 0.2 ft^3, unless noted; $370/oz gold price; sample analyses in table A-5]

Map No.	Sample	Type	Description
002	ETRD071	Channel	Red and brown, bouldery (20 %), cobbly (35 %), pebbly (20 %), sandy (25 %), angular to subangular gravel composed of volcanic rocks; cinnabar, limonite.
002	ETRD076	Pan	Red, gray, and white, bouldery (35 %), cobbly (30 %), pebbly (20 %), sandy (15 %), angular to subangular gravel composed of volcanic rocks.
013	ETRD067	Pan	Red and gray, bouldery (15 %), cobbly (20 %), pebbly (20 %), sandy and silty (45 %), angular gravel composed of slightly silicic volcanic rocks.
026	ETRD099	Pan	Gray to yellow and brown, cobbly (10 %), pebbly (20 %), sandy and silty (70 %), subangular gravel composed of volcanic rocks.
031	ETMM036	Pan	Brown, bouldery (10 %), cobbly (10 %), pebbly (40 %), sandy (40 %), subrounded gravel composed of andesite, rhyolite, and diabase.
034	ETMM096	Pan	Gray to tan, silty sand. Sample size 0.1 ft^3.
035	ETMM037	Pan	Gray to brown, silty sand beneath vesicular basalt cap and above white, ashy tuff. Sample size 0.1 ft^3.
036	ETRD037	Pan	Gray, red, and brown, cobbly (10 %), pebbly (25 %), sandy (65 %), rounded to subangular gravel composed of volcanic rocks. Sample size 0.1 ft^3.
037	ETMM038	Pan	Brown, bouldery (10 %), cobbly (20 %), pebbly (50 %), sandy (20 %), subangular gravel composed of basaltic, andesitic, and rhyolitic rocks. Placer gold value equivalent to $0.60/$yd^3$.
038	ETMM039	Pan	Gray, volcanic, silty sand with a minor subangular pebble component. Sample size 0.1 ft^3.
039	ETRD038	Pan	Red, gray, and brown, pebbly (10 %), sand (90 %), rounded gravel composed of volcanic rocks. Sample size 0.1 ft^3.
083	ETRD050	Pan	Red and gray, bouldery (10 %), cobbly (20 %), pebbly (35 %), sandy (35 %), angular gravel composed of volcanic and granitic rocks in an alluvial plain.

Table A-4.--Descriptions of alluvial samples from the Emigrant Trail study area and vicinity--continued

Map No.	Sample	Type	Description
084	ETRD049	Pan	Gray, red and brown, cobbly (25 %), pebbly (40 %), sandy and silty (35 %), subangular to angular gravel composed of volcanic and granitic rocks.
089	ETRD045	Pan	Tan and gray, cobbly (20 %), pebbly (40 %), sand (40 %), angular gravel composed of volcanic rocks in an alluvial plain.
092	ETRD044	Channel	Red and gray, cobbly (30 %), pebbly (40 %), sandy (30 %), rounded to subangular, limonitic gravel composed of volcanic rocks; pyrite and magnetite (?).
099	ETRD031	Pan	White, red, and brown, cobbly (20 %), pebbly (45 %), sandy (35 %), subangular gravel composed of volcanic rocks.
101	ETRD085	Pan	Red, gray, and green, bouldery (15 %), cobbly (25 %), pebbly (35 %), sandy (25 %), angular to subangular gravel composed of volcanic rocks.
102	ETRD035	Pan	Gray, red, and brown, bouldery (10 %), cobbly (10 %), pebbly (25 %), sand and silty (55 %), rounded to subangular gravel composed of volcanic rocks.
107	ETRD004	Pan	Limonitic, bouldery (10 %), cobbly (20 %), pebbly (20 %), sandy (50 %), angular gravel composed of argillite and quartzite; estimated 30 % too coarse to pan.
109	ETMM010	Pan	Yellow to brown, pebbly (30 %) sand and silt; angular gravel composed of siltite, quartzite, and volcanics.
109	ETMM115	Pan	Yellow-brown, sandy (40 %), pebbly (50 %), cobbly (10 %), subrounded gravel composed of rhyolite, basalt, and quartzite.
109	ETMM116	Pan	Yellow-brown, sandy (30 %), pebbly (50 %), cobbly (20 %), subrounded gravel composed of rhyolite, dacite, basalt, and reworked Lake Lahontan gravel.
109	ETMM117	Pan	Yellow-brown, sandy (30 %), pebbly (50 %), cobbly (20 %), subrounded gravel composed of rhyolite, dacite, basalt, and reworked Lake Lahontan gravel.
109	ETMM118	Pan	Yellow-brown, sandy (40 %), pebbly (50 %), cobbly (10 %), subrounded gravel composed of volcanic rocks and reworked Lake Lahontan gravel.
115	ETRD024	Pan	Red (limonitic), gray, and brown, cobbly (35 %), pebbly (45 %), sandy (20 %), subangular to rounded gravel composed of rhyolite and granitic rocks.

Table A-4.--Descriptions of alluvial samples from the Emigrant Trail study area and vicinity--continued

Map No.	Sample	Type	Description
116	ETMM018	Pan	Gray, pebbly (80 %), sandy (20 %), subrounded, slightly limonitic, caliche-cemented, dioritic and basaltic gravel; fossil shoreline gravel at basalt cliff; ditches and trenches. Sample of 0.4 ft^3. Placer gold value about $0.30/$yd^3$.
116	ETRD019	Pan	Red (limonitic), gray, and green, bouldery (25 %), cobbly (30 %), pebbly (30 %), sandy (15 %), angular to rounded gravel composed of granitic, metasedimentary (?), and metavolcanic (?) rocks; ancient shoreline. Sample size 0.3 ft^3.
117	ETRD083	Pan	Gray, green, and tan, bouldery (10 %), cobbly (30 %), pebbly (30 %), sandy (30 %), angular to subangular gravel composed of olivine (?)-rich basaltic rock.
122	ETRD013	Pan	Gray, decomposed, rounded, granitic gravel from ancient Lake Lahonton shoreline.
124	ETMM015	Pan	Gray, bouldery (5 %), cobbly (30 %), pebbly (50 %), sandy (15 %), angular gravel and colluvium composed of metasedimentary rocks (30 %), diorite (60 %), and other granitics (10 %); ancient shoreline occurrence.
124	ETRD016	Pan	Gray, bouldery (10 %), cobbly (15 %), pebbly (30 %), sandy (45 %), rounded to subangular gravel composed of granitic and biotite schist rocks; granitics contain hornblende and muscovite.
126	ETMM016	Pan	Gray to yellow, pebbly (10 %), sandy (90 %), angular gravel composed of diorite and granitic and metasedimentary rocks. Sample size 0.1 ft^3.
130	ETRD079	Channel	Red, gray, and brown, cobbly (20 %), pebbly (55 %), sandy (25 %), rounded to subangular gravel composed of volcanic and granitic rocks.
130	ETWH004	Channel	Red (limonite-stained), brown, and gray, rounded to subangular gravel composed of volcanic and quartzitic rocks; 30 % too large to pan.
130	ETWH005	Channel	Red (limonite-stained), brown, and gray, rounded to subangular gravel composed of volcanic and quartzitic rocks; 5 % too large to pan. Sample size 0.1 ft^3.
130	ETWH028	Channel	Red (limonite-stained), brown, and gray, rounded to subangular gravel composed of volcanic and quartzitic rocks. Alluvial analysis only.

Table A-4.--Descriptions of alluvial samples from the Emigrant Trail study area and vicinity--continued

Map No.	Sample	Type	Description
131	ETWH019	Channel	Gray to brown, subangular to subrounded gravel composed of volcanic and metasedimentary rocks; 95 % finer than 0.25 inch.
132	ETWH020	Channel	Gray and red, angular, limonite-stained gravel composed of volcanic and sedimentary rocks; 90 % finer than 0.25 inch.
134	ETWH017	Channel	Red, brown, and green, angular to rounded gravel composed of quartzite, rhyolite, and slate; 80 % finer than 0.25 inch. Placer gold value equivalent to $0.50/yd^3$.
134	ETWH018	Pan	Red, brown, and green, angular to rounded gravel composed of quartzite, rhyolite, and slate; 20 % too coarse to pan.
135	ETWH024	Grab	Red, brown, and gray, angular gravel composed of volcanic rocks, clay, and soil. Sample size 0.1 ft^3.
153	ETCR041	Pan	Gray to brown alluvium with approximately 5 % too large to pan.
153	ETCR042	Pan	Gray to brown alluvium with approximately 15 % too large to pan.
159	ETCR029	Pan	Gray to brown alluvium with approximately 2 % too large to pan; two bags.
159	ETCR030	Pan	Gray to brown alluvium with approximately 15 % too large to pan.
159	ETCR031	Pan	Gray to brown alluvium with approximately 20 % too large to pan. Placer gold value equivalent to $1.20/yd^3$.
159	ETCR032	Pan	Gray to brown alluvium with approximately 5 % too large to pan. Placer gold value equivalent to $0.75/yd^3$.
171	ETWH027	Channel	Red, gray, and brown gravel composed of quartzite (70 %), slate (20 %), and volcanic rocks and quartz (10 %).
180	ETCR001	Pan	Gray to brown silty sand with approximately 5 % too large to pan.
187	ETCR028	Pan	Gray to brown alluvium with approximately 5 % too large to pan.

Table A-5.--Analyses of alluvial sample concentrates from the Emigrant Trail study area and vicinity, Humboldt, Pershing, and Washoe Counties, Nevada

[All ppm except Au, ppb and Fe and Na, %; <, less than; >, more than; *, *anomalous analyses and samples; anomalous thresholds in parentheses below element*; NA, not available; Ir, Cd, Te, and Sn below detection limits; map nos. on pl. 1; chemical element abbreviations in appendix, "Sampling procedures and analytical methods"; samples sorted by map number; sample descriptions in table A-4]

Map No.	Sample	Latitude (north)	Longitude (west)	Au (876)	Ag (3.3)	Cu (128)	Pb (177)	Zn (1690)	Hg (20.4)	As (419)	Sb (93)	Se (8)	Ba (7840)	Mo (20)	W (68)	Ni (350)	Co (160)	Fe (13.3)	Cr (1550)	Th (89)	U (23)	Na NA	Br (15)	Cs (18.6)	La (217.2)	Ce (543)	Sm (34.6)	Eu (10.3)	Tb (5.3)	Yb (25.2)	Lu (3)	Sc (74.8)	Hf (109.3)	Ta (11.6)	Rb (434)	Zr (4720)
002	*ETRD071	41.8081	119.5628	<5	<5	14	32	1500	*>50.000	76	*120.0	<10	870	<2	7	<20	79	>10	<50	5.4	4.5	0.8	10	4	54	110	12.0	4	2	13	1.2	74.6	16	6	<10	<500
002	*ETRD076	41.8075	119.6072	<5	<5	14	26	980	*33.400	12	3.8	<10	1100	<2	<2	<20	64	>10	<50	4.4	3.7	1.8	<1	<1	45	81	11.0	3	1	7	1.1	60.0	11	4	39	660
013	ETRD067	41.4969	119.4744	7	<5	19	24	790	0.981	6	1.7	<10	300	<2	3	<20	50	>10	290	20.0	6.7	2.7	<1	3	100	300	18.0	<2	3	15	1.7	31.0	33	3	140	1300
026	ETRD099	*41.4764*	*119.1078*	29	<5	15	14	*710*	*0.728*	6	1.5	<10	190	<2	2	<20	24	>10	110	22.0	5.5	4.0	1	4	190	470	24.1	<2	2	11	1.5	25.0	21	2	160	1100
031	ETMM036	41.3653	119.2208	120	<5	17	22	840	11.971	19	2.6	<10	900	<2	5	<20	35	>10	310	12.0	3.4	2.5	<1	3	140	270	18.0	3	2	8	0.9	40.0	19	3	66	790
034	ETMM096	41.3047	119.1678	<5	<5	15	11	540	0.784	6	1.2	<10	900	2	<2	<20	16	6.7	160	11.0	3.4	3.8	<1	4	72	150	12.0	<2	1	7	0.6	25.0	11	2	110	<500
035	ETMM037	41.3194	119.2722	<5	<5	74	15	980	2.368	6	2.6	<10	860	<2	3	140	110	>10	290	5.6	2.9	1.9	<1	2	33	64	6.2	<2	<1	<5	0.5	40.0	11	2	49	<500
036	ETRD037	41.3194	119.2869	<5	<5	16	17	950	0.079	7	1.4	<10	980	<2	<2	<20	57	>10	210	4.4	2.1	2.4	<1	1	42	89	8.1	3	1	<5	0.6	50.3	8	2	53	770
037	ETMM038	41.3197	119.2972	40	<5	17	25	780	NA	41	5.7	<10	4800	3	18	<20	44	>10	170	7.0	3.8	3.3	2	5	46	200	10.0	3	2	7	<0.5	35.0	9	<1	89	660
038	ETMM039	41.3081	119.3022	<5	<5	20	15	290	17.688	10	2.1	<10	1600	5	<2	<20	28	5.3	62	7.9	3.6	3.7	<1	4	42	120	8.8	4	1	6	0.6	17.0	7	<1	130	<500
039	ETRD038	41.3086	119.2903	<5	<5	18	17	670	0.998	8	1.7	<10	1200	<2	3	<20	50	>10	280	5.2	2.5	2.9	<1	2	44	110	9.3	3	<1	6	0.6	48.0	9	2	70	930
083	ETRD050	41.1050	119.2892	10	<5	28	14	420	0.479	12	1.2	<10	1200	4	3	85	33	9.1	410	6.9	2.1	3.7	<1	3	30	72	5.3	<2	<1	<5	<0.5	20.0	9	<1	29	<500
084	*ETRD049	41.0856	119.2808	*1860	<5	52	*250	940	0.825	203	7.2	<10	1800	3	38	130	110	>10	1300	15.0	4.4	1.3	6	2	94	200	14.0	3	1	8	1.0	39.0	27	2	55	1300
089	ETRD045	41.0089	119.2808	29	<5	28	16	1000	0.357	6	1.0	<10	830	<2	2	140	110	>10	770	9.4	3.4	1.3	<1	2	34	65	7.3	<2	1	<5	<0.5	43.0	16	1	28	910
092	ETRD044	40.9808	119.3042	<5	<5	18	13	770	0.034	18	0.5	<10	440	<2	<2	94	84	>10	940	7.4	4.4	1.4	<1	1	34	86	8.4	3	<1	<5	<0.5	52.6	16	<1	<10	700
099	ETRD031	40.9269	119.2067	<5	<5	28	45	430	0.183	208	26.6	<10	2800	7	5	<20	17	6.8	120	14.0	8.5	2.7	6	10	39	93	6.8	<2	1	9	0.6	14.0	35	2	130	1500
101	ETRD085	41.0075	119.1494	<5	<5	30	22	900	0.514	10	1.5	<10	1900	<2	<2	80	90	>10	820	6.8	2.9	2.5	<1	2	41	79	7.5	2	1	<5	<0.5	38.0	12	2	37	680
102	ETRD035	41.0308	119.1550	<5	<5	28	21	1100	0.038	5	1.3	<10	1500	2	<2	160	140	>10	840	8.2	4.7	1.3	<1	<1	51	130	9.5	<2	<1	6	0.7	39.0	47	2	<10	2700
107	*ETRD004	40.9917	118.9953	5	<5	23	40	1500	0.478	53	6.1	<10	3300	*24	32	<20	30	>10	64	11.0	6.2	2.2	3	4	110	340	19.0	<2	3	22	*3.4	25.0	25	7	72	1700
109	*ETMM010	40.9650	118.9964	*2710	<5	65	21	680	3.746	79	5.0	<10	1900	4	13	140	78	>10	470	17.0	11.0	2.0	3	6	79	210	17.0	3	2	9	0.9	34.0	38	4	48	1700
109	*ETMM115	40.9694	118.9942	<5	<5	125	25	670	0.064	109	5.6	<10	*>20000	7	11	*480	150	>10	1100	7.6	6.5	2.3	2	15	39	80	6.6	3	<1	9	0.6	39.0	23	1	47	980
109	*ETMM116	40.9833	118.9953	<5	<5	63	23	490	*0.078*	97	6.3	*<10*	*>20000	4	32	230	89	*>10*	790	11.0	10.0	2.1	<1	5	53	120	9.2	4	<1	9	0.8	35.0	30	2	<10	840
109	ETMM117	40.9647	118.9939	27	<5	31	19	480	0.095	48	7.0	<10	1600	<2	14	85	64	>10	480	32.0	19.0	1.5	1	4	130	250	25.3	5	3	17	1.7	45.0	86	6	<10	3500
109	*ETMM118	40.9642	119.0008	<5	<5	42	13	790	0.020	35	3.8	<10	*8800	<2	6	130	130	>10	1300	25.0	15.0	0.4	<1	1	99	190	18.0	5	3	12	1.8	50.1	*140	6	<10	*5300
115	*ETRD024	40.8453	119.2256	<5	<5	17	10	470	0.025	10	3.5	<10	490	<2	4	<20	25	>10	140	82.3	20.0	2.7	<1	3	*250	*560	*40.8	5	5	20	2.4	39.0	38	*12	31	1100
116	ETMM018	40.8261	119.2317	300	<5	81	62	560	NA	75	5.9	<10	410	3	15	<20	78	>10	130	31.0	11.0	1.5	3	3	63	170	19.0	4	2	10	0.9	52.4	24	6	51	900
116	*ETRD019	40.8194	119.2319	38	*6	40	25	340	0.152	28	4.1	<10	690	<2	7	<20	37	>10	160	12.0	4.5	3.0	1	5	38	90	9.3	<2	2	6	<0.5	35.0	8	2	86	<500
117	*ETRD083	40.7839	119.2825	<5	<5	17	*217	580	0.481	25	18.0	<10	310	<2	5	<20	35	>10	130	25.0	15.0	1.7	2	2	80	220	23.2	7	3	17	1.8	47.0	60	6	22	2400
122	*ETRD013	*40.7789*	*119.0344*	*320*	<5	*58*	14	*470*	0.269	24	4.8	<10	180	<2	23	<20	49	>10	360	*122.0	21.0	1.4	<1	3	140	320	30.9	4	4	16	1.9	42.0	45	8	38	1700
124	ETMM015	40.7883	119.0100	39	<5	123	10	330	1.267	89	20.1	<10	420	10	3	<20	43	>10	130	2.9	2.6	1.3	3	3	13	24	3.8	3	<1	<5	<0.5	26.0	2	<1	38	<500
124	ETRD016	40.7892	119.0153	6	<5	60	13	640	0.197	42	4.9	<10	330	3	13	<20	60	>10	340	66.1	15.0	1.6	1	2	55	150	15.0	5	2	8	<0.5	45.0	36	4	21	1300
126	*ETMM016	40.7867	118.9642	11	<5	22	13	310	1.767	22	4.3	<10	140	<2	5	<20	40	>10	<50	*182.0	*31.0	1.0	2	1	*250	*570	*49.6	9	5	13	1.6	12.0	62	*16	14	2000
130	ETRD079	40.7917	118.7056	7	<5	26	16	<200	0.074	31	8.5	<10	800	2	5	<20	13	4.6	130	11.0	3.6	1.9	5	13	35	85	6.4	<2	<1	<5	<0.5	11.0	7	1	170	<500
130	*ETWH004	40.7953	118.6961	*3310	<5	83	172	340	2.487	410	151.0	<10	1600	11	*160	69	100	>10	260	14.0	5.5	0.9	*24	16	53	90	9.3	<2	2	<5	1.3	16.0	15	2	40	<500
130	ETWH005	40.7953	118.6961	<5	<5	45	54	300	1.693	122	29.5	<10	3900	6	30	52	49	>10	250	11.0	3.2	1.2	5	16	41	62	6.4	<2	<1	8	0.5	17.0	11	1	170	900
131	*ETWH019*	*40.7833*	*118.7247*	<5	<5	57	64	360	0.817	158	47.8	<10	1700	8	22	<20	67	>10	270	16.0	4.9	1.2	7	6	62	120	8.7	3	1	11	0.5	20.0	23	2	120	<500
132	*ETWH020	40.7786	118.7331	140	<5	68	82	360	0.559	215	84.0	*24	800	6	32	75	90	>10	330	21.0	6.2	1.2	12	8	85	150	12.0	6	2	11	1.4	26.0	40	3	98	1600
134	ETWH017	40.7567	118.7544	52	<5	48	63	580	NA	147	38.9	<10	890	13	9	<20	42	>10	260	14.0	6.7	1.9	6	11	64	120	9.1	4	2	9	0.7	17.0	20	2	140	<500
134	ETWH018	40.7567	118.7544	<5	<5	38	58	380	1.052	126	32.3	<10	870	15	12	<20	35	>10	190	15.0	7.6	1.9	6	10	67	160	9.0	3	<1	8	0.5	17.0	23	3	120	1100
135	ETWH024	40.7542	118.6989	350	<5	NA	NA	510	0.475	32	9.1	<10	950	5	4	81	51	>10	680	25.0	7.1	2.7	2	4	70	180	10.0	3	1	6	<0.5	28.0	42	2	110	1700
153	ETCR041	40.7492	118.5275	17	<5	58	42	410	1.639	63	10.0	<10	530	4	<2	<20	57	>10	250	41.0	10.0	1.2	2	7	110	250	17.0	5	2	10	0.9	27.0	48	3	130	1700
153	ETCR042	40.7511	118.5589	<5	<5	49	27	<200	0.578	60	8.7	<10	540	<2	5	74	32	>10	190	24.0	6.2	1.6	3	7	71	150	11.0	3	2	5	0.9	23.0	26	3	110	<500
159	ETCR029	40.6722	118.6739	<5	<5	63	45	650	2.316	91	27.4	<10	650	6	19	<20	59	>10	370	33.0	10.0	1.3	4	4	130	300	20.6	5	2	11	1.0	35.0	36	4	150	1500
159	ETCR030	40.6764	118.6667	<5	<5	14	12	260	2.359	15	2.0	<10	610	6	4	50	20	7.6	150	14.0	2.9	3.1	<1	4	46	100	6.8	<2	1	<5	<0.5	8.5	7	1	58	<500
159	ETCR031	40.6853	118.6481	100	<5	37	46	390	NA	50	11.0	<10	1000	5	5	43	43	>10	270	18.0	3.6	1.5	3	5	87	210	14.0	<2	1	6	0.6	25.0	13	2	150	<500
159	ETCR032	40.7044	118.6461	98	<5	69	97	280	NA	139	34.2	<10	490	16	13	70	56	>10	250	20.0	5.1	1.1	5	3	78	210	13.0	<2	<1	7	0.5	18.0	24	2	66	<500
171	ETWH027	40.7150	118.4636	<5	<5	17	10	<200	0.166	21	2.9	<10	400	5	5	<20	14	6	280	20.0	5.6	1.5	<1	8	88	210	11.0	8	2	8	0.8	22.0	26	2	200	<500
180	*ETCR001	40.6847	118.3703	130	<5	*157	*332	550	0.500	*447	24.0	<10	560	<2	17	<20	62	>10	330	74.7	18.0	1.4	11	5	210	450	24.0	6	3	14	1.9	34.0	*130	4	100	4000
187	ETCR028	40.6342	118.6661	20	<5	28	124	650	1.115	60	20.4	<10	1700	13	19	<20	44	>10	230	39.0	10.0	2.5	2	5	91	270	14.0	5	1	10	0.8	28.0	37	3	120	2100

Table A-6.--Whole-rock analyses of selected rock samples from the Emigrant Trail study area and vicinity, Humboldt, Pershing, and Washoe Counties, Nevada

[Map numbers on pl. 1; <, less than; all analyses in %; header abbreviations in appendix, "Sampling Procedures and Analytical Methods"; descriptions of samples in table A-2]

Map No.	Sample	Al_2O_3	SiO_2	CaO	Fe_2O_3	K_2O	MgO	MnO	Na_2O	P_2O_5	TiO_2	BaO	Cr_2O_3	S (Total)	LOI	Total
005	ETMM083	15.21	65.74	1.38	3.98	4.99	0.75	0.18	4.19	0.25	0.82	0.28	<0.01	0.04	2.87	100.63
050	ETRD052	2.46	90.62	<0.01	4.16	0.98	0.11	<0.01	0.03	<0.03	0.13	0.03	0.04	1.65	1.94	100.50
099	ETMM026	10.64	70.96	0.37	11.07	<0.01	0.14	<0.01	0.28	0.09	0.33	0.02	<0.01	0.16	6.11	100.03
110	ETMM008	18.70	48.79	10.26	10.84	0.69	4.67	0.16	3.29	0.18	1.89	0.03	0.01	<0.02	0.71	100.23
111	ETRD007	13.66	70.59	0.64	1.52	5.59	0.13	0.02	3.19	0.02	0.08	0.04	<0.01	<0.02	4.30	99.79

Table A-7.--Analyses of selected samples for boron and lithium, Emigrant Trail study area and vicinity, Humboldt, Pershing, and Washoe Counties, Nevada

[Map nos. on pl. 1; <, less than; sample descriptions in table A-2; additional analyses in table A-3]

Map No.	Sample	B (ppm)	Li (ppm)
002	ETMM089	33	3
002	ETRD073	43	15
003	ETRD105	166	14
004	ETRD104	90	14
018	ETMM077	49	24
020	ETRD058	45	16
031	ETMM035	169	62
050	ETRD052	27	4
053	ETRD086	<10	7
084	ETMM048	51	7
084	ETRD047	11	5
095	ETRD039	43	14
096	ETRD025	32	17
098	ETRD084	215	50
104	ETMM001	233	35
107	ETRD001	287	42
107	ETRD003	248	36
107	ETRD006	129	5
108	ETMM007	73	4
114	ETMM020	24	5
116	ETMM019	84	3
120	ETRD011	406	10
121	ETMM011	92	8
128	ETRD080	100	21
128	ETRD081	24	16
136	ETCR050	20	5
143	ETWH006	123	19
156	ETCR045	25	25
172	ETWH002	<10	4

Table A-8.--Locational data for mineral sites in the Emigrant Trail study area and vicinity, Humboldt, Pershing, and Washoe Counties, Nevada

[Map nos. on pl. 1; mineral locality descriptions in table A-1; UTM metric coordinates reference grid 11; latitudes and longitudes reference 1927 North American Datum; Public Land Survey data reference Mount Diablo Prime Meridian and Baseline]

Map No.	MILS No.	UTM (East)	UTM (North)	Latitude (North)	Longitude (West)	Town ship (N)	Range (E)	Section	Subsection
001	320310300	282783	4633686	41.8272	119.6156	45	21	15	NW,NW,NW
002	320310084	284939	4631586	41.8089	119.5889	45	21	23	NE,SE,NW
003	320310362	264853	4605876	41.5719	119.8203	42	19	11	SW,SE
004	320310364	280841	4610961	41.6222	119.6306	43	21	28	NW
005	320310350	286175	4608055	41.5975	119.5656	43	21	36	NW, SE
006	320130558	308041	4606016	41.5847	119.3028	42	24	7	SE,SE,NE
007	320310366	305442	4602441	41.5519	119.3328	42	23	13	SE,NE,SW
008	320310361	303412	4603608	41.5619	119.3575	42	23	11	SW,SW,SW
009	320310347	298327	4602637	41.5519	119.4181	42	23	17	NW,SW,SW
010	320310359	295122	4601472	41.5406	119.4561	42	22	24	NW
011	320310334	289115	4597656	41.5047	119.5267	42	21	32	S2
012	320310333	287819	4595316	41.4833	119.5414	41	22	7	NW,SE,NE
013	320310342	292968	4596833	41.4983	119.4803	41	22	3	NE,SE,NE
014	320310335	291401	4595489	41.4858	119.4986	41	22	9	NE,NE,NE
015	320310341	290540	4594625	41.4778	119.5086	41	22	9	SE,NE,SW
016	320310340	290011	4593985	41.4719	119.5147	41	22	9	SW,SW
017	320310339	287456	4592371	41.4567	119.5447	41	22	19	NE,NW,NE
018	320310338	289049	4592224	41.4558	119.5256	41	22	20	N2
019	320310332	287871	4588247	41.4197	119.5383	41	22	31	NE,SE
020	320310324	289171	4585219	41.3928	119.5217	40.5	22	32	SE,SE,NE
021	320310326	290662	4583543	41.3781	119.5033	40.5	22	4	SE,NE
022	320310354	282330	4581777	41.3600	119.6022	40	21	27	NE
023	320310363	283020	4576822	41.3156	119.5922	39.5	21	26	SW
024	320310328	302352	4579137	41.3414	119.3622	40	23	28	SE
025	320130560	318080	4594245	41.4811	119.1789	41	25	7	E2,NW
026	320130554	324056	4593664	41.4772	119.1072	41	25	10	SE,NE
027	320130575	327548	4590158	41.4464	119.0644	41	26	19	SW,SW,NW
028	320130564	324673	4585717	41.4058	119.0975	40	25	3	NE

Table A-8.--Locational data, mineral sites, Emigrant Trail study area and vicinity--continued

Map No.	MILS No.	UTM (East)	UTM (North)	Latitude (North)	Longitude (West)	Town ship (N)	Range (E)	Section	Subsection
029	320130570	327279	4584821	41.3983	119.0661	40	25	1	SE,SE
030	320130577	318647	4584544	41.3939	119.1692	40	25	7	SE,NE,NE
031	320130562	314135	4581514	41.3656	119.2222	40	24	23	NE,NW
032	320130327	314298	4580698	41.3583	119.2200	40	24	23	C
033	320130550	310543	4579229	41.3442	119.2644	40	24	28	NW
034	320130567	317891	4576419	41.3206	119.1758	39	25	6	NW,NE
035	320130551	309818	4576493	41.3194	119.2722	39	24	5	NE
036	320130561	308588	4576525	41.3194	119.2869	39	24	6	NE
037	320130571	307726	4576581	41.3197	119.2972	39	24	6	NW
038	320130555	307274	4575305	41.3081	119.3022	39	24	6	SW
039	320130557	308272	4575334	41.3086	119.2903	39	24	6	SE
040	320310330	296065	4570577	41.2628	119.4344	39	23	30	NE,SW,NW
041	320310353	294090	4571000	41.2661	119.4581	39	22	13	NW
042	320310035	292729	4568849	41.2464	119.4736	39	22	23	NE,SW
043	320310358	290947	4570167	41.2578	119.4953	39	22	15	SE,SW
044	320310331	289439	4570210	41.2578	119.5133	39	22	16	S2
045	320310343	287568	4570165	41.2569	119.5356	39	22	17	SW
046	320310368	286733	4570322	41.2581	119.5456	39	22	18	SE
047	320310348	285722	4569885	41.2539	119.5575	39	21	24	NE,NE,NE
048	320310337	285636	4569210	41.2478	119.5583	39	21	24	NE,NE,SE
049	320310329	282523	4567235	41.2292	119.5947	39	21	26	NW,SW,SW
050	320310356	292427	4565613	41.2172	119.4761	39	22	35	SW,NE,SW
051	320130242	321968	4571219	41.2747	119.1256	39	25	15	SW
052	320130576	322833	4570276	41.2664	119.1150	39	25	22	SE
053	320130093	323656	4569667	41.2611	119.1050	39	25	13	S2
054	320130568	326420	4565313	41.2225	119.0708	38	25	1	SE
055	320130497	316620	4566875	41.2344	119.1881	39	25	31	sw
056	320130490	315242	4566454	41.2303	119.2044	38	24	1	NW
057	320130495	316519	4565555	41.2225	119.1889	38	24	1	SE
058	320130494	316445	4565246	41.2197	119.1897	38	24	1	S2

Table A-8.--Locational data, mineral sites, Emigrant Trail study area and vicinity--continued

Map No.	MILS No.	UTM (East)	UTM (North)	Latitude (North)	Longitude (West)	Town ship (N)	Range (E)	Section	Subsection
059	320130573	318902	4563863	41.2078	119.1600	38	25	8	W2
060	320130493	318359	4558911	41.1631	119.1650	38	25	29	W2
061	320310496	319809	4556064	41.1378	119.1469	37	25	5	NE
062	320130492	317772	4554226	41.1208	119.1706	37	25	7	NE
063	320310164	296049	4562522	41.1903	119.4319	38	23	7	NW,SE
064	320310344	296369	4562568	41.1908	119.4281	38	23	7	NE,SE
065	320310351	298938	4562564	41.1914	119.3975	38	23	9	SE,SE,NW
066	320130552	305225	4563226	41.1989	119.3228	38	23.5	14	NW,NE
067	320310357	305390	4562511	41.1925	119.3206	38	23.5	14	SE,NE
068	320310315	294314	4559048	41.1586	119.4514	38	22	24	SE
069	320310166	298866	4559044	41.1597	119.3972	38	23	21	W
070	320310336	299142	4559003	41.1594	119.3939	38	23	21	SE
071	320310346	298792	4559723	41.1658	119.3983	38	23	21	NE,NW
072	320310367	298256	4558849	41.1578	119.4044	38	23	23	C,SW
073	320310210	299134	4556259	41.1347	119.3931	38	23	33	NE
074	320310345	300105	4556754	41.1394	119.3817	38	23	34	NE,NW,NW
075	320310360	302511	4557522	41.1469	119.3533	38	23	26	NW,NE,SE
076	320310365	305745	4558180	41.1536	119.3150	38	23.5	36	C,NW,NW
077	320130569	306943	4557748	41.1500	119.3006	38	23.5	36	SE,SE,NE
078	320130588	305879	4555310	41.1278	119.3125	37	23.5	1	SW
079	320310081	298235	4552306	41.0989	119.4025	37	23	17	NE,SW,SW
080	320310349	300235	4552006	41.0967	119.3786	37	23	15	NE,NE
081	320310082	298043	4552067	41.0967	119.4047	37	23	16	NW,NW,NW
082	320130582	309696	4554154	41.1183	119.2667	37	24	11	NW,SE
083	320130581	307768	4552727	41.1050	119.2892	37	24	18	C
084	320130572	308746	4550568	41.0858	119.2769	37	24	23	NW
085	320130574	305951	4548209	41.0639	119.3094	37	23.5	36	NW
086	320130586	312804	4541276	41.0031	119.2258	36	24	23	NW
087	320310327	302061	4546146	41.0444	119.3550	37	23	35	SE,NW,SE
088	320310352	302638	4546041	41.0436	119.3481	37	23	36	SW,NW,SW

Table A-8.--Locational data, mineral sites, Emigrant Trail study area and vicinity--continued

Map No.	MILS No.	UTM (East)	UTM (North)	Latitude (North)	Longitude (West)	Town ship (N)	Range (E)	Section	Subsection
089	320130579	308195	4542039	41.0089	119.2808	36	24	17	NW
090	320130553	305793	4541580	41.0042	119.3092	36	23.5	13	SE
091	320310355	302962	4538045	40.9717	119.3417	36	23	25	SW,SE,NW
092	320130587	306145	4538971	40.9808	119.3042	36	24	25	SE
093	320130585	308856	4537056	40.9642	119.2714	36	24	32	SE
094	320270769	310189	4532577	40.9242	119.2542	35	24	16	NE
095	320270788	307981	4531268	40.9119	119.2800	35	24	20	NE,NE,NW
096	320270754	309291	4529446	40.8958	119.2639	35	24	28	NW,NE,NW
097	320270783	310148	4531645	40.9158	119.2544	35	24	16	SE
098	320270752	313044	4527872	40.8825	119.2189	35	24	35	E2,NW,NE
099	320270758	314185	4532965	40.9286	119.2069	35	24	12	NW,SE,SW
100	320130563	315937	4536687	40.9625	119.1872	36	25	31	SE,SW
101	320130578	319242	4541603	41.0075	119.1494	36	25	17	SE
102	320130583	318835	4544202	41.0308	119.1550	36	25	8	SE
103	320130584	317287	4544862	41.0364	119.1736	36	25	7	NE
104	320130326	329791	4546161	41.0508	119.0253	36	26	4	SW,NE,NW
105	320130559	330735	4545561	41.0456	119.0139	36	26	4	SE
106	320130580	332022	4543710	41.0292	118.9981	36	26	10	SW,NE,SE
107	320130566	332686	4540762	41.0028	118.9894	36	26	23	NW,NW
108	320270749	331115	4537588	40.9739	119.0072	36	26	34	NE,NW
109	320130556	331976	4536547	40.9647	118.9967	36	26	34	NW,NW,SE
110	320270784	332970	4533991	40.9419	118.9842	35.5	27	32	SW
111	320130565	336783	4547512	41.0644	118.9425	37	27	30	SE
112	320310325	294002	4532024	40.9153	119.4461	35	22	13	NW,SW,SW
113	320310265	303461	4525810	40.8617	119.3319	34	23	2	NW,NE,SE
114	320270755	313109	4523771	40.8456	119.2169	34	24	11	SE
115	320270797	312423	4523655	40.8444	119.2250	34	24	11	NE,NE,SW
116	320270753	311842	4522037	40.8297	119.2314	34	24	14	W2
117	320270786	307400	4517064	40.7839	119.2825	34	24	33	SE,SW
118	320310264	300003	4503617	40.6611	119.3658	32	23	15	NE,NW,NW

Table A-8.--Locational data, mineral sites, Emigrant Trail study area and vicinity--continued

Map No.	MILS No.	UTM (East)	UTM (North)	Latitude (North)	Longitude (West)	Town ship (N)	Range (E)	Section	Subsection
119	320270801	308122	4509735	40.7181	119.2717	33	24	10	SE
120	320270005	311680	4508378	40.7067	119.2292	33	24	23	SW
121	320270559	321452	4515378	40.7719	119.1156	34	26	31	NW
122	320270765	328568	4515643	40.7758	119.0314	34	26	35	NW,NE
123	320270763	330640	4515751	40.7772	119.0069	34	26	36	NE
124	320270760	330620	4517084	40.7892	119.0075	34	27	30	NW
125	320270766	330989	4515865	40.7783	119.0028	34	27	32	NW
126	320270750	334267	4516724	40.7867	118.9642	34	27	28	NW
127	320270799	336761	4515736	40.7783	118.9344	34	27	27	SW
128	320270768	351994	4522578	40.8428	118.7556	34	29	5	W2
129	320270225	354970	4518666	40.8081	118.7194	34	29	16	E
130	320270779	356597	4516813	40.7917	118.6997	34	29	23	SW
131	320270693	354469	4515921	40.7833	118.7247	34	29	28	E2
132	320270659	353584	4515139	40.7761	118.7350	34	29	33,28	NE,NW,NW; SE,SW
133	320270577	355410	4514826	40.7736	118.7133	34	29	34	E2,NW
134	320270100	351921	4513040	40.7569	118.7542	33	29	5	NW
135	320270796	356584	4512649	40.7542	118.6989	33	29	2	N2
136	320270756	353893	4511990	40.7478	118.7306	33	29	8	NE,SW,SW
137	320270794	352510	4510785	40.7367	118.7467	33	29	8	NE,SW,SW
138	320130498	357162	4525531	40.8703	118.6950	35	29	34	E2
139	320270775	359174	4521883	40.8378	118.6703	34	29	1	SE,SW
140	320130409	360155	4521553	40.8350	118.6586	34	29	1	SSE
141	320270227	360174	4518965	40.8117	118.6578	34	29	13	W,NE
142	320270781	361002	4518139	40.8044	118.6478	34	30	19	N2
143	320270777	358521	4515910	40.7839	118.6767	34	29	25	NW
144	320270007	359249	4516917	40.7931	118.6683	34	29	24	SE
145	320270792	361299	4516412	40.7889	118.6439	34	30	30	NW,NE
146	320270793	360537	4515838	40.7836	118.6528	34	30	30	SW
147	320270798	358060	4513908	40.7658	118.6817	34	29	36	SW,NW,SW
148	320270751	362709	4515053	40.7769	118.6269	34	30	29	SE

Table A-8.--Locational data, mineral sites, Emigrant Trail study area and vicinity--continued

Map No.	MILS No.	UTM (East)	UTM (North)	Latitude (North)	Longitude (West)	Town ship (N)	Range (E)	Section	Subsection
149	320270101	364257	4515247	40.7789	118.6086	34	30	28	SE,SW
150	320270770	374002	4518894	40.8133	118.4939	34	31	16	SE,SE,NW
151	320270767	361401	4511935	40.7486	118.6417	33	30	6	SE
152	320270764	369488	4515553	40.7825	118.5467	34	31	30	W
153	320270790	369191	4513059	40.7600	118.5497	33	30	1	SW,NW,NE
154	320270757	368396	4512085	40.7511	118.5589	33	30	1	SW,NW,SW
155	320270782	363402	4510976	40.7403	118.6178	33	30	8	SW,NE
156	320270573	366038	4510129	40.7331	118.5864	33	30	10	SE
157	320270099	364098	4509353	40.7258	118.6092	33	30	16	C
158	320270795	366768	4508905	40.7222	118.5775	33	30	14	NE,SW,SW
159	320270778	360027	4504931	40.6853	118.6564	33	30	31	SW,NW
160	320270776	367927	4506630	40.7019	118.5633	33	30	26	SE,NE,NE
161	320270774	368819	4506892	40.7044	118.5528	33	30	24	SW,SW,SE
162	320270761	370942	4508898	40.7228	118.5281	33	31	18	SE,NW,SE
163	320270762	371236	4509259	40.7261	118.5247	33	31	18	NE
164	320270450	369084	4505599	40.6928	118.5494	33	30	25	SW,SE
165	320270112	369511	4505836	40.6950	118.5444	33	30	25	NE,SE
166	320270240	369918	4504962	40.6872	118.5394	33	31	31	SE,NW,NW
167	320270789	371429	4504348	40.6819	118.5214	33	31	32	NE,NW,SW
168	320270759	369454	4502628	40.6661	118.5444	32	31	6	SW,NE,SW
169	320270772	377235	4510423	40.7375	118.4539	33	31	11	C
170	320270804	376425	4508405	40.7192	118.4631	33	31	14	All
171	320270800	376349	4507906	40.7147	118.4639	33	31	23	NW,SW,NW
172	320270241	374522	4503773	40.6772	118.4847	33	31	34	SE
173	320270771	373379	4503182	40.6717	118.4981	32	31	2	E2
174	320270802	375111	4502619	40.6669	118.4775	32	31	3	E2
175	320270042	375842	4502885	40.6694	118.4689	32	31	2	C,S2,NW
176	320270787	374906	4501457	40.6564	118.4797	32	31	10	NE,SW,NE
177	320270791	375803	4500520	40.6481	118.4689	32	31	11	NE,SW,SW
178	320270805	376151	4501558	40.6575	118.4650	32	31	11	SE,NE,NW

Table A-8.--Locational data, mineral sites, Emigrant Trail study area and vicinity--continued

Map No.	MILS No.	UTM (East)	UTM (North)	Latitude (North)	Longitude (West)	Town ship (N)	Range (E)	Section	Subsection
179	320270243	377643	4502366	40.6650	118.4475	32	31	1	SW
180	320270785	384236	4506513	40.7033	118.3703	33	32	33	NE,SE,NE
181	320270475	398155	4504799	40.6897	118.2053	33	33	1	NE
182	320270029	397251	4510363	40.7397	118.2169	33	33	12	W2,W2
183	320270464	398008	4509520	40.7322	118.2078	33	33	13	N2
184	320270276	394265	4505286	40.6936	118.2514	33	33	27	W2
185	320270246	380966	4497072	40.6178	118.4072	32	32	20	SW,SW,SW
186	320270263	379788	4488019	40.5361	118.4194	31	32	19	NW,NE,SE
187	320270780	359100	4499275	40.6342	118.6661	32	29	1	SE,NE,NW
188	320270169	360353	4499773	40.6389	118.6514	32	30	18	
189	320270803	352151	4490181	40.5511	118.7461	31	29	17	NE,NW,SE
190	320270773	353523	4487133	40.5239	118.7292	31	29	28	SW,SW,NE

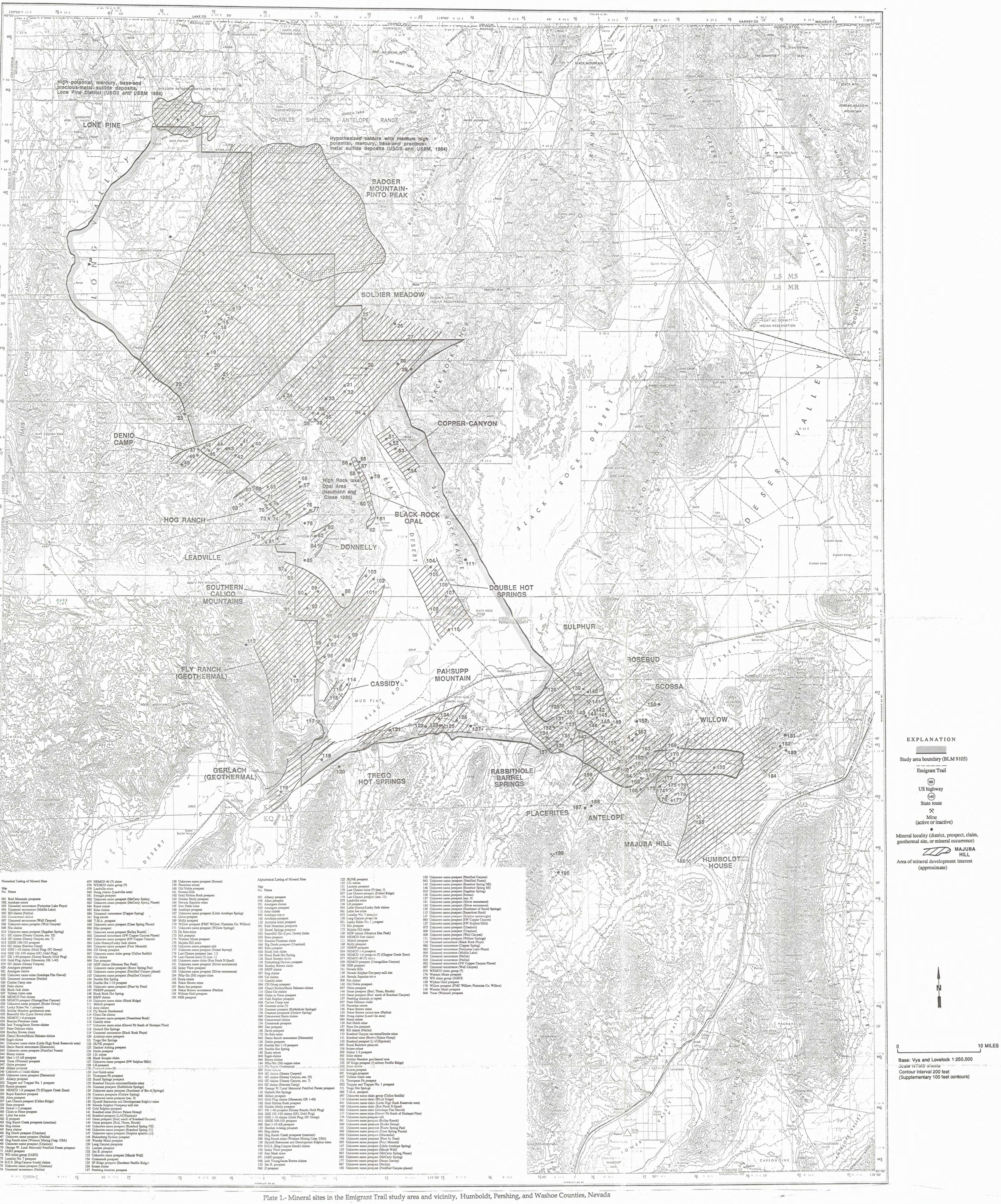


Plate 1.- Mineral sites in the Emigrant Trail study area and vicinity, Humboldt, Pershing, and Washoe Counties, Nevada