U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

MINERAL SUMMARIES

U.S. Bureau of Land Management Wilderness Study Areas in California outside the California Desert

Vol. 3

Edited by

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U.S. Geological Survey Open-File Report 90-0096

Prepared by the U.S. Geological Survey and the U.S. Bureau of Mines

for the U.S. Bureau of Land Management

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1990

CONTENTS

Contents (continued)

Contents (continued)

TABLES

FIGURES

INTRODUCTION

The U.S. Geological Survey (Menlo Park, CA) in cooperation with the U.S. Bureau of Mines (Spokane, WA) prepared this mineral "Briefing Book," that summarizes the mineral resource evaluations on 81 wilderness study areas in or administered from California outside the California Desert. These areas are lands administered by the U.S. Bureau of Land Management. All but two of these areas are classified as wilderness study areas; two exceptions are instant study areas. Interspersed throughout many of the federal lands are parcels of private and State land.

This third and final volume for California U.S. Bureau of Land Management wilderness study areas supplements the first two volumes prepared by the U.S. Bureau of Mines in cooperation with the U.S. Geological Survey as background data for the proposed California Desert Protection Act (S-7, 1987; S-11, 1989).

This volume covers a total of 1,255,432 acres. The mineral resource information was requested under the Federal Land Policy and Management Act (Public Law 94-579, October 21, 1976), which required the U.S. Geological Survey and U.S. Bureau of Mines to conduct mineral surveys on all or parts of 19 areas to determine the mineral values, if any, that may be present. The U.S. Bureau of Land Management requested studies of wilderness study areas in and administered from California outside the California Desert, that total 327,912 acres. These consist of 7 areas that total 72,997 acres and parts of 12 areas that total 254,915 acres. This briefing book additionally contains information on 927,520 acres that consist of the 62 remaining study areas that total 624,348 acres and the unstudied parts of 12 areas that total 303,172 acres. However, the mineral information on the areas that were not studied is tenuous and based on literature searches and, where applicable, discussions with private industry. Table 1 is a list of the U.S. Bureau of Land Management wilderness study areas covered in this volume, along with their number, acreages, and whether they were studied by the U.S. Geological Survey and U.S. Bureau of Mines.

Format of Briefing Book

Each mineral summary in this book includes text describing the identified resources, mineral resource potential, mining activity, mineral setting, recommendations for further study, and references. Each summary also has a map showing significant mines and prospects in and near the proposed wilderness, along with an indication of the potential for undiscovered resources. Identified resources and areas of high resource potential are shown in red; areas of moderate resource potential are shown in pink. Undiscovered resources are studied by the U.S. Geological Survey and identified mineral resources are studied by the U.S. Bureau of Mines.

Table 2 lists the study areas covered in this volume and shows those which have identified resources or areas of moderate or high mineral resource potential. Table 3 lists designated strategic and critical minerals and table 4 contains a list of mineral commodities in the wilderness study areas, their import reliance, major foreign sources, and principal uses. A geologic time chart is included in the back of this book for reference.

Classification of Mineral Resources

According to a Memorandum of Understanding, the U.S. Bureau of Mines is responsible for studying the known, or identified resources, and the U.S. Geological Survey is responsible for studying unknown, or the undiscovered resources of a study area. The resource classification used by the U.S. Bureau of Mines and the mineral resource classification used by the U.S. Geological Survey are presented in figures 1 and 2.

List of Measurement Abbreviations Used in This Book

ft	foot
lb	pound
lb/ton	pound per ton
Ma	million years
mi	mile
mi^2	square mile
oz	troy ounce
oz/ton	troy ounce per ton
ppm	part per million
stu	short ton unit
yd^2	square yard
yd^3	cubic yard
%	percent

Other Abbreviations Used in This Book

BLM	U.S. Bureau of Land Management
MILS	U.S. Bureau of Mines Mineral Industry Location System
MRDS	U.S. Geological Survey Mineral Resources Data System
USBM	U.S. Bureau of Mines
USFS	U.S. Forest Service
USGS	U.S. Geological Survey

MINERAL SUMMARY FOR THE STATE OF CALIFORNIA OUTSIDE THE CALIFORNIA DESERT

The State of California has an impressive mineral wealth. The State led the Nation in production of nonfuel minerals in 1986. It is the sole producer of boron minerals and ranked first nationwide in production of asbestos, portland cement, diatomite, calcined gypsum, rare-earth concentrates, construction sand and gravel, sodium compounds, and tungsten. The State ranked second in production of natural calcium chloride, gold, magnesium compounds, and sodium carbonate. The State's gold production increased over 100 percent from 1985 to 1986 (all data from Minerals Yearbook, vols. 1 and 2, 1986, by U.S. Bureau of Mines).

Many of the wilderness Study areas in California are in near vicinity to areas of mineral production; however, the only identified or known resources in the study areas are antimony, building stone, chromium, cinders, cobalt, geothermal energy, gold, gravel, manganese, mercury, nickel, perlite, pozzolan, pumice, sand, silver, sulphur, tungsten, and zeolites. (table 2). A total of 22 wilderness study areas have potential for undiscovered resources of antimony, building stone, chromium, cinders, clay, cobalt, geothermal energy, gold, mercury, nickel, oil and gas, pumice, silver, sulphur, and (or) zeolites. There are an additional 45 study areas have moderate potential for undiscovered resources of antimony, asbestos, barite, building stone, chromite, clay, copper, diatomite, feldspar, gemstone, geothermal energy, gold, iron, jade, lead, limestone, lithium, manganese, mercury, molybdenum, nickel, oil and gas, perlite, phosphorous, pozzolan, sand and gravel, silver, titanium, tungsten, uranium, zeolites, and (or) zinc.

Table 1.--Table listing U.S. Bureau of Land Management wilderness study areas in California outside the California Desert, their numbers and acreages, and whether they were studied by the U.S. Geological Survey and U.S. Bureau of Mines

Name	Number	Acres	Studied
Agua Tibia	CA-060-002	360	no
Bear Canyon	CA-040-305C	318	no
Bear Mountain	CA-040-305B	3,198	no
Beauty Mountain G	CA-060-020G	11,342	no
Benton Range	CA-010-077	4,052	no
Big Butte	CA-050-211	9,536	no
Bitterbrush	CA-020-604	640	no
Black Butte	CA-040-305A	40	no
Black Canyon	CA-010-065	6,518	no
Black Mountain	CA-010-020	150	no
Bodie	CA-010-100	15,445	no
Bodie Mountains	CA-010-099	6,600	no
Buffalo Hills	CA-020-619	47,315	no
Caliente Mountain	CA-010-042	19,018	no
Carson Iceberg	NV-030-532	550	yes
Casa Diablo	CA-010-082	5,547	no
Cedar Roughs	CA-050-331	7,183	no
Chemise Mountain ISA	CA-050-111	3,941	partially
Chidago Canyon	CA-010-079	20,246	no
Coyote Southeast	CA-010-063	3,211	no
Crater Mountain	CA-010-062	6,760	no
Dry Valley Rim	CA-020-615	93,205	partially
East Fork High Rock Canyon	CA-020-914/NV-020-006A	52,000	partially
Eden Valley	CA-050-214	6,674	no
Excelsior	CA-010-088	9,383	no
Fish Slough	CA-010-080	14,450	no
Five Springs	CA-020-609	47,160	no
Garcia Mountain	CA-010-012	78	no
Granite Mountains	CA-010-090	52,781	no
Hauser Mountain C	CA-060-027C	5,489	no
High Rock Canyon	CA-020-913B	33,300	partially
Independence Creek	CA-010-057	6,250	no
King Range	CA-050-112	31,709	yes
Laurel-McGee	CA-010-072	110	no
Lava	CA-030-203	11,632	no
Little High Rock Canyon	CA-020-913	52,143	partially
Masonic Mountains	CA-010-102	6,600	no
Massacre Rim	CA-020-1013	110,000	partially
Merced River	CA-040-203	12,835	no
Milk Ranch/Case Mountain	CA-010-023	8,970	no
Morman Meadow	CA-010-094	7,280	no

Table 1.--(continued)

Name	Number	Acres	Studied
Moses	CA-010-025	558	no
Mt. Biedeman	CA-010-095	12,420	no
Paiute	CA-010-060	5,100	no
Panoche Hills North	CA-040-301A	6,670	no
Panoche Hills South	CA-040-301B	11,267	no
Pinnacles Contiguous	CA-040-303	5,838	partially
Pit River Canyon	CA-020-103	11,575	partially
Piute Cypress ISA	CA-010-046	5,213	no
Poodle Mountains	CA-020-618/621	25,000	no
Red Mountain	CA-050-132	6,244	no
Rocky Creek/Cache Creek	CA-050-317	33,582	no
San Benito	CA-040-309	1,500	no
San Felipe Hills	CA-060-023	5,325	no
San Ysidro Mountain	CA-060-022	2,125	no
Sawtooth Mountain A	CA-060-024A	3,883	no
Sawtooth Mountain C	CA-060-024C	2,454	no
Sheep Ridge	CA-010-022	5,102	no
Sheldon Contiguous	CA-020-1012	24,130	partially
Skedaddle	CA-020-612	60,960	partially
Slinkard	CA-010-105/NV-030-531	6,350	no
South Warner Contiguous	CA-020-708	4,330	yes
Southern Otay Mountain	CA-060-029	7,940	yes
Sweetwater	CA-010-103	960	no
Symmes Creek	CA-010-064	7,700	no
Table Mountain	CA-060-026	1,018	no
Thatcher Ridge	CA-050-212	17,187	no
Timbered Crater	CA-030-201	18,095	yes
Tule Mountain	CA-020-211	17,860	no
Tunnel Ridge	CA-030-402	4,623	yes
Tunnison Mountain	CA-020-311	20,650	partially
Twin Peaks	CA-020-619A	90,345	partially
Ventana Wilderness Contiguous	CA-040-308	676	no
Volcanic Tablelands	CA-010-081	11,840	no
Walford Springs	CA-010-092	13,200	no
Wall Canyon	CA-020-805	45,790	no
Western Otay Mountain	CA-060-028	5,750	yes
Wheeler Ridge	CA-010-068	3,197	no
White Mountain	CA-010-075	1,260	no
Yellow Rock Canyon	CA-020-913A	13,050	no
Yolla Bolly Contiguous	CA-030-501	646	no

Table 2.–U.S. Bureau of Land Management wilderness study areas with identified resources (known) or with high or moderate mineral resource potential (undiscovered)

Wilderness study area	Number	Identified resources (known)	Mineral resource potential (undiscovered)	
			High	Moderate
Agua Tibia	CA-060-002	none		
Bear Canyon	CA-040-305C	none		
Bear Mountain	CA-040-305B	none		
Beauty Mountain G	CA-060-020G	tungsten, gold		tungsten, gold
Benton Range	CA-010-077	pumice, geothermal	geothermal	gold, silver, lead
Big Butte	CA-050-211	none		
Bitterbrush	CA-020-604	none		
Black Butte	CA-040-305A	none		
Black Canyon	CA-010-065	none		gold, silver, tungsten, lead, zinc, barite
Black Mountain	CA-010-020	none		
Bodie	CA-010-100	gold, silver	gold, silver	
Bodie Mountains	CA-010-099	sulphur, manganese, mercury, antimony	gold, silver, mercury, antimony, sulphur, geothermal	manganese
Buffalo Hills	CA-020-619	none		gold, silver, copper, lead, zinc, clay, zeolites, pozzolan
Caliente Mountain	CA-010-042	none	oil, gas	phosphorous
Carson Iceberg	NV-030-532	none		
Casa Diablo	CA-010-082	none		gold, silver, copper, lead
Cedar Roughs	CA-050-331	none		
Chemise Mountain ISA	CA-050-111	none		
Chidago Canyon	CA-010-079	none	building stone	gold, silver, lead, tungsten
Coyote Southeast	CA-010-063	none		geothermal
Crater Mountain	CA-010-062	none	cinders	gold, silver, copper, geothermal
Dry Valley Rim	CA-020-615	zeolites, perlite		zeolites
East Fork High Rock Canyon	CA-020-914/NV-020-006A	none		gold, silver, mercury, zeolites
Eden Valley	CA-050-214	none		
Excelsior	CA-010-088	none		geothermal
Fish Slough	CA-010-080	none	building stone	
Five Springs	CA-020-609	clay	clay	
Garcia Mountain	CA-010-012	none		
Granite Mountains	CA-010-090	sand, gravel	geothermal	molybdenum, uranium, sand, gravel
Hauser Mountain C	CA-060-027C	none		
High Rock Canyon	CA-020-913B	none	zeolites	gold, silver, mercury
Independence Creek	CA-010-057	none		
King Range	CA-050-112	none		
Laurel-McGee	CA-010-072	sand, gravel	geothermal	
Lava	CA-030-203	cinders		gold, geothermal, oil, gas, zeolites, cinders
Little High Rock Canyon	CA-020-913	none		gold, silver
Masonic Mountains	CA-010-102	none	mercury, geothermal	gold, silver
Massacre Rim	CA-020-1013	none		gold, silver, mercury, uranium
Merced River	CA-040-203	none	gold, silver	copper, jade
Milk Ranch/Case Mountain	CA-010-023	none		uranium, feldspar
Morman Meadow	CA-010-094	none	gold, silver, geothermal	
Moses	CA-010-025	none		
Mt. Biedeman	CA-010-095	none	gold, silver, geothermal	
Palute	CA-010-060	none	cinders	geothermal
Panoche Hills North	CA-040-301A	none		diatomite, oil, gas

Table 2.–(continued)

Wilderness study area	Number	Identified resources (known)	Mineral resource potential (undiscovered)	
			High	Moderate
Panoche Hills South	CA-040-301B	none		diatomite, oil, gas
Pinnacles Contiguous	CA-040-303	none		
Pit River Canyon	CA-020-103	none		
Piute Cypress ISA	CA-010-046	none		gold, silver, tungsten
Poodle Mountains	CA-020-618/621	none		gold, silver, copper, lead, zinc, iron, titanium, perlite, clay, zeolite, pozzolan
Red Mountain	CA-050-132	nickel, cobalt, chromium	nickel, cobalt, chromium	
Rocky Creek/Cache Creek	CA-050-317	none		gold, silver, mercury, geothermal
San Benito	CA-040-309	none	gold, silver, mercury	chromite, clay, gemstone, asbestos
San Felipe Hills	CA-060-023	none		tungsten
San Ysidro Mountain	CA-060-022	none		gold, tungsten, limestone, geothermal
Sawtooth Mountain A	CA-060-024A	none		gold, tungsten, gemstone
Sawtooth Mountain C	CA-060-024C	none		tungsten, molybdenum
Sheep Ridge	CA-010-022	none		tungsten, molybdenum
Sheldon Contiguous	CA-020-1012	none		
Skedaddle	CA-020-612	perlite	gold, silver, mercury, antimony	gold, silver, mercury, antimony, perlite, geothermal
Slinkard	CA-010-105/NV-030-531	none		
South Warner Contiguous	CA-020-708	none		
Southern Otay Mountain	CA-060-029	none		
Sweetwater	CA-010-103	none		gold, silver, geothermal
Symmes Creek	CA-010-064	none		
Table Mountain	CA-060-026	none		manganese, nickel, tungsten, feldspar
Thatcher Ridge	CA-050-212	none		oil, gas, geothermal
Timbered Crater	CA-030-201	building stone		building stone, geothermal
Tule Mountain	CA-020-211	none		
Tunnel Ridge	CA-030-402	none		
Tunnison Mountain	CA-020-311	none		
Twin Peaks	CA-020-619A	pozzolan		gold
Ventana Wilderness Contiguous	CA-040-	none		
Volcanic Tablelands	CA-010-081	none	building stone	geothermal
Walford Springs	CA-010-092	none	geothermal	
Wall Canyon	CA-020-805	none		gold, silver, mercury, zeolites, uranium clay, pozzolan
Western Otay Mountain	CA-060-028	none		
Wheeler Ridge	CA-010-068	none		geothermal
White Mountain	CA-010-075	none	pumice	silver, zinc, copper
Yellow Rock Canyon	CA-020-913A	none		gold, silver, mercury, uranium, lithium, zeolites
Yolla Bolly Contiguous	CA-030-501	none		

Table 3. --Mineral Commodities designated strategic and critical

1. Aluminum/Bauxite
2. Antimony*
3. Asbestos*
4. Beryllium/Beryl
5. Bismuth
6. Cadmium
7. Chromium/Chromite*
8. Cobalt*
9. Columbium (Niobium)
10. Copper*
11. Diamond
12. Fluorspar
13. Germanium
14. Graphite
15. Lead*
16. Manganese*
17. Mercury*
18. Mica
19. Molybdenum*
20. Nickel*
21. Platinum (iridium, platinum, palladium)
22. Quartz crystals
23. Rutile
24. Sapphire/Ruby (Corundum)
25. Silver*
26. Talc
27. Tantalum
28. Thorium
29. Tin
30. Tungsten*
31. Vanadium
32. Zinc*

*Indicates commodities that are identified or have moderate or high mineral resource potential in wilderness study areas in California outside the California Desert.

Table 4. Percent of U.S. Consumption from, Major Foreign Sources, and Principal Uses for Mineral Commodities Identified in U.S. Bureau of Land Management Wilderness Study Areas outside the California Desert

Metals and Minerals	Major Foreign Sources	Principal Uses
Net Exports		
Boron	Turkey, Italy, Argentina	Glass products (59%), soap and detergents (7%)
Clays	United Kingdom, Mexico, Canada	Paper, refactories, pottery, tile, fire bricks, foundry sand, drilling mud, absorbent uses, construction materials
Diatomite	Taiwan, Mexico	Filter aid (67%), fillers (17%)
Feldspar	Mexico, Venezuela	Glass (54%), pottery (46%)
Lithium	Chile, Zimbabwe, Canada	Ceramics and glass (40%), aluminum products and lubricants (45%)
Molybdenum	Canada, Mexico, Chile Federal Republic of Germany	Machinery (30%), oil and gas industry (15%), transportation (15%), chemical (15%), electrical (15%)
Phosphate Rock	Morocco, Republic of Togo, Netherlands, Antilles	Fertilizer (92%), chemicals (8%)
Sand and gravel	Canada, Australia, Antigua	Construction sand and gravel: concrete aggregate (28%), road base (15%), asphalt (10%), industrial sand and gravel: glass (40%), foundry (21%), abrasive (7%)
Talc and pyrophyllite	Canada, Italy, France	Talc: ceramics (35%), paints (17%), paper (13%), roofing (11%), pyrophyllite: ceramics (55%), refractories (17%), insecticides (11%)

Table 4. - (Continued)

Metals and Minerals	Major Foreign Sources	Principal Uses
0-25 Percent Net Import Reliance		
Beryllium	China, Brazil, Republic of South Africa, Switzerland	Alloy and oxides in electrical equipment and components (56%), nuclear reactors, aerospace (22%)
Cement	Canada, Mexico, Spain	Ready-mix concrete (72%), concrete products (12%)
Copper	Chile, Canada, Peru	Construction (42%), electrical and electronic (24%)
Gold	Canada, Switzerland (mostly) Republic of South Africa (origin), Uruguay	Jewelry and arts (59%), electronic (33%), dental (8%)
Lead (metal)	Canada, Mexico, Australia, Peru	Transportation with 70% in batteries and gasoline additives
Perlite	Greece	Building construction (70%), filter aid (12%)
Stone (crushed)	None	Construction aggregate (63%), cement and lime (11%); of the crushed stone, 72% was limestone-dolomite; 15% granite
26-50 Percent Net Import Reliance		
Gypsum	Canada, Mexico, Spain	Industrial and building plaster (77%), cement and agriculture (20%)
Iron ore	Canada, Venezuela, Liberia, Brazil	Blast furnaces (97.6%), steel furnaces (0.3%)
Pumice and pumicite	Greece	Concrete aggregate and building block (90%)
Stone (dimension)	Italy, Canada, Spain	Building construction (47%), monuments (26%), rubble (14%); of the total, 55% was granite, 25% limestone, 11% sandstone

Table 4. - (Continued)

Metals and Minerals	Major Foreign Sources	Principal Uses
51-90 Percent Net Import Reliance		
Asbestos	Canada, Republic of South Africa	Friction products (22%), roofing products (17%), asbestos-cement pipe (17%), coatings and compounds (15%)
Barite	China, Morocco, India	Weighting agent in drilling muds (65%), paints and rubber
Chromium	Republic of South Africa, Turkey, Zimbabwe, Yugoslavia	Chemical and metalurgical industry (90%), refractory industry (10%)
Nickel	Canada, Australia, Norway, Botswana	Stainless and alloy steel (39%), nonferrous alloys (28%), electroplating (22%)
Platinum-group metals	Republic of South Africa, United Kingdom, USSR	Automotive (42%), electrical and electronic (20%), dental and medical (20%)
Silver	Canada, Mexico, Peru, United Kingdom	Photography (45%), electrical and electronic (26%), electroplating and jewelry (13%)
Tungsten	Canada, China, Bolivia	Metalworking (76%), lamps and lighting (11%), electrified machinery (10%), transportation (9%)
Zinc	Canada, Peru, Mexico, Honduras	Construction materials (50%), transportations (23%), machinery (12%), electrical (10%)
Greater Than 91 Percent Net Import Reliance		
Graphite	Mexico, China, Brazil, Madagascar	Refractories (25%), lubricants (15%) foundry (14%), brake linings (13%)
Manganese	Republic of South Africa, Gabon, Australia, Brazil, France	Manganese ferroalloys, dry cell batteries, chemicals

Table 4. - (Continued)

Metals and Minerals	Major Foreign Sources	Principal Uses
Net Import Data Withheld		
Antimony	Bolivia, China, Mexico, Republic of South Africa, France	Flame retardants (65%), batteries (10%) chemicals (10%), ceramics and glass (5%)
Mercury	Spain, Algeria, Turkey,	Electrical (51%), chlorine productions (19%), paints (11%)
Thorium	France, Netherlands, Canada, Australia, United Kingdom	Nuclear fuel, incandescent lamp mantles, alloys, refractories, ceramics, welding electrodes
Minerals not listed in Mineral Commodity Summaries		
Uranium		Nuclear energy
Zeolite		Filter-aid, absorbents

Source: Adapted from U.S. Bureau of Mines, Mineral Commodity Summaries, 1987, 193 p.

RESOURCE/RESERVE CLASSIFICATION

	IDENTIFIED RESOURCES			UNDISCOVERED RESOURCES	
	Demonstrated		Inferred	Probability Range	
	Measured	Indicated		Hypothetical	Speculative
ECONOMIC	Reserves		Inferred Reserves		
MARGINALLY ECONOMIC	Marginal Reserves		Inferred Marginal Reserves		
SUB-ECONOMIC	Demonstrated Subeconomic Resources		Inferred Subeconomic Resources		

Major elements of mineral resource classification, excluding reserve base and inferred reserve base. Modified from McKelvey, V.E., 1972, Mineral resource estimates and public policy: American Scientist, v. 60, p. 32-40; and 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, p. 5.

Figure 1.--Resource/reserve classification.

DEFINITION OF LEVELS OF MINERAL RESOURCE POTENTIAL AND CERTAINTY OF ASSESSMENT

LEVELS OF RESOURCE POTENTIAL

H **HIGH** mineral resource potential is assigned to areas where geologic, geochemical, and geophysical characteristics indicate a geologic environment favorable for resource occurrence, where interpretations of data indicate a high degree of likelihood for resource accumulation, where data support mineral-deposit models indicating presence of resources, and where evidence indicates that mineral concentration has taken place. Assignment of high resource potential to an area requires some positive knowledge that mineral-forming processes have been active in at least part of the area.

M **MODERATE** mineral resource potential is assigned to areas where geologic, geochemical, and geophysical characteristics indicate a geologic environment favorable for resource occurrence, where interpretations of data indicate reasonable likelihood for resource accumulation, and (or) where an application of mineral-deposit models indicates favorable ground for the specified type(s) of deposits.

L **LOW** mineral resource potential is assigned to areas where geologic, geochemical, and geophysical characteristics define a geologic environment in which the existence of resources is permissive. This broad category embraces areas with dispersed but insignificantly mineralized rock, as well as areas with little or no indication of having been mineralized.

N NO mineral resource potential is a category reserved for a specific type of resource in a well-defined area.

U **UNKNOWN** mineral resource potential is assigned to areas where information is inadequate to assign a low, moderate, or high level of resource potential.

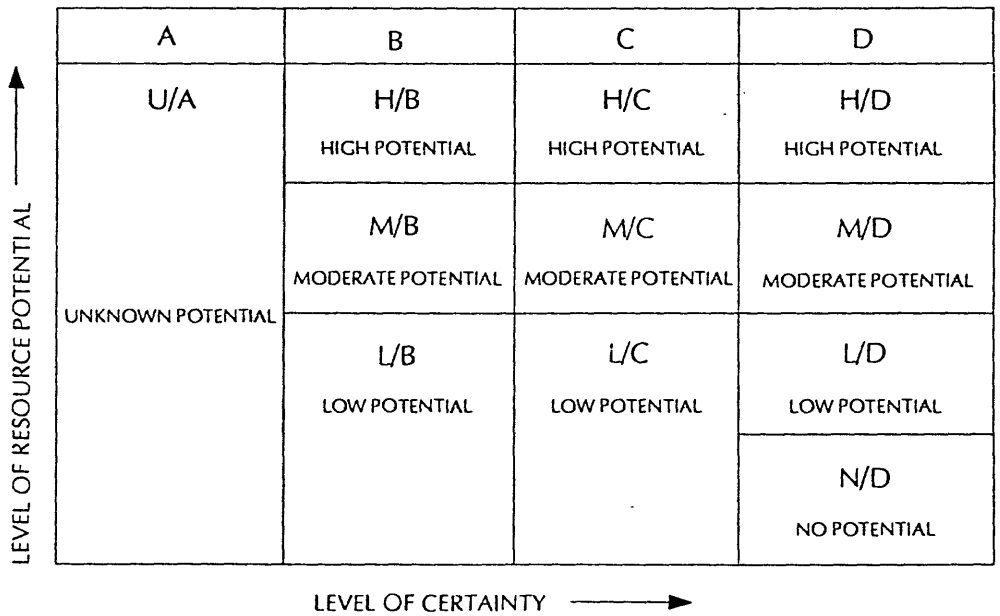
LEVELS OF CERTAINTY

A Available information is not adequate for determination of the level of mineral resource potential.

B Available information only suggests the level of mineral resource potential.

C Available information gives a good indication of the level of mineral resource potential.

D Available information clearly defines the level of mineral resource potential.



Abstracted with minor modifications from:

Taylor, R.B., and Steven, T.A., 1983, Definition of mineral resource potential: Economic Geology, v. 78, no. 6, p. 1268-1270.
Taylor, R.B., Stoneman, R.J., and Marsh, S.P., 1984, An assessment of the mineral resource potential of the San Isabel National Forest, south-central Colorado: U.S. Geological Survey Bulletin 1638, p. 40-42.
Goudarzi, G.H., compiler, 1984, Guide to preparation of mineral survey reports on public lands: U.S. Geological Survey Open-File Report 84-0787, p. 7, 8.

Figure 2.--Definition of levels of mineral resource potential and certainty of classification.

Wilderness Study Areas

(in order alphabetically)

Name: Agua Tibia
Number: CA-060-002
Size (acres): 360

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): No mineral resources have been identified within the wilderness study area. Gem- and lithium-bearing pegmatites are present in the Pala district about 6 mi to the south. However, no gem- or lithium-bearing pegmatites have been discovered in the wilderness study area.

Mineral resource potential (undiscovered): Stream-sediment sampling in the adjacent Agua Tibia Primitive area produced virtually no samples with anomalous concentrations of base or precious metals or indicator elements. The area has a low potential for semiprecious stones, lipidolite, or dimension stone such as have been produced from similar gabbro and pegmatites in the nearby Pala district.

Mining activity: There is no evidence of mining activity in the wilderness study area nor is it in any mining district. There are no current mining claims in the wilderness study area according to January, 1989, U.S. Bureau of Land Management records. Gems and lithium have been produced from pegmatites in the Pala mining district 6 mi south; gabbro for facing and dimension stone has been produced from the Magee quarry, 7 mi south of the wilderness study area.

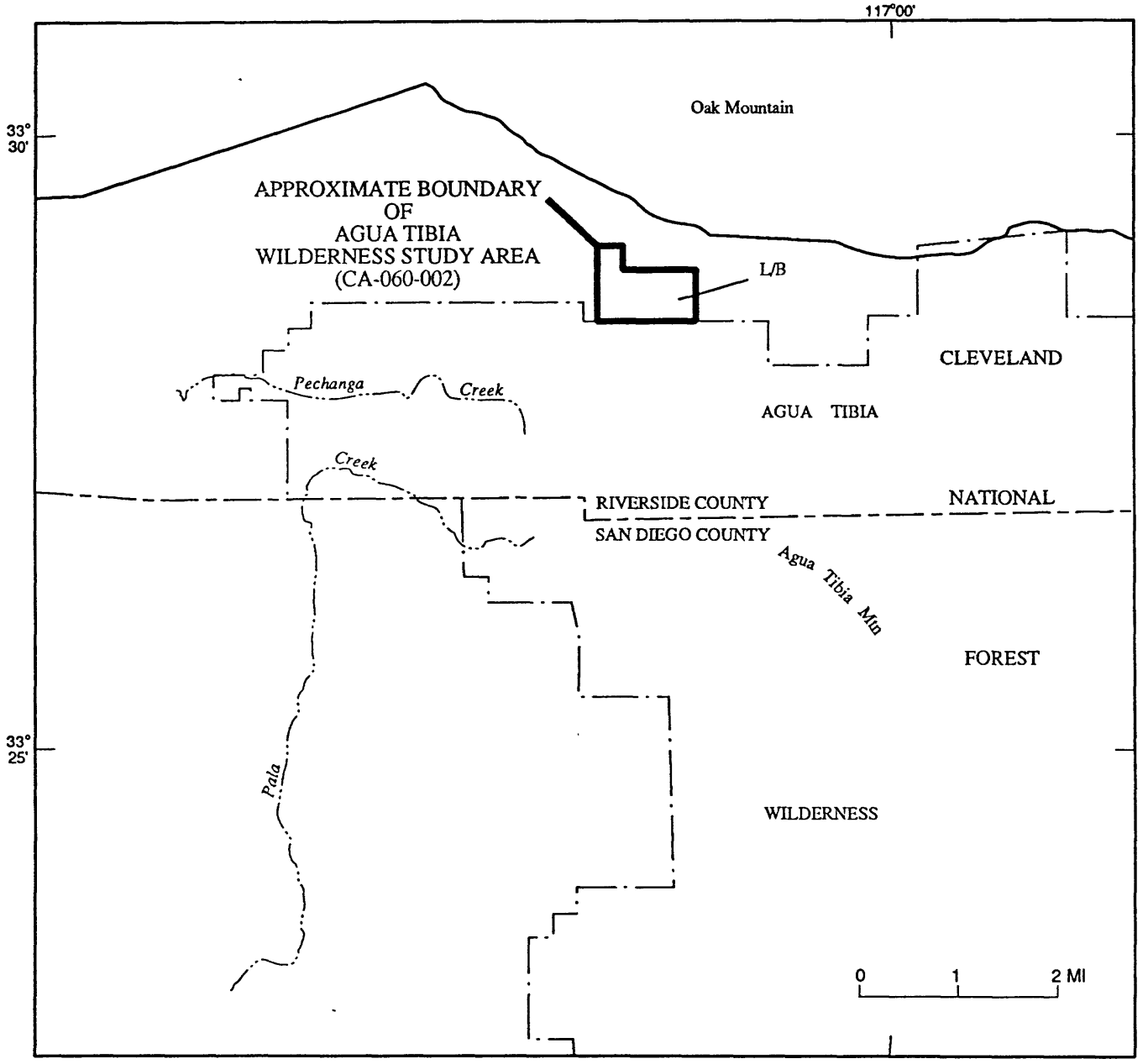
Mineral Setting: This area of about 1 mi^2 is located adjacent the north end of the Agua Tibia Primitive Area, part of Cleveland National Forest. It is underlain mostly or entirely by hornblende gabbro, probably part of the San Marcos Gabbro, and probably of Cretaceous age. A small part may be underlain by the Pleistocene Temecula Arkose. A normal fault separating these units is situated at or near the edge of the area.

Recommendations: The wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines to increase the certainty that the mineralization within the adjacent U.S. Forest Service lands extend into this U.S. Bureau of Land Management land.

References:

Cather, E.E., 1984, Mineral investigation of the Agua Tibia Wilderness Study Area (BLM No. 060-002), Riverside County, California: U.S. Bureau of Mines Open-File Report MLA 11-84, 8 p.

Irwin, W.P., Greene, R.C., and Thurber, H.K., 1970, Mineral resources of the Agua Tibia Primitive Area, California: U.S. Geological Survey Bulletin 1319-A, 18 p.



EXPLANATION

L/B, Geologic terrane having low mineral resource potential for semiprecious stones, lipidolite, and dimension stone with certainty level B

Mineral resources of the Agua Tibia Wilderness Study Area.

Name: Bear Canyon
Area number: CA-040-305C
Size (acres): 318

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): There are no known mineral occurrences or resources in the wilderness study area.

Mineral resource potential (undiscovered): The study area has low potential for chromium associated with small bodies of mafic or ultramafic rock. Significant deposits of other metallic elements are unlikely within the study area. Limestone if present, would occur in very small pendants. The area has low potential for geothermal resources. The lithologies present are unlikely to host resources of oil and gas.

Mining activity: There has been no known mineral production from the wilderness study area. No known prospecting or mining has been conducted in or adjacent to the wilderness study area, nor is it in any mining district. There are no current mining claims in the wilderness study area according to 1988 U.S. Bureau of Land Management records. Similar geologic settings in the region have been prospected for or produced oil and gas, coal, diatomite, building stone, limestone, dolomite, barite, copper, tungsten, molybdenum, and phosphate.

Mineral setting: The area is underlain by crystalline basement rocks of the Salinian block. Within the study area this basement is primarily composed of granodiorite, quartz monzonite, and quartz diorite intrusions. Small bodies of gabbro could be also be present. Metasedimentary rocks may occur as pendants within the intrusions in the southwestern corner of the area

Recommendations: The wilderness study area should be studied as part of a comprehensive mineral survey by the Bureau of Mines and Geological Survey.

References:

Jennings, C.W. and Strand, R.G., compilers, 1958, Santa Cruz sheet: California Division of Mines and Geology Geologic Map of California, scale 1:250,000.

Pearson, R.C., Hayes, P.T., and Fillo, P.V., 1967, Mineral resources of the Ventana Primitive Area, Monterey County, California: U.S. Geological Survey Bulletin 1261-B, 42 p.

Seiders, V.M., Esparza, L.E., Sabine, Charles, Spear, J.M., Stebbins, Scott, and Benham, J.R., 1983, Mineral resource potential map of part of the Ventana Wilderness and the Black Butte, Bear Mountain, and Bear Canyon Roadless Areas, Monterey County, California: U.S. Geological Survey Miscellaneous Field Studies Map MF-1559-A, scale 1:50,000.

Hart, E.W., 1966, Mines and mineral resources of Monterey County, California: California Division of Mines and Geology County Report No. 5, 142 p.

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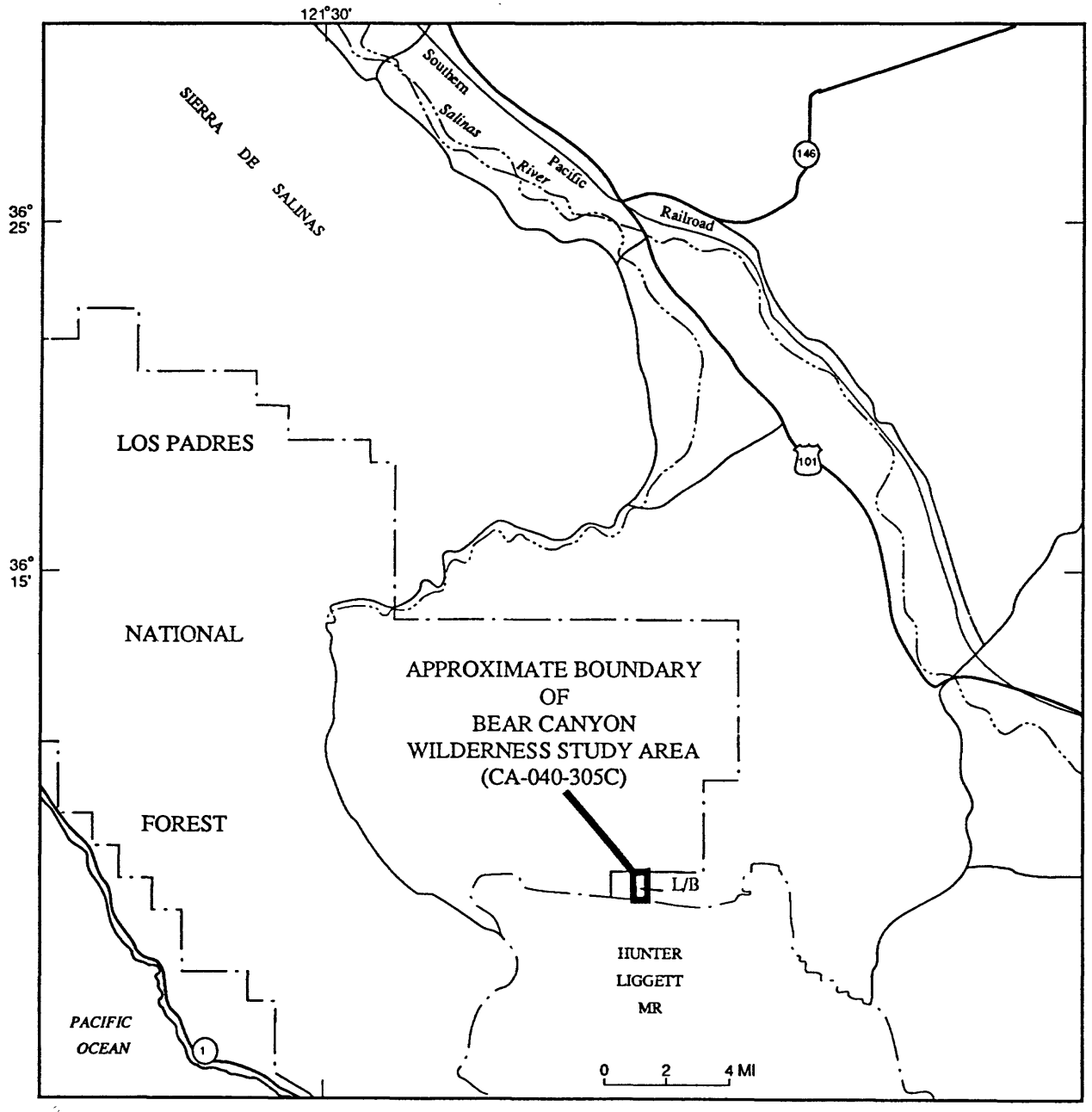


EXPLANATION

L/B Geologic terrane having low mineral resource potential for chromium and geothermal energy with certainty level B

Mineral resources of the Bear Canyon Wilderness Study Area.

Name: Bear Mountain
Area number: CA-040-305B
Size (acres): 3,198

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): There are no known mineral occurrences or resources in the wilderness study area.

Mineral resource potential (undiscovered): Marble is present in discontinuous bodies in metasedimentary sequence mentioned below. The southwest part of the area therefore has low resource potential for marble. Oil and gas is produced from the Monterey Formation in the Salinas Valley to the east, however the productive sandstone beds are not known to extend into the study area. The area is considered to have low potential for oil and gas and geothermal resources.

Mining activity: There has been no known mineral production from the wilderness study area. No known prospecting or mining has been conducted in or adjacent to the wilderness study area, nor is it in any mining district. There are no current mining claims in the wilderness study area according to 1988 U.S. Bureau of Land Management records. Similar geologic settings in the region have been prospected for or produced oil and gas, coal, diatomite, building stone, limestone, dolomite, barite, copper, tungsten, molybdenum, and phosphate.

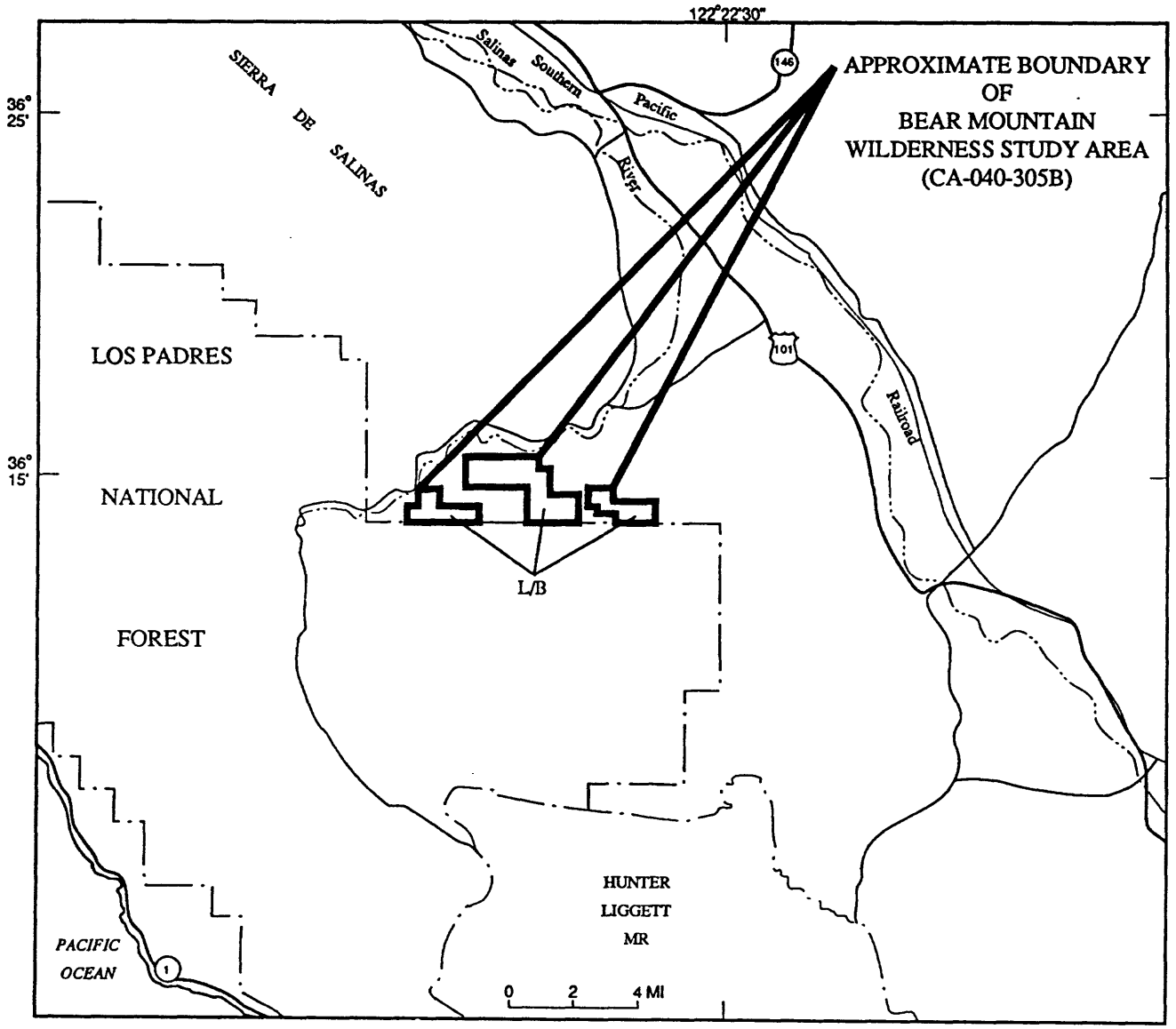
Mineral setting: Metamorphosed sedimentary rocks exposed in the southwest part of the study area are depositionaly overlain by lower to middle Tertiary marine sandstone, mudstone, and conglomerate. A fault juxtaposes these rocks against the middle to upper Tertiary Monterey Formation that underlies the majority of the study area. The Monterey Formation near the study area primarily consists of marine mudstone, to the east sandstone becomes more abundant.

Recommendations: The wilderness study area should be studied as part of a comprehensive mineral survey by the Bureau of Mines and Geological Survey. The sediments within the area should be studied to determine if organic content and porosity are sufficient to indicate a higher potential for oil and gas.

References:

Jennings, C.W. and Strand, R.G., compilers, 1958, Santa Cruz sheet: California Division of Mines and Geology Geologic Map of California, scale 1:250,000.

Seiders, V.M., Esparza, L.E., Sabine, Charles, Spear, J.M., Stebbins, Scott, and Benham, J.R., 1983, Mineral resource potential map of part of the Ventana wilderness and Black Butte, Bear Mountain, and Bear Canyon roadless areas, Monterey County, California; U.S. Geol. Surv. MF-1559-A.



EXPLANATION

L/B Geologic terrane having low mineral resource potential for chromium and geothermal energy with certainty level B

Mineral resources of the Bear Mountain Wilderness Study Area.

Name: Beauty Mountain G
Area number: CA-060-020G
Size (acres): 11,342

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): The wilderness study area is known to contain deposits of tungsten and minor amounts of gold.

Mineral resource potential (undiscovered): The area has moderate mineral resource potential for tungsten and gold.

Mining activity: Bureau of Mines records show six prospects for tungsten and gold. Bureau of Land Management reports one tungsten mine had production. In 1983, there were more than 30 placer claims and 11 lode claims recorded. According to January, 1989, U.S. Bureau of Land Management records, 17 current mining claims are located in the southeast corner of the wilderness study area.

Mineral setting: Mesozoic rocks are intruded by Cretaceous granitic rocks of the Peninsular Ranges batholith Cenozoic surficial deposits occur as well.

Recommendations: The combination of known commodities, a past-producing mine, historic and current claims, and geologic structures favorable to mineralization suggests a requirement for a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines.

References:

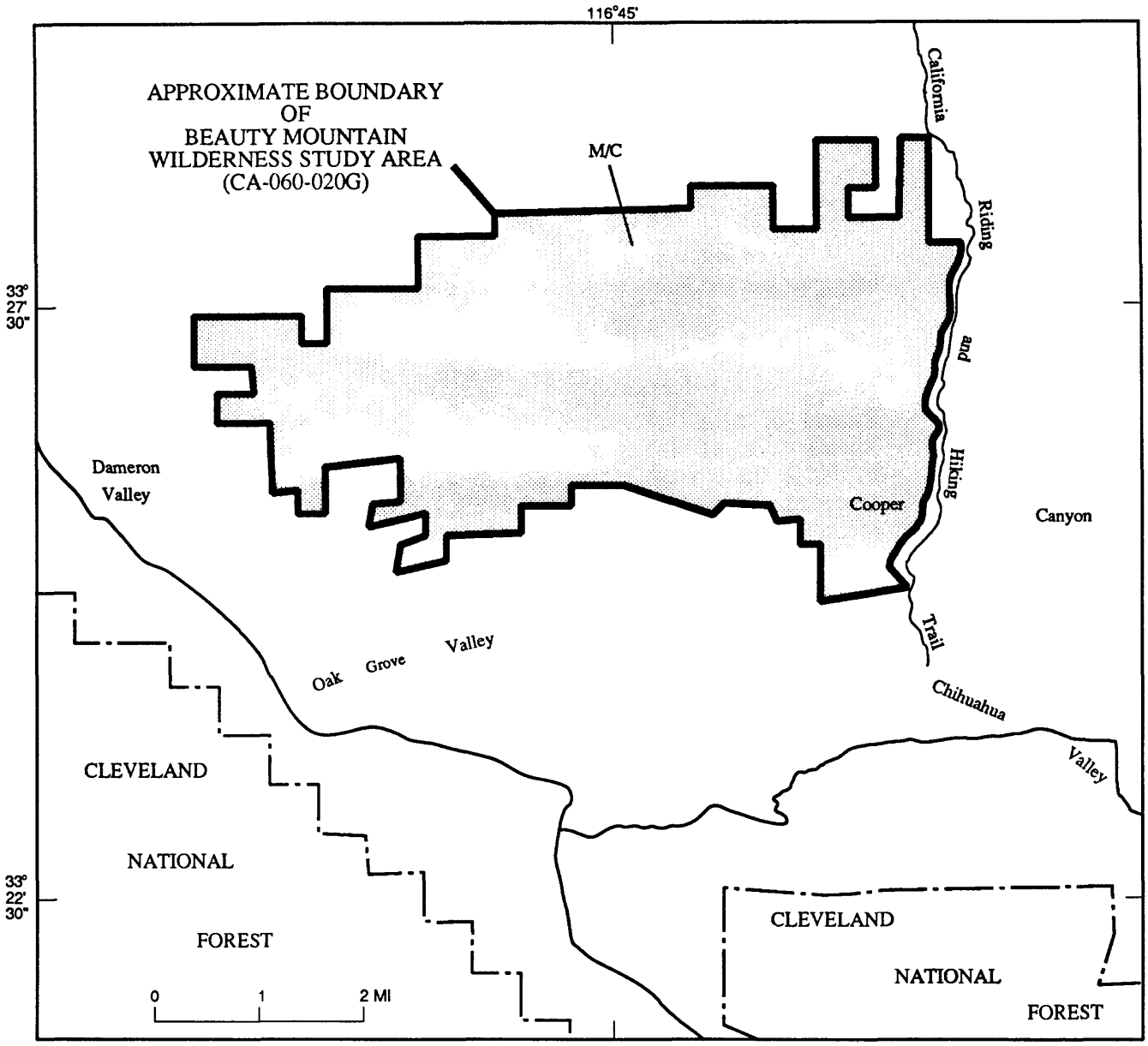
Rogers, T.H., compiler, 1965, Santa Ana sheet: California Division of Mines and Geology Geologic Map of California, scale 1:250,000.

U.S. Bureau of Land Management, 1988, California state-wide wilderness study report: draft copy, part 3, v. 3.

_____1988, Geographic index of mining claims.

U.S. Bureau of Mines, 1988, Mineral industry location system (MILS).

Weber, F.H., 1963, Geology and mineral resources of San Diego County, California: California Division of Mines and Geology County Report 3, 309 p.



EXPLANATION

L/C Geologic terrane having moderate mineral resource potential for tungsten and gold with certainty level C as well as identified resources of tungsten and gold

Mineral resources of the Beauty Mountain G Wilderness Study Area.

Name: Benton Range
Area number: CA-010-077
Size (acres): 4,052

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): Resources of volcanic pumice occur on the eastern edge of the wilderness study area primarily in the northern portion. The U.S. Bureau of Land Management Benton Range GEM report rates the entire area as having a low favorability for metals with a small high favorability area around the Tower mine located about 0.5 mi southwest of the wilderness study area. Rains and others (1982) have estimated that the Tower mine still contains an estimated 47,400 tons of gold-silver resources.

Much of the area is listed as having high favorability for geothermal resources. One spring within the wilderness study area is indicated to have heat values and chemistry that make it useable for direct-heating purposes.

Mineral resource potential (undiscovered): Based on known deposits exploited at both Blind Springs Hill on the east, and in the central and southern parts of the Benton Range, the mineral resource potential in the two areas is moderate for small deposits of gold, silver, and lead associated mainly with pyrite and galena, in quartz-filled fissure veins within the granitic rocks. The area has low mineral resource potential for tungsten. The potential for geothermal resources is high, owing to the presence of hot springs at Benton, less than 3 miles to the north.

Mining activity: Approximately $6 million worth of silver was produced from the Blind Spring Hills mining district between 1862 and 1929 (Ransome, 1940). This district is about three mi east of the northern part of the wilderness study area in rocks similar to those in the wilderness study area. Volcanic pumice was produced from several mines and pits adjacent to and just outside the eastern edge of both portions of the wilderness study area. Total production is unknown.

Development of the Tower mine began in 1876, and by 1888, it had produced $150,000 worth of gold ore (Whiting, 1888). Tungsten was discovered in 1916 at the Black Rock tungsten mine, located about three mi south of the wilderness study area (Dupuy, 1948). Between 1928 and 1957 approximately 700,000 tons of ore were produced from this mine. There was also minor production in 1970 and 1978. There are five current mining claims in or adjacent to the wilderness study area according to January, 1989, U.S. Bureau of Land Management records.

Mineral setting: This small study area is underlain by massive granite and granodiorite of Jurassic and Triassic ages, respectively, that are locally covered by a thin veneer of basalt of Tertiary age, and detritus of Tertiary and Quaternary ages. Only a few faults, northeast to northwest striking and steeply dipping, cut the rocks in the study area, but numerous similar faults project into the area from the south; all appear to be of Quaternary age.

Recommendations: The wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines to increase the certainty that the mineralization within the adjacent U.S. Forest Service lands extend into this U.S. Bureau of Land Management land. Rocks in the wilderness study area are similar to those in the Blind Springs district and other mineralized areas adjacent to the wilderness study area. The wilderness study area should be examined to determine the potential for metal resources and to identify the pumice resource. A program of geochemical sampling and detailed geologic mapping, at a scale no smaller than 1:24,000, should be carried out as the first steps in the exploration for mineral deposits.

References:

Crowder, D.F., Robinson, P.F., and Harris, D.L., 1972, Geologic map of the Benton quadrangle, Mono County, California and Esmeralda and Mineral Counties, Nevada: U.S. Geological Survey Geologic Quadrangle Map GQ-1013.

Donahoe, J.L., Chaffee, M.A., Fey, D.L., Hill, R.H., and Sutley, S.J., 1982, Geochemical map showing anomalous drainage basins, Benton, Range Further Planning (RARE II) Area, Memo County, California: U.S. Geological Survey Miscellaneous Field Studies Map MF-1317-B, scale 1:62,500.

Donahoe, J.L., McKee, E.H., Rains, R.L., Barnes, D.J., Campbell, H.W., Denton, D.K., Jr., Iverson, S.R., Jeske, R.E., and Stebbins, S.A., 1983, Mineral resource potential map of the Benton Range Roadless Area, Mono County, California: U.S. Geological Survey Miscellaneous Field Studies Map MF-1317-C.

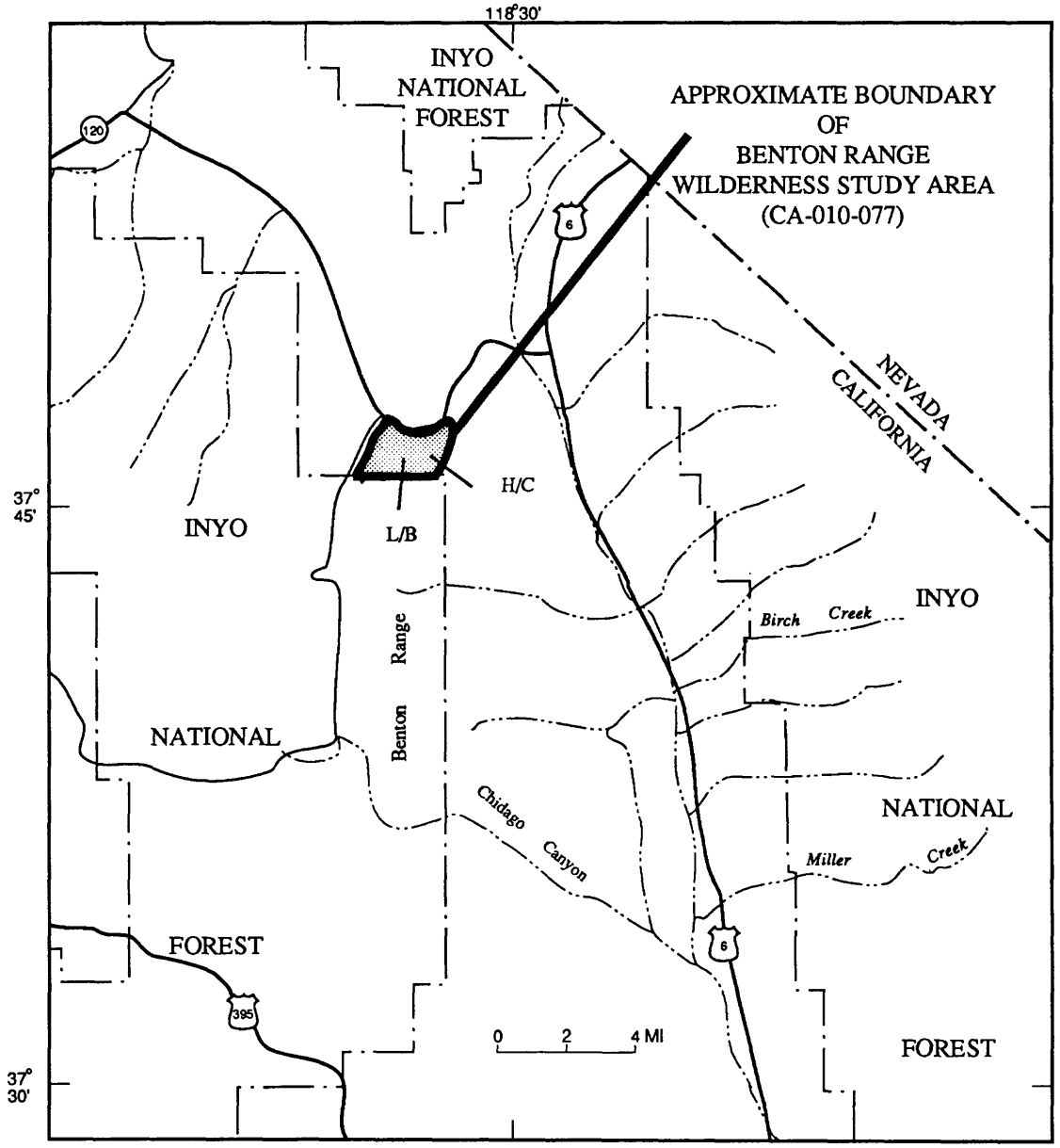
Dupuy, L.W., 1948, Black Rock tungsten deposit, Mono County, California: U.S.Bureau of Mines Report of Investigations 4210, 6 p.

Lemmon, D.L., 1941, Tungsten deposits of the Benton Range, Mono County, California: U.S. Geological Survey Bulletin 922-S, 12 p.

McKee, E.H., and Donahoe, J.L., 1981, Geologic map of the Benton Range Further Planning (RARE II) Area Mono County, California: U.S. Geological Survey Miscellaneous Field Studies Map MF-1317-A.

Rains, R.L., Barnes, D.J., Campbell, H.W., Denton, D.K., Jr., Iverson, S.R.,Jeske, R.E., and Stebbins, S.A., 1982, Mineral investigation of the Benton Range RARE II area (No. 5056), Mono County, California: U.S. Bureau of Mines Open-File Report MLA 83-82, 15 p.

Whiting, H.A., 1888, Eighth report of the State Mineralogist: California Division of Mines and Geology, p. 352-401.



EXPLANATION

H/C Geologic terrane having high mineral resource potential for geothermal energy with certainty level C as well as identified resources of pumice and geothermal energy

M/C Geologic terrane having moderate mineral resource potential for gold, silver, and lead with certainty level C

L/B Geologic terrane having low mineral resource potential for tungsten with certainty level B

Mineral resources of the Benton Range Wilderness Study Area.

Name: Big Butte
Area number: CA-050-211
Size (acres): 9,536

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): No mineral resources have been identified within the wilderness study area. A study of the Yolla Bolly - Middle Eel wilderness, adjacent and to the east, indicated no significant mineral trends.

Mineral resource potential (undiscovered): The area has low mineral resource potential for manganese, chromite, and asbestos.

Mining activity: There is no known mineral production from the wilderness study area. No known mines or prospects exist in the wilderness study area and no mining districts are located in or near the area. No current (October, 1988) claims are located in the wilderness study area, according to 1988 U.S. Bureau of Land Management records.

Mineral setting: This area is underlain by sedimentary rocks of the Franciscan Formation with accompanying serpentinite and peridotite. A fault many tens of miles in length and parallel to the regional structure passes adjacent the area.

Recommendations: The wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines.

References:

Strand, R.G., compiler, 1962, Redding sheet: California Division of Mines and Geology Geologic Map of California, scale 1:250,000.

Jennings, C.W., and Strand, R.G., compilers, 1960, Ukiah sheet: California Division of Mines and Geology Geologic Map of California, scale 1:250,000.

Leszcykowski, A.M., and Gobla, Michael, 1982, Mineral investigation of the Yolla Bolly - Middle Eel wilderness (F.S.), Tehama and Trinity Counties, California: U.S. Bureau of Mines Open-File Report MLA 103-82, 9 p.

U.S. Bureau of Land Management, 1988, Geographic index of mining claims.

_____1989, California state-wide wilderness study report: draft copy, part 3, v. 2.

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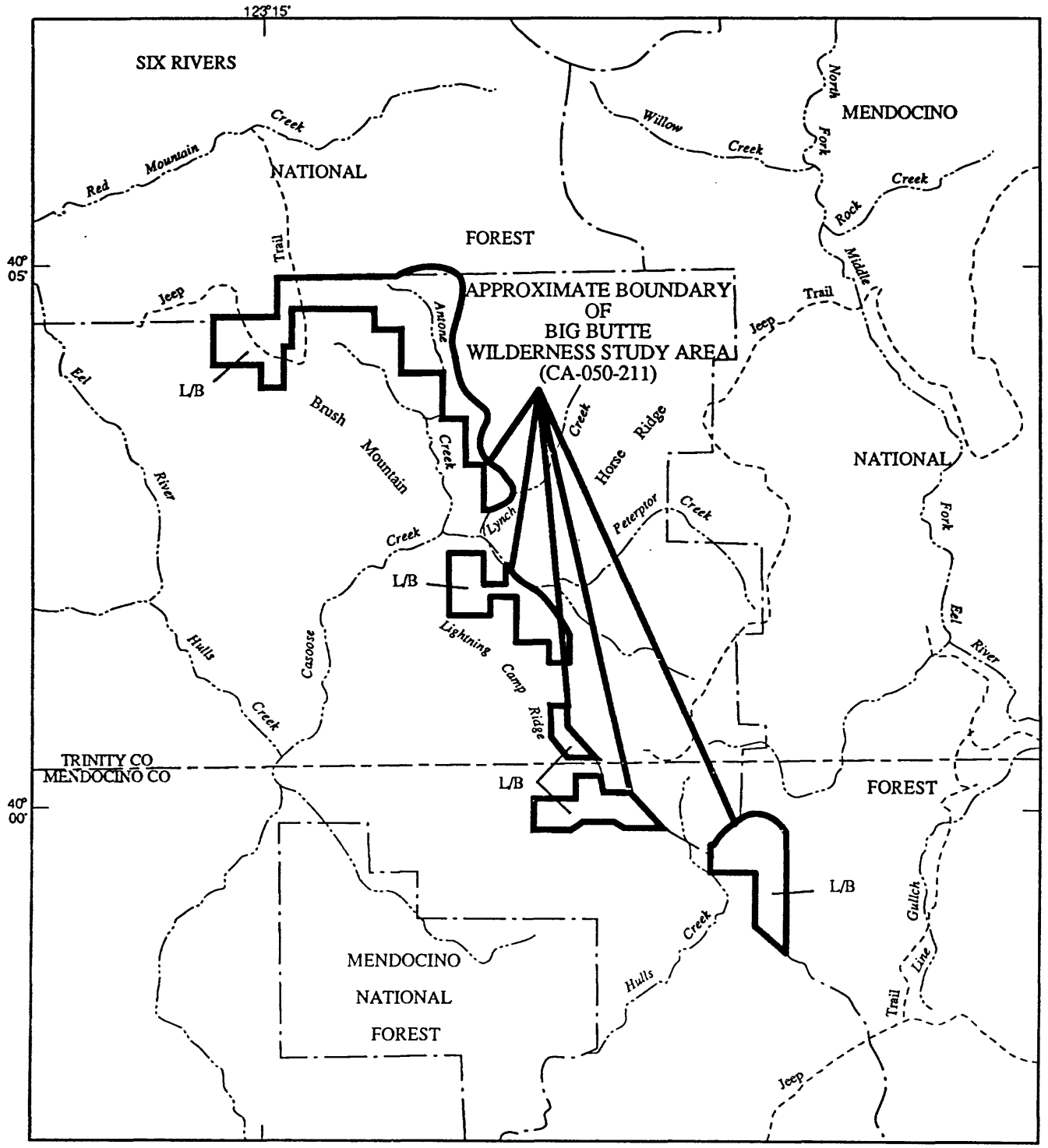


EXPLANATION

L/B Geologic terrane having low mineral resource potential for manganese, chromite, and asbestos with certainty level B

Mineral resources of the Big Butte Wilderness Study Area.

Name: Bitterbrush
Area number: CA-020-604
Size (acres): 640

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): There are no known mineral occurrences or deposits in the wilderness study area.

Mineral resource potential (undiscovered): Metallic mineral resources and geothermal energy resources are unlikely in this area. Areas of volcanic derived sediments and lake deposits have low potential for clay, zeolites, and pozzolan.

Mining activity: The wilderness study area is not in a mining district, contains no current claims or leases, according to 1988 U.S. Bureau of Land Management records, and has had no known mineral production.

Mineral setting: This small study area is surrounded by Tertiary basaltic rocks of probable Pliocene age, but includes quaternary deposits from a small lake bed.

Recommendations: The wilderness study area should be studied to assess the clay, zeolites, and pozzolan potential by the U.S. Geological Survey and the U.S. Bureau of Mines.

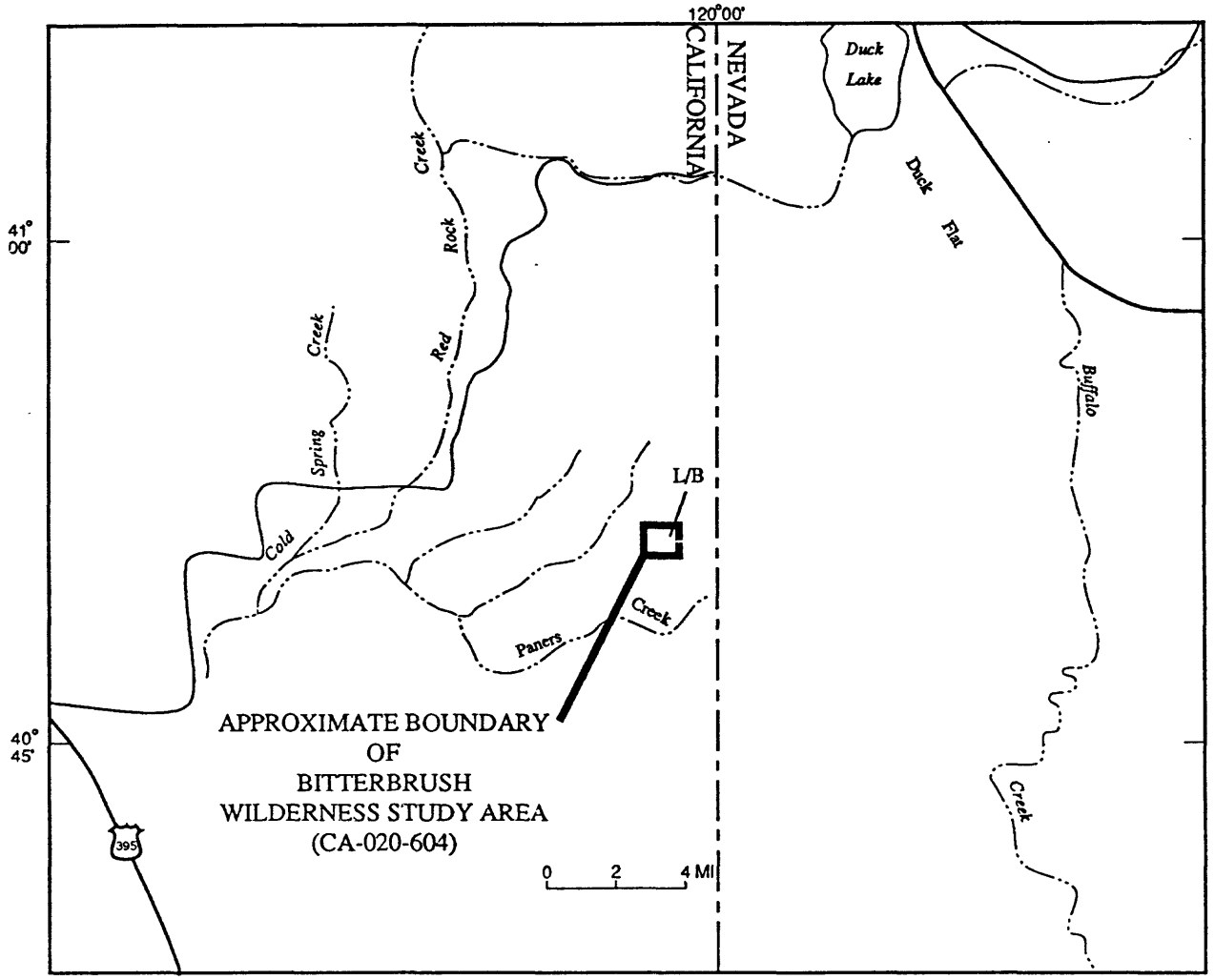
References:

Lydon, P.A., Gay, T.E., Jr., and Jennings, C.W., compilers, 1960, Westwood (Susanville) sheet: California Division of Mines and Geology Geologic map of California, scale 1:250,000.

Gay, T.E., 1966, Economic mineral deposits of the Cascade Range, Modoc Plateau, and Great Basin region of northeastern California in Geology of northern California: California Division of Mines and Geology Bulletin 190, p. 104-107.

U.S. Bureau of Land Management, 1988, Geographic index (of) all claims.

U.S. Bureau of Mines, 1989, Mineral Industry Location System (MILS).



EXPLANATION

L/B Geologic terrane having low mineral resource potential for clay, zeolites, and pozzolan with certainty level B

Mineral resources of the Bitterbrush Wilderness Study Area.

Name: Black Butte
Area number: CA-040-305A
Size (acres): 40

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): There are no known mineral occurrences or resources in the wilderness study area.

Mineral resource potential (undiscovered): Very weak geochemical anomalies of mercury, molybdenum, chromium, nickel and thorium have been detected in the region. The study area has low potential for these elements. There are no hot springs within the area; the mercury anomalies, however, suggest the potential for geothermal resources is low. The part of the area underlain by Tertiary sedimentary rocks has low potential for phosphate rock and oil and gas.

Mining activity: There has been no known mineral production from the wilderness study area. No known prospecting or mining has been conducted in or adjacent to the wilderness study area, nor is it in any mining district. There are no current mining claims in the wilderness study area according to 1988 U.S. Bureau of Land Management records. Similar geologic settings in the region have been prospected for or produced oil and gas, coal, diatomite, building stone, limestone, dolomite, barite, copper, tungsten, molybdenum, and phosphate.

Mineral setting: The northwest trending Arroyo Seco fault divides the area geologically. Southwest of the fault metasedimentary rocks of unknown age are exposed. These rocks may include gneiss, quartzite, amphibolite and schist. Northwest of the fault Tertiary sandstone, mudstone and conglomerate unconformably overlie the older basement rocks.

Recommendations: The wilderness study area should be studied as part of a comprehensive mineral survey by the Bureau of Mines and Geological Survey. Stream sediments and rocks in the area should be sampled and analyzed to determine if mercury or other metals are present in anomalous concentrations.

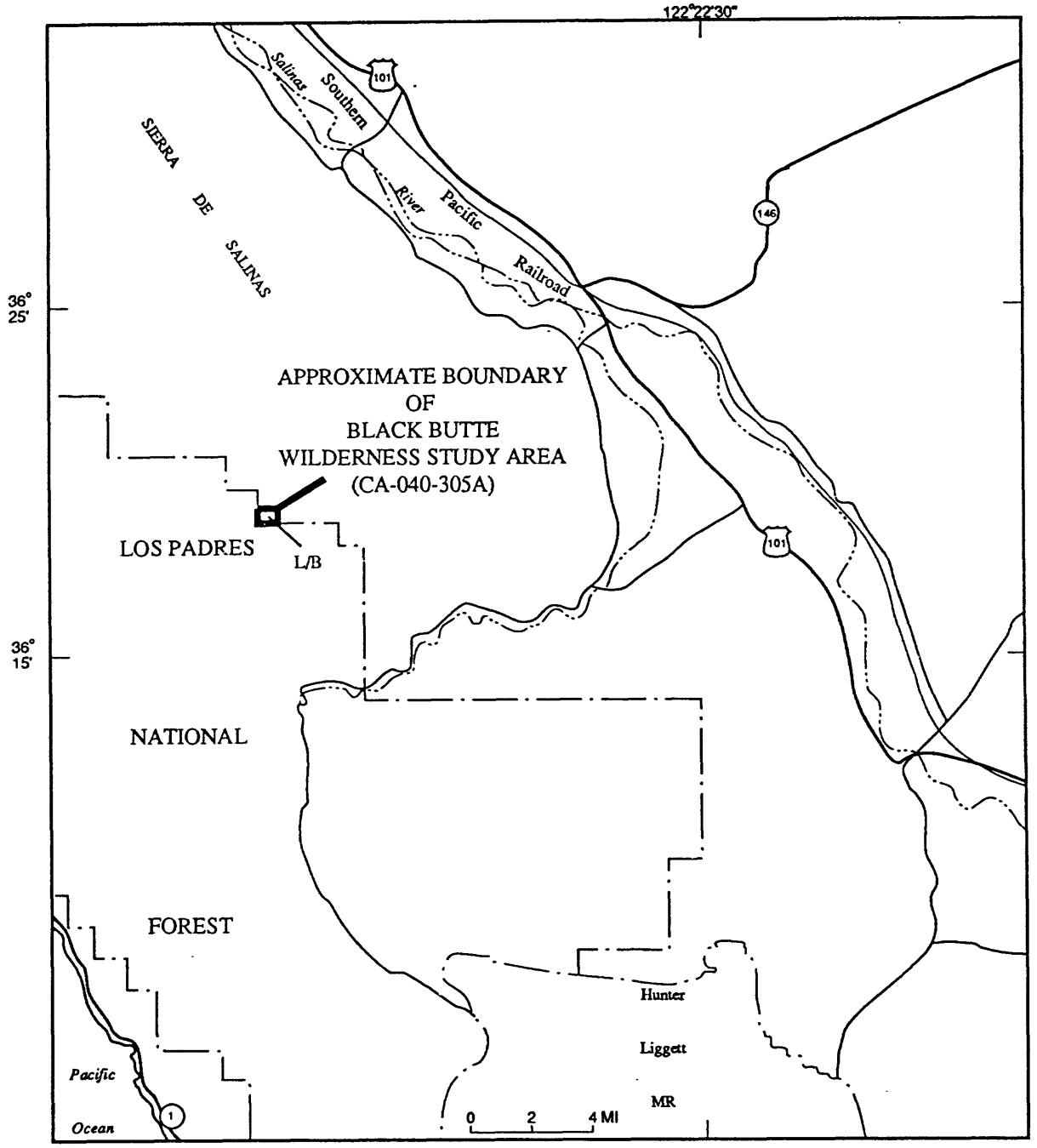
References:

Hart, E.W., 1966, Mines and mineral resources of Monterey County, California: California Division of Mines and Geology County Report No. 5, 142 p.

Jennings, C.W. and Strand, R.G., 1958, Santa Cruz sheet: California Division of Mines and Geology Geologic Map of California, scale 1:250,000.

Seiders, V.M., Esparza, L.E., Sabine, Charles, Spear, J.M., Stebbins, Scott, and Benham, J.R., 1983, Mineral resource potential map of part of the Ventana wilderness and Black Butte, Bear Mountain, and Bear Canyon roadless areas, Monterey County, California; U.S. Geol. Surv. MF-1559-A.

U.S. Bureau of Land Management, 1988, Geographic index (of) all claims.



EXPLANATION

L/B Geologic terrane having low mineral resource potential for mercury, molybdenum, chromium, nickel, thorium, geothermal energy, phosphate rock, and oil and gas with certainty level B

Mineral resources of the Black Butte Wilderness Study Area.

Name: Black Canyon
Area number: CA-010-065
Size (acres): 6,518

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): No mineral resources have been identified in the wilderness study area. However, gold, silver, lead, and tungsten have been mined nearby.

Mineral resource potential (undiscovered): The Black Canyon Wilderness Study Area has moderate, mineral resource for gold, silver, tungsten, lead, zinc, and barite. The southern part of the area near west of Harkless flat has low mineral resource potential for vein deposits of gold, copper, and zinc.

Mining activity: A number of mines have been active in the White Mountains just to the east of the wilderness study area. Twelve mining districts join or overlap the wilderness study area but most of the claims in the area were located in the Bishop, Black Canyon, and Poleta districts. The Poleta mine is situated about 0.5 mi east of the wilderness study area. The mine is one of the oldest in the Bishop district. Production since 1900 amounts to more than 2,000 ounces of gold and 800 ounces of silver, and the total production may be as much as twice that amount.

The R and R claim area is situated about two mi east of the wilderness study area. Several thousand tons of tungsten ore was mined in 1952, but work ceased in 1953. The Little Gem (X-ray) mine is about one mi east of the wilderness study area. The Mirage-Mariposa is about 1.5 mi east and the Gray Eagle is about two mi east of the wilderness study area. In 1912, a total of 5 carloads of ore was shipped from these three mines. There is one current mining claim in the wilderness study area according to January, 1989, U.S. Bureau of Land Management records.

Mineral setting: Rocks in the wilderness study area consist mostly of Upper Proterozoic through Cambrian strata consisting of a sequence of carbonate, sandstone, and shale deposited in a shallow-marine continental-shelf environment. In places the strata have been intruded by Mesozoic plutonic rocks of the Inyo batholith, an eastern extension of the Sierra Nevada batholith that consists predominantly of granite. Quaternary stream and alluvial fan deposits cover much of the bedrock.

Recommendations: Due to the numerous mines and extensive prospecting adjacent to the wilderness study area, the wilderness study area should be studied as part of a comprehensive mineral survey by the Bureau of Mines and Geological Survey to increase the certainty that the mineralization within the adjacent U.S. Forest Service lands extend into this U.S. Bureau of Land Management land. All claims, prospects, and mines should be identified, mapped, and sampled. Surface mapping and sampling should be done to discover and define any undeveloped resources associated with previous mining activity. Geophysical and geochemical studies covering the entire area should be done to assess undiscovered resources. Additional detailed stream-sediment sampling of heavy-mineral pockets using concentration techniques and sensitive analyses could help define the extent of tungsten deposits.

References:

Bateman, P.C., 1956, Economic geology of the Bishop tungsten district: California Department of Natural Resources, Division of Mines Special Report 47, 87 p.

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Diggles, M.F., and Rains, R.L., 1983, Blanco Mountain and Black Canyon Roadless Areas, California in S.P. Marsh, S.J. Kropschot, and R.G. Dickinson, eds., 1983, Wilderness mineral potential: U.S. Geological Survey Professional Paper 1300, v. 1, p. 185-186.

Diggles, M.F., Blakely, R.J., Rains, R.L., and Schmauch, S.W., 1983, Mineral resource potential of the Blanco Mountain and Black Canyon Roadless Areas, Inyo and Mono Counties, California: U.S. Geological Survey Miscellaneous Field Studies Map MF-1361-C, scale 1:62,500.

Diggles, M.F., Dellinger, D.A., Sutley, S.J., Fey, D.L., and Hill, R.H., 1982, Chemical data for samples of rock, stream-sediment, and nonmagnetic dense-mineral concentrate in the White Mountains, Blanco Mountain, Birch Creek, and Black Canyon Roadless Areas, White Mountains, California and Nevada: U.S. Geological Survey Open-File Report 82-984, 188 p.

Knopf, Adolph, 1914, Mineral resources of the Inyo and White Mountains, California, *in* Contributions to economic geology, 1912, part 1, metals and nonmetals, except fuels: U.S. Geological Survey Bulletin 540, p. 81-120.

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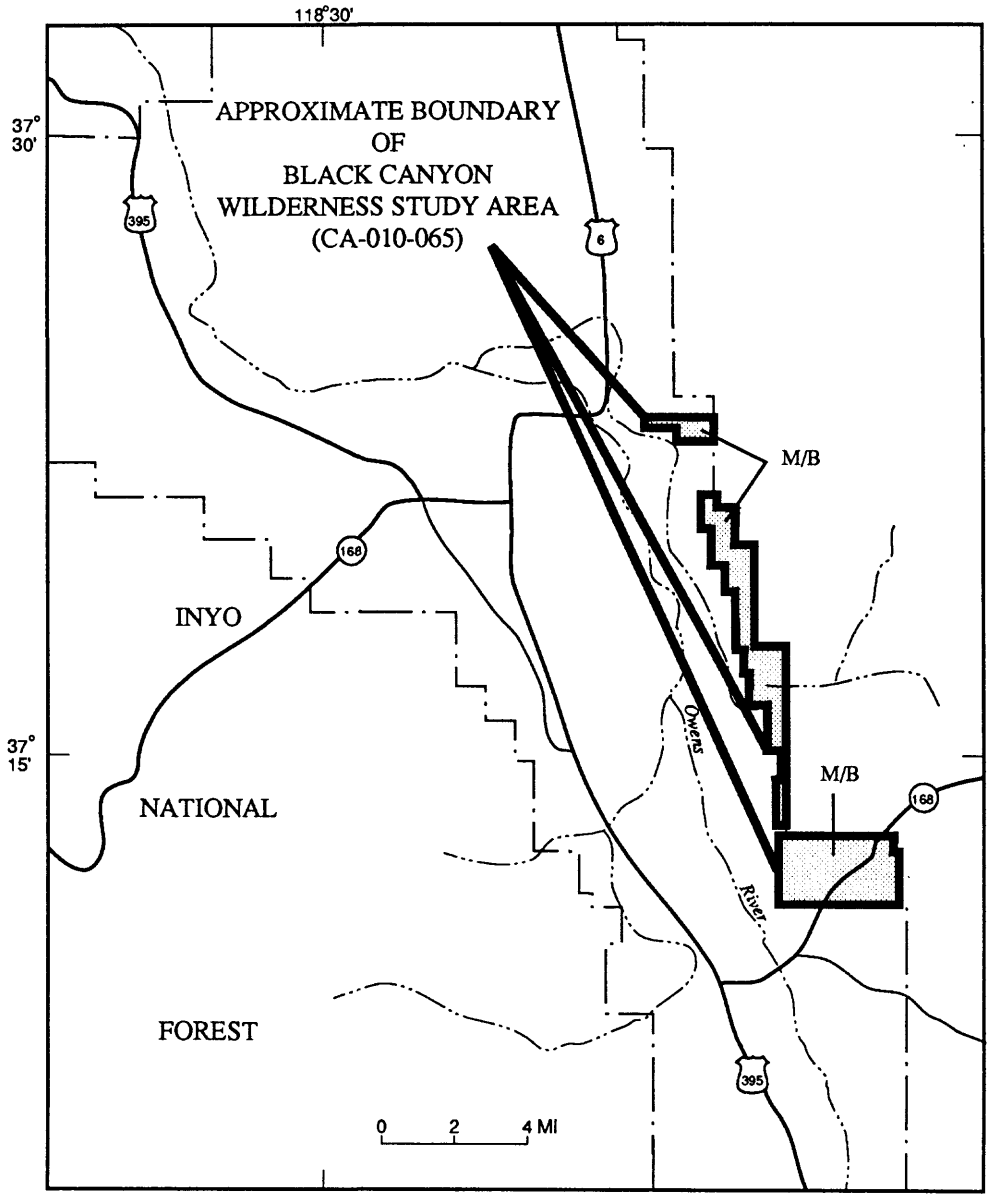
Rains, R.L., Horn, M.C., and Neumann, T.R., 1983, Mineral investigations of the Black Canyon RARE II Area (No. 5061), Inyo County, California: U.S. Bureau of Mines Open-File Report MLA 85-83, 21 p.

Schmauch, S.W., 1987, Mines and prospects of the Andrews Mountain, Mazourka, and Paiute Roadless Areas, Inyo County, California: U.S. Geological Survey Miscellaneous Field Studies Map MF-1492-D, scale 1:62,500



EXPLANATION

M/B Geologic terrane having moderate mineral resource potential for gold, silver, tungsten, lead, zinc, and barite with certainty level B

L/B Geologic terrane having low mineral resource potential for gold, copper, and zinc with certainty level B

Mineral resources of the Black Canyon Wilderness Study Area.

Name: Black Mountain
Area number: CA-010-020
Size (acres): 150

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): There are no known mineral occurrences or resources in the wilderness study area. Occurrences of uranium and placer gold are present nearby in similar geologic settings.

Mineral resource potential (undiscovered): The area has low energy resource potential for oil and gas and low mineral resource potential for uranium and gold.

Mining activity: There is no known mineral production from the wilderness study area, however, uranium and placer gold have been produced nearby. The wilderness study area is situated in the LaPanza mining district. There are no current mining claims in the wilderness study area according to 1988 U.S. Bureau of Land Management records.

Mineral setting: The Black Mountain area is composed of Upper Miocene marine rocks and less abundant Mesozoic granite within the coast range geomorphic province. A branch of the Huerhuero fault cuts through this region.

Recommendations: The wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines. This area has not been mapped in sufficient detail to confidently evaluate the potential for undiscovered mineral and energy resources. Further detailed geologic mapping is recommended.

References:

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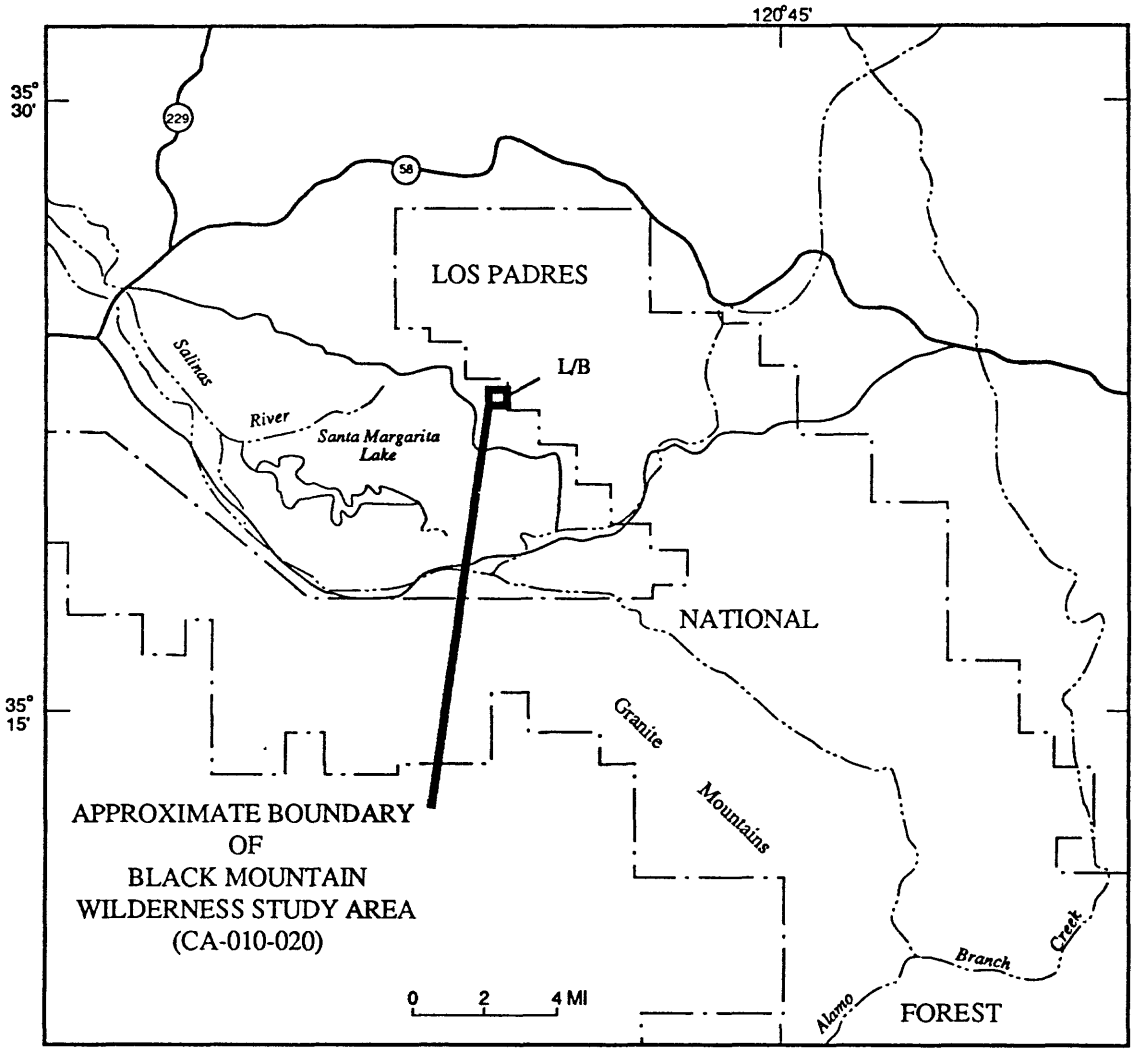

EXPLANATION

L/B Geologic terrane having low mineral resource potential for oil and gas, uranium, and gold with certainty level B

Mineral resources of the Black Mountain Wilderness Study Area.

Name: Bodie
Area number: CA-010-100
Size (acres): 15,445

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): Homestake Mining Co. estimates 9.3 million tons of ore containing 0.03 ounce per ton gold and 0.06 ounce per ton silver in the Paramont mine located in the northwestern part of the wilderness study area after analyzing 14,088 feet of drill core. An additional 5 to 7 million tons of ore grade rock may be present. Throughout the area Homestake feels they have identified a possible 24 million tons of ore at 0.069 ounce per ton gold and 0.42 ounce per ton silver.

Mineral resource potential (undiscovered): Because of the similarity of geology and structure with much of the nearby Masonic, Bodie, and Aurora mining districts, the study area is here considered to have high resource potential for deposits of gold and silver as quartz fissure-vein lodes. Further extrapolation also suggests that the more favorable structures trend northeast, in the eastern part, and northwest in the western part.

Mining activity: The northern portion of the Bodie mining district and the unorganized rough Creek mining district are situated in the wilderness study area. Gold, silver, and mercury have been mined in and near the study area. The Bodie district produced about 1.5 million ounces of gold from 1859 to the 1920's. Since 1935, several companies have explored and analyzed the Bodie vein systems. The Paramont mercury mine was active from the 1940's to the 1960's. Production figures are unavailable. As of October, 1988, there were 1,015 current mining claims in the wilderness study area according to U.S. Bureau of Land Management records.

Mineral setting: The study area is entirely underlain by Tertiary volcanic rocks, mainly extrusive, but including minor shallow intrusions. The southernmost and northernmost parts consist mostly of volcanic breccias of andesitic and silicic composition, that originated mainly as lahars. The west-central part is composed of tuff, both welded and non-welded, also andesitic to silicic in composition. The east-central part consists of basalt flows and cinder cones. The entire study area is traversed by steep normal faults that strike northwest and northeast.

Recommendations: Further exploratory work in the study area should include detailed geologic mapping, with emphasis on a search for alteration zones, and geochemical exploration. The combination of historical production, the numerous current prospects and claims in a large area of hydrothermally-altered rocks, and ongoing company exploration throughout the wilderness study area strongly suggests that the wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines.

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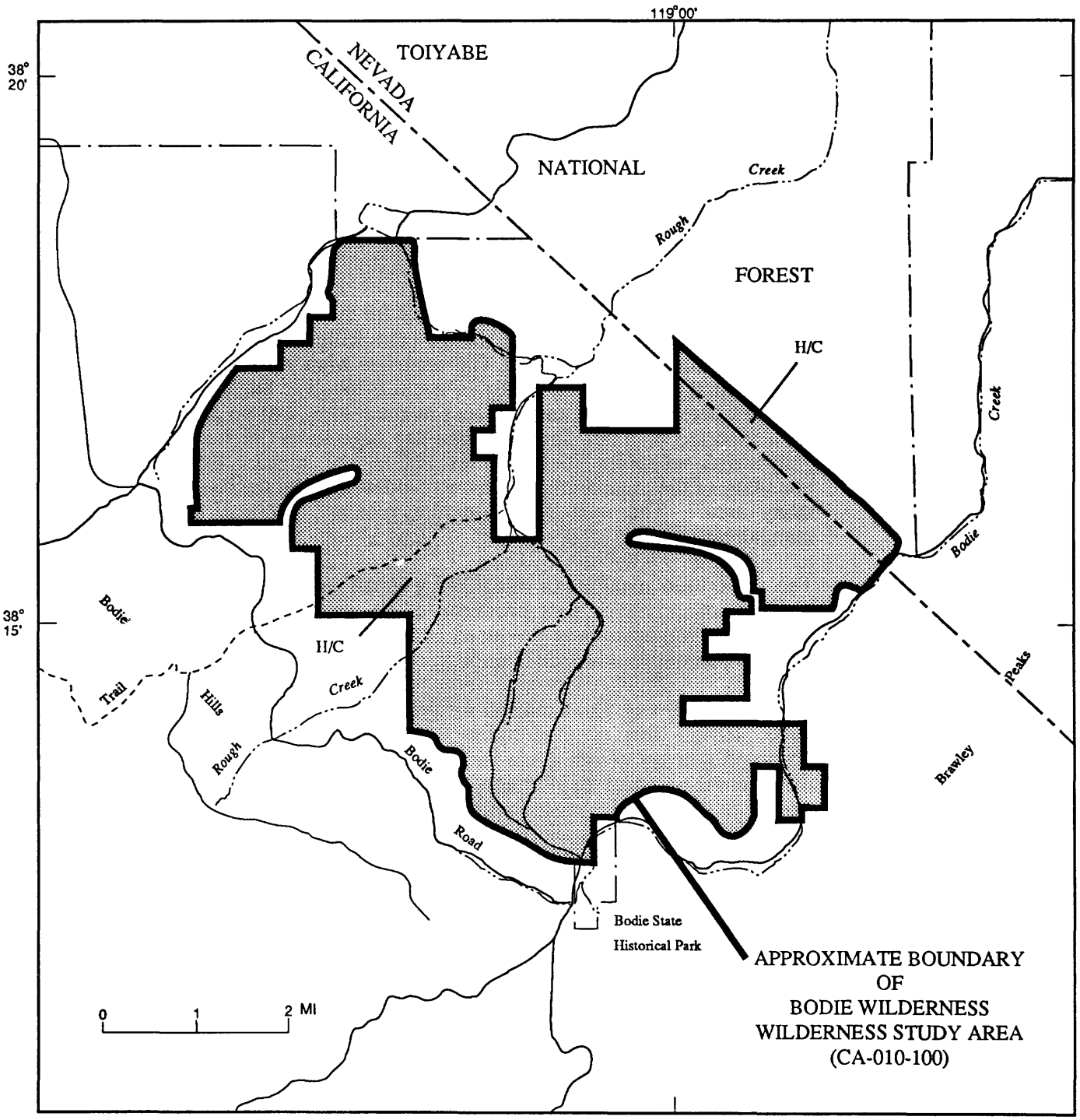

EXPLANATION

H/C Geologic terrane having high mineral resource potential for gold and silver with certainty level C as well as identified resoruces of gold and silver

Mineral resources of the Bodie Wilderness Study Area.

Name: Bodie Mountains
Area number: CA-010-099
Size (acres): 6,600

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): The U.S. Bureau of Land Management reports an estimated 15 million tons of rock containing 18 or more percent sulphur in the Wedertz mine area, manganese at the Champion claim, and mercury and antimony at the Wedertz mercury mine.

Mineral resource potential (undiscovered): The study area has high resource potential for the occurrence of small gold and silver deposits as quartz fissure-vein fillings along the dominant northwest-trending structures. The area has high resource potential for mercury and antimony especially in zones of opalitic alteration. Mercury has been detected at numerous places in the region, but no production has been reported to date. The area also has high potential for sulphur and geothermal resources inasmuch as active hot springs exist near the boundary of the area, on the northwest, and within the southeast part of the study area. The area has moderate mineral resource potential for manganese.

Mining activity: The Champion manganese mine had a small production. The Wedertz mercury mine was a past producer of an unknown amount. Several carloads of travertine was produced near Travertine Hot Springs adjacent to the wilderness study area boundary.

Homestake Mining Co. explored for gold near the Wedertz mine and by 1987, 10,483 feet of exploration drilling was completed. The gold observed was not of ore grade but high-grade sulphur mineralization was discovered. Recent exploration has occurred in a large area of rock alteration, perhaps associated with hot springs, and may be a continuation of the sulphur zone. In 1986, exploration drilling for gold was in progress with 1,600 feet completed between Bodie Mountains and Bodie Wilderness Study Areas. As of October, 1988, there were 734 current mining claims in the wilderness study area according to U.S. Bureau of Land Management records.

Mineral setting: Underlain almost exclusively by Tertiary volcanic rocks of intermediate to silicic composition, most of which are breccia, mainly lahar in origin, and tuff, but including minor, shallow rhyolite intrusions. Geology similar to Bodie except that fault pattern dominantly made up of northwest-striking, steep normal faults, locally interrupted by east-striking normal faults.

Recommendations: Future exploration of the area for mineral resources should begin with a detailed geochemical sampling program that includes a reconnaissance examination for the occurrence of zones of hydrothermal alteration. The proximity of the wilderness study area to the Bodie and the Masonic mining districts combined with production from the wilderness study area and recent company activity strongly suggests that the wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines.

References:

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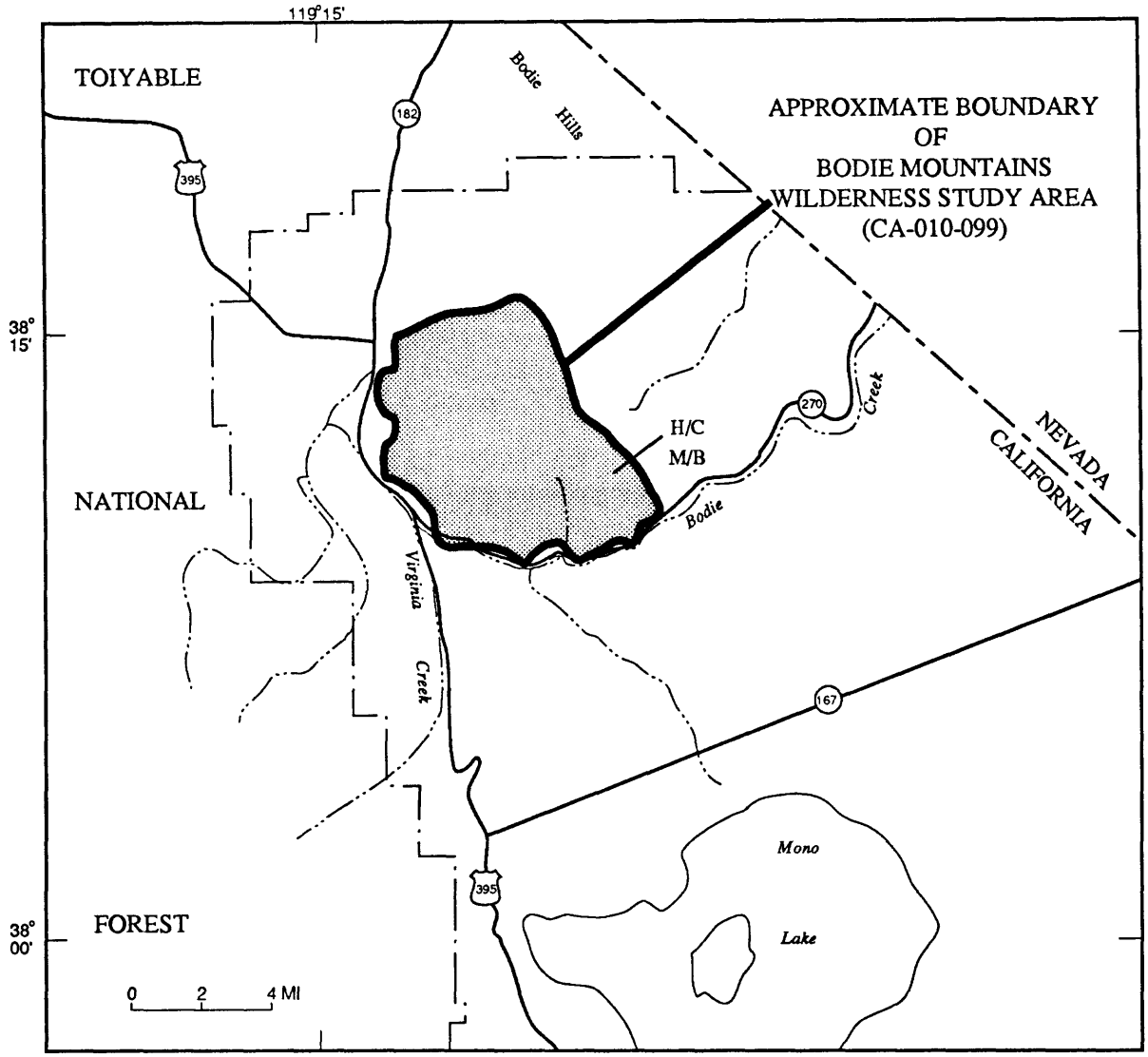

EXPLANATION

H/C Geologic terrane having high mineral resource potential for gold, silver, mercury, antimony, sulphur, and geothermal energy with certainty level C, as well as identified resources of sulphur, mercury, and antimony.

M/B Geologic terrane having moderate mineral resource potential for manganese with certainty level B as well as identified resources of manganese

Mineral resources of the Bodie Mountains Wilderness Study Area.

Name: Buffalo Hills
Area number: CA-020-619
Size (acres): 47,315

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): No known mineral occurrences or deposits are present within the wilderness study area.

Mineral resource potential (undiscovered): The study area has moderate mineral resource potential for gold, silver, copper, lead, and zinc. Areas of volcanic-derived sediments and lake deposits have moderate resource potential for clay, zeolites, and pozzolan.

Mining activity: There is no known mineral production from the wilderness study area. No current mining claims are located within the wilderness study area according to 1988 U.S. Bureau of Land Management records. The area is not within any mining districts and no locations are shown in MILS.

Mineral setting: The study area is entirely within an extensive area of Miocene to Pliocene olivine basalt flows and dikes. Minor tuff and volcanic derived sediments including shale, sandstone, mudstone, and lake sediments, occur locally. Several north trending faults occur in the study area. Sedimentary rocks in this area are also known to contain abundant vertebrate and plant fossils of Barstovian age.

Recommendations: The wilderness study area should be studied as part of a comprehensive mineral survey by the Bureau of Mines and Geological Survey. Future work in the area, in the form of geologic mapping and details geochemical sampling is needed to accurately assess the potential for precious and metallic mineral occurrences, and the sediment associated resources, zeolite, clay, and pozzolan

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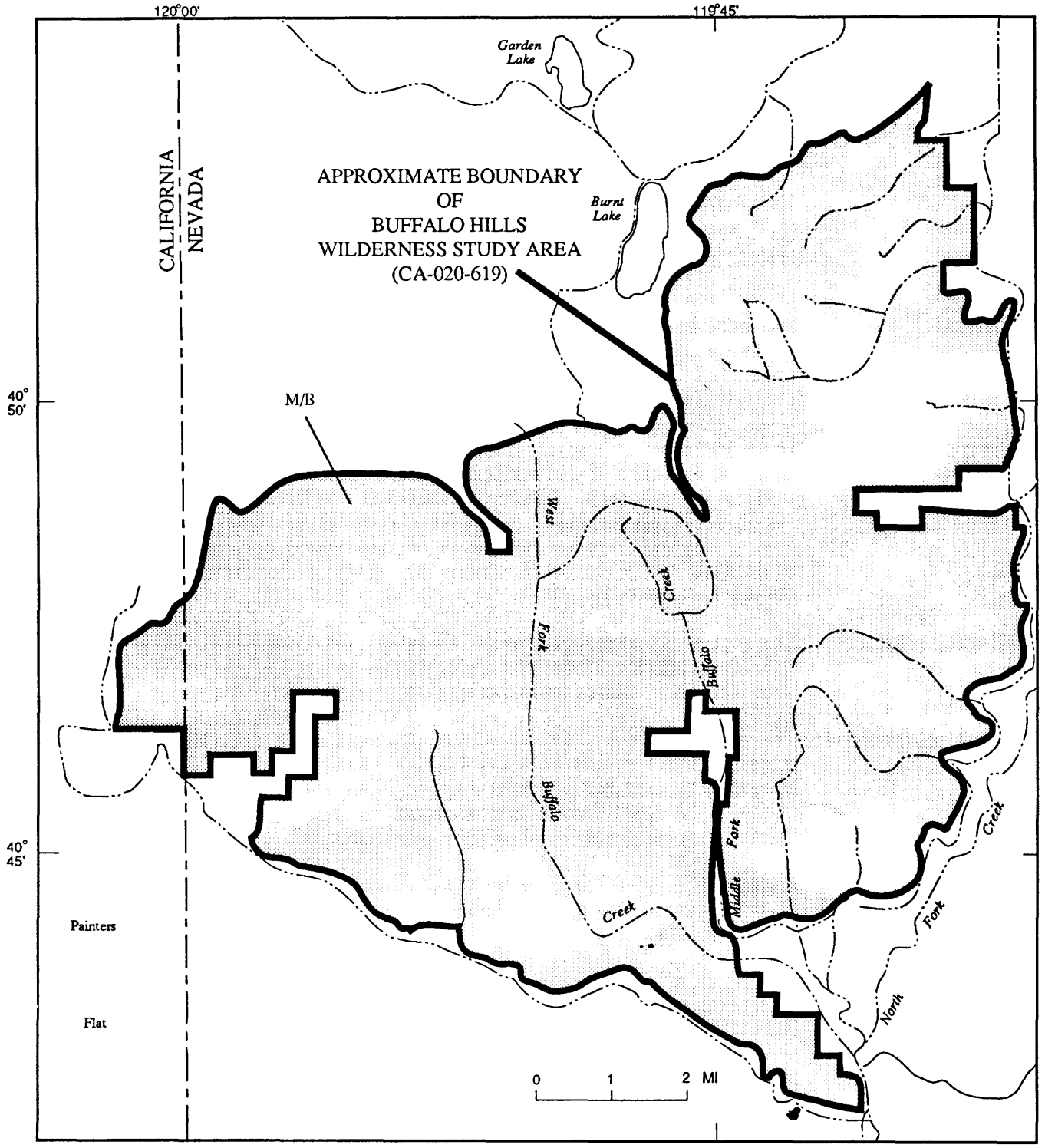

EXPLANATION

M/B Geologic terrane having moderate mineral resource potential for gold, silver, copper, lead, zinc, clay, zeolites, and pozzolan with certainty level B

Mineral resources of the Buffalo Hills Wilderness Study Area.

Name: Caliente Mountain
Area number: CA-010-042
Size (acres): 19,018

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): There are no known mineral occurrences or resources in the wilderness study area.

Mineral resource potential (undiscovered): The area has high potential for resources of oil and gas. The area has moderate mineral resource potential for phosphorous deposits.

Mining activity: There has been no known mineral production from the wilderness study area. Seven oil and gas wells have been drilled in and adjacent to the wilderness study area. All are dry wells but similar Miocene stratigraphy has produced oil and gas in the region. he wilderness study area is not in a mining district; there are no current mining claims in or adjacent to the wilderness study area according to 1988 U.S. Bureau of Land Management records.

Mineral setting: The area is predominantly underlain by the Monterey Shale of Miocene age. These marine formations are important source and reservoir rocks for hydrocarbon resources throughout central and southern California.

Recommendations: The wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines. This area has not been mapped in sufficient detail to confidently evaluate the potential for undiscovered mineral and energy resources. Further detailed geologic mapping is recommended.

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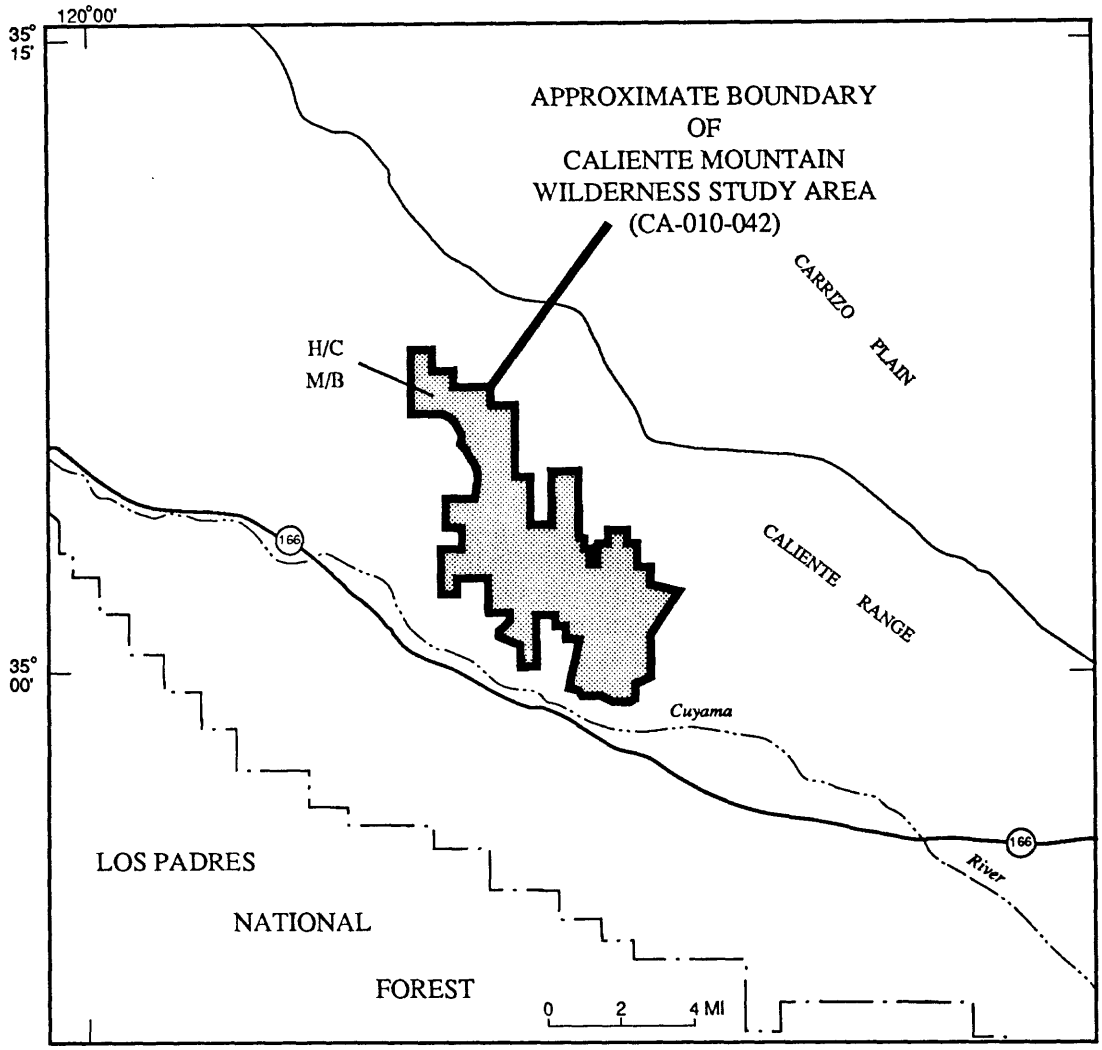

EXPLANATION

H/C Geologic terrane having high mineral resource potential for oil and gas with certainty level C

M/B Geologic terrane having moderate mineral resource potential for phosphorous with certainty level B

Mineral resources of the Caliente Mountain Wilderness Study Area.

Name: Carson Iceberg
Area number: NV-030-532
Size (acres): 550

Status of mineral surveys: This wilderness study area has been studied as part of a mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines (Keith and Miller, 1988).

Identified mineral resources (known): No mineral resources are identified in the wilderness study area. Samples from the area contained uneconomic amounts of gold, silver, copper, lead, zinc, mercury, arsenic, and molybdenum.

Mineral resource potential (undiscovered): The study area has low resource potential for gold in placer deposits in gravels from the Carson River and some of its tributaries. The study area exclusive of the stream sediments also has low resource potential for silver in small vein type deposits.

Mining activity: The wilderness study area is situated at the east side of the Silver Mountain mining district and at the west side of the Silver King mining district. Prospecting began in the vicinity of the wilderness study area in the 1850's. Although figures are incomplete, $300,000 may have been produced from the Silver Mountain district. There are no mines or current mining claims according to January, 1989, U.S. Bureau of Land Management records in the wilderness study area.

Mineral setting: The area is underlain by a thin layer of interbedded lava flows and mudflows of Tertiary age overlying a granitic pluton of Cretaceous age. Locally, both of these units have been intruded by younger rhyolitic dikes.

Recommendations: Additional work is not recommended for this area due to the small size of the area, the small amount of hydrothermal alteration, and the small number of and concentrations in geochemical anomalies.

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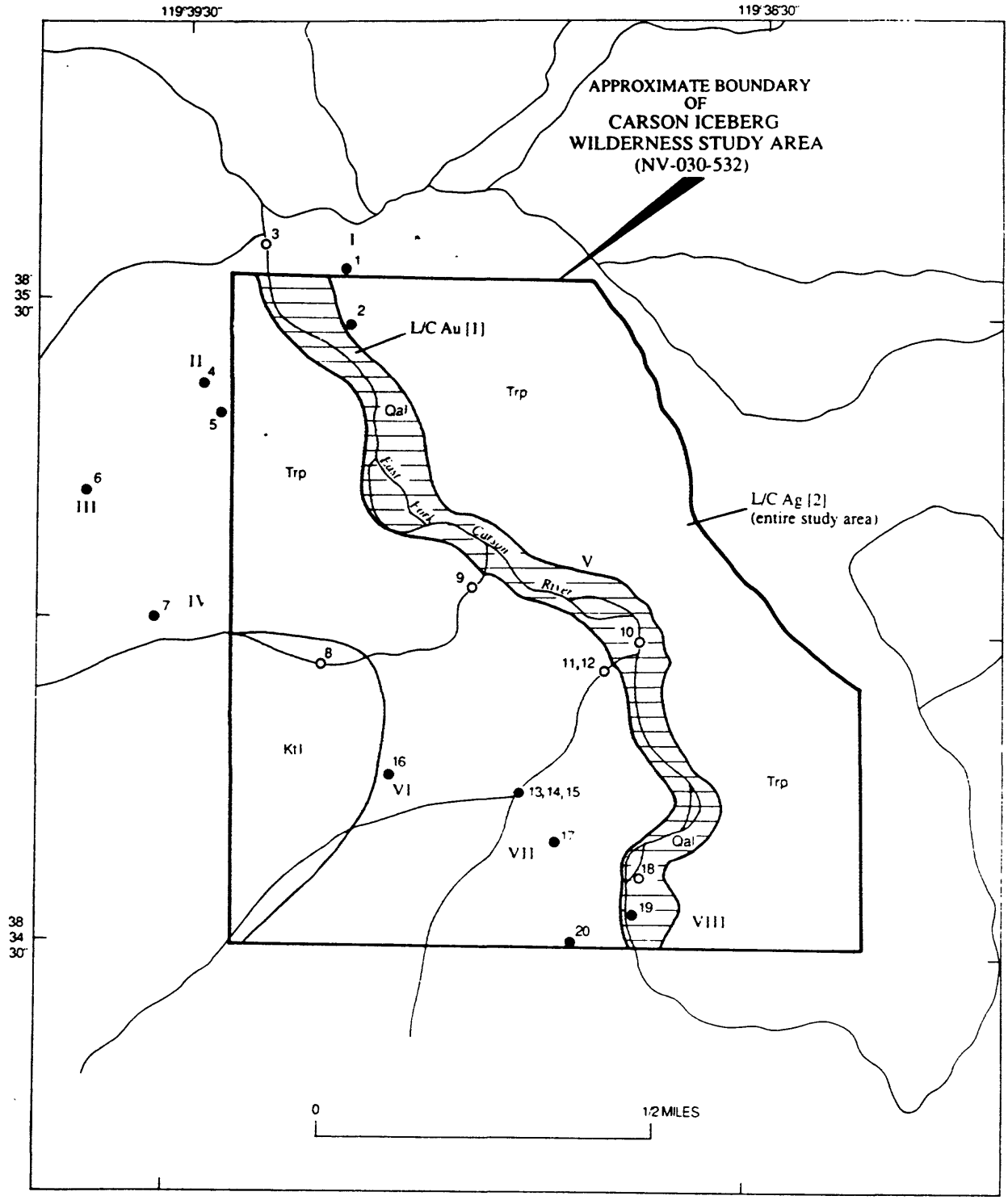

Mineral resources of the Carson Iceberg Wilderness Study Area.

EXPLANATION

	Area with low mineral resource potential (L)
C	Certainty level of assessment–Data give good indication of level of potential
	Commodities
Au	Gold
Ag	Silver
[ ]	Type of deposit or occurrence
1	Placer
2	Disseminated epithermal
	Geologic map units
Qal	Alluvium (Quaternary)–Unconsolidated silt, sand, and gravel
Trp	Relief Peak Formation (Tertiary)–Interbedded andesitic lava flows, lahars, and sedimentary rocks
Ktl	Granodiorite of Topaz Lake (Cretaceous)–Coarsely prophyritic granodiorite
———	Contact
•2	Rock sample location (see table 2, appendixes)
o3	Alluvium sample location (see tables 3 and 4, appendixes)
IV	Site location–May cover large area and contain more than one sample locality (see table 1, appendixes)

Explanation, mineral resources of the Carson Iceberg Wilderness Study Area.

Name: Casa Diablo
Area number: CA-010-082
Size (acres): 5,547

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): The Casa Diablo mine, in the central portion of the wilderness study area, has produced gold, silver, lead, and copper. Further study is needed to appraise if any resources remain in the mine.

Mineral resource potential (undiscovered): The study area has moderate resource potential for small deposits of gold, silver, copper, and lead, as quartz-bearing fissure-veins in granitoid rocks. An occurrence of mercury at the Casa Diablo mine was reported in 1940, but no subsequent work substantiating the presence of mercury is known, hence the study area has low mineral resource potential for mercury. As calcareous roof-pendant rocks and associated skarns (the host rock at the Black Rock mine) are not present in the study area, a mineral resource potential of tungsten is not considered geologically permissive.

Mining activity: The Casa Diablo mine, located on the northern slope of Case Diablo Mountain, produced $100,000 worth of gold, silver, and base metals (U.S. Bureau of Land Management, 1983b). It was discovered in 1895, and was most active in the early 1920's. It produced gold, silver, lead, and copper from three quartz veins containing gold-bearing pyrite, chalcopyrite, and silver-bearing galena.

A group of pits and other workings are situated in an irregular line trending southward from the Casa Diablo mine, probably exploring the same or similar veins as the Casa Diablo. The Crater View mine, listed in a table of copper-producing mines as having produced $100,000 worth of copper, is located in T. 6 S., R. 31 E. (Eric, 1948). The exact location within the township is unknown, and may be inside the wilderness study area.

The northern portion of the wilderness study area includes the southern portion of the Chidago mining district, which encompasses a dozen or more productive mines in T. 3 S., R. 31 E., and T. 4 S., R. 31 E. Probably less than $1,000,000 in gold and silver was produced in the Chidago district (Rinehart and Ross, 1956). A number of formerly-producing mines occur one to three miles north of the wilderness study area. The Beckman mine, about one mile north of the wilderness study area, and the Long Chance (aka Vanelmart), located about one-half mile to the north of the Beckman, both produced somewhat less than $100,000 (Rinehart and Ross, 1956). The Black Rock mine, about 7 miles north of the Casa Diablo Wilderness Study Area, produced at least 275,000 tons of tungsten ore averaging 0.5 percent WO_3 (U.S. Bureau of Land Management, 1983b).

As of October, 1988, there were 48 current mining claims in the wilderness study area. Most of these are centered on the Casa Diablo mine area.

Mineral setting: Bedrock in the study area is composed of chiefly massive, medium-grained, equigranular to locally porphyritic Jurassic granite and granodiorite, and smaller bodies of alaskite, diorite, and gabbro. Locally large remnants of mainly quartz-biotite phyllite country rock (Paleozoic and Precambrian(?), are moderately abundant, especially near the northern margin of the area. A dense swarm of north-northwest-trending porphyritic rhyolite and aplite dikes and sills cut most of the rocks, but are especially abundant in the granodiorite and phyllite. A thick blanket of rhyolite pumice and tuff (Bishop Tuff) of Quaternary age surrounds and laps onto the bedrock exposed in the higher topography. The study area is interpreted as an eastward-dipping fault block, upthrown on the west, along a steep, north-trending Basin and Range frontal fault.

Recommendations: Due to the number of past-producing base- and precious-metal mines in the wilderness study area, and in the area to the north, the wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines. A geochemical sampling program should be a prerequisite to further resource assessment in the study area, and should include at least a reconnaissance examination for rock alteration.

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_____1957, Geology of the Casa Diablo Mountain quadrangle, Mono County, California: U.S. Geological Survey Geologic Quadrangle Map GQ-99, scale 1:62,500.

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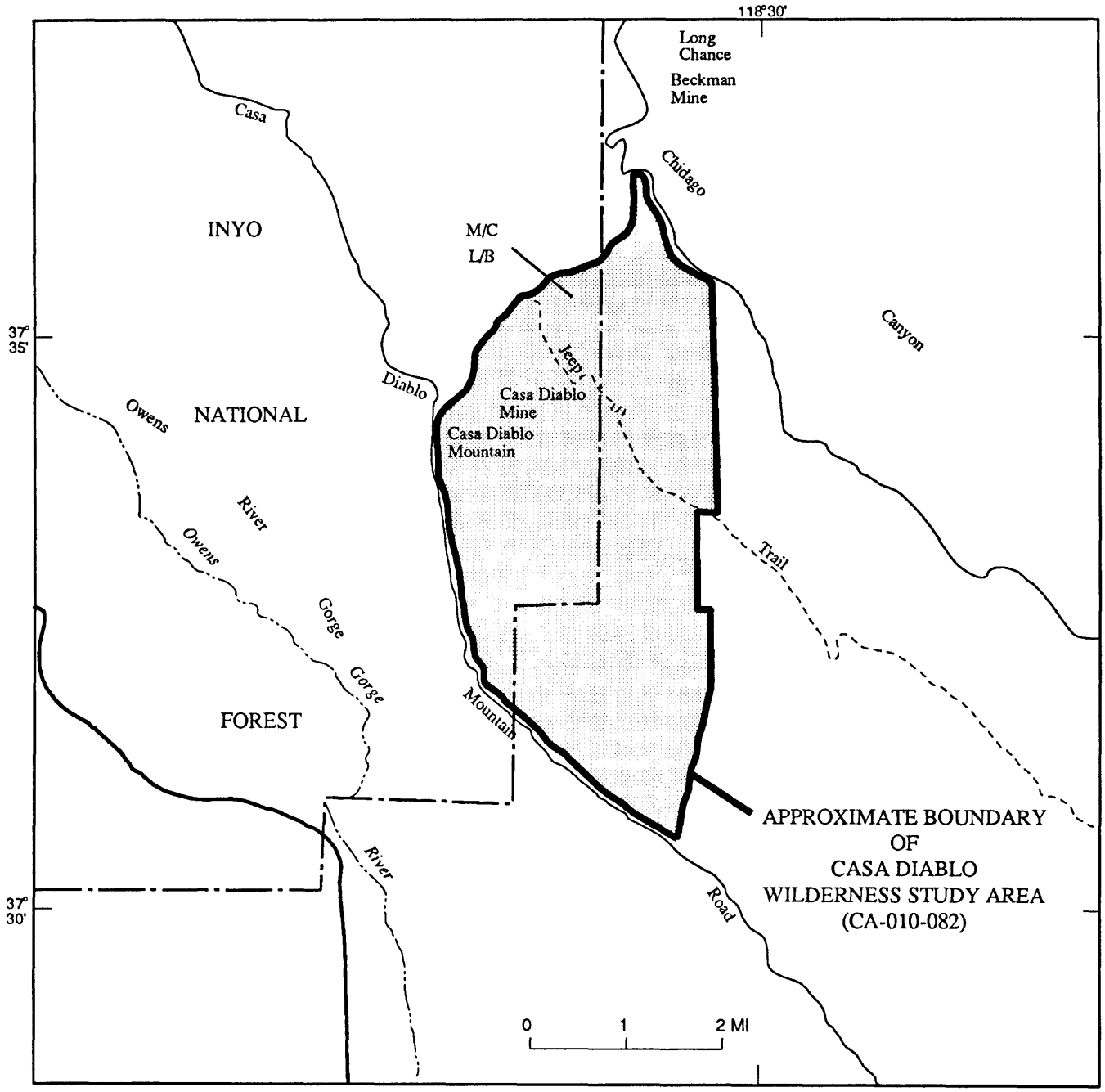

EXPLANATION

M/C Geologic terrane having moderate mineral resource potential for gold, silver, copper, and lead with certainty level C

L/B Geologic terrane having low mineral resource potential for mercury with certainty level B

Mineral resources of the Casa Diablo Wilderness Study Area.

Name: Cedar Roughs
Area number: CA-050-331
Size (acres): 7,183

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): No mineral resources have been identified within the wilderness study area.

Mineral resource potential (undiscovered): The area has low potential for gold, silver and mercury in epithermal deposits and chromium and manganese in deposits related to Franciscan ultramafic rocks. The potential for geothermal resources is low in the study area.

Mining activity: There is no known mineral production and no mining districts in the wilderness study area. During World War I, claims were staked on chromite deposits which occurred as stringers and lenses in a mass of serpentine. Several trenches were recorded as being dug before 1918 but there were no shipments of ore. No current claims are located in or adjacent to the wilderness study area, according to 1988 U.S. Bureau of Land Management records.

Mineral setting: The geology of the area is divided by several northwest trending faults separating diverse lithologic units. In the southwest part of the area Quaternary landslide deposits cover Jurassic and/or Cretaceous marine mudstone, siltstone, and conglomerate. The middle of the area is underlain by serpentinized ultramafic rocks and the northeast part by Franciscan sediments and greenstone. At least one of the faults may have been active during the Quaternary.

Recommendations: The wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines.

References:

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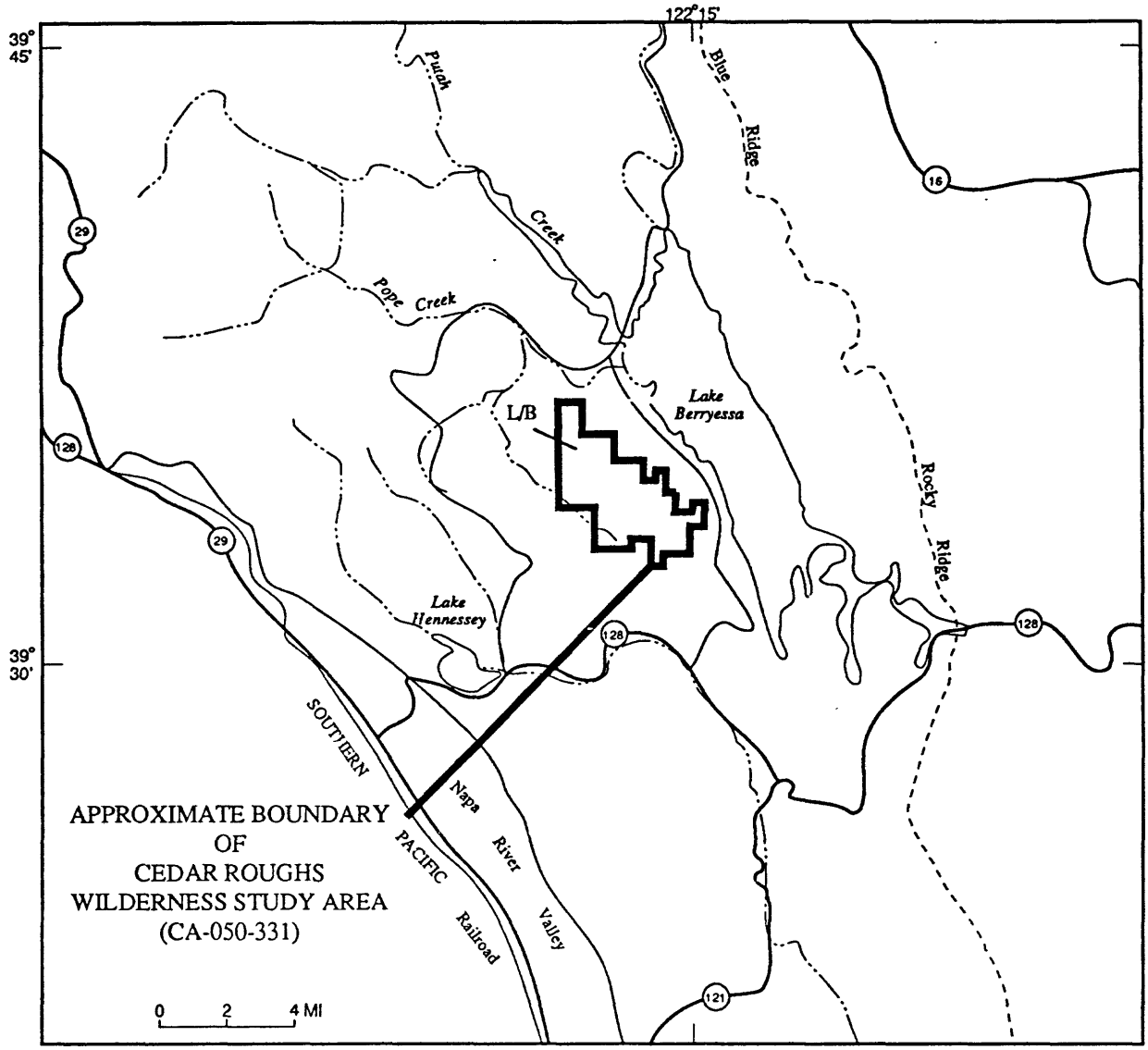

EXPLANATION

L/B Geologic terrane having low mineral resource potential for gold, silver,mercury, chromium, manganese, and geothermal energy with certainty level B

Mineral resources of the Cedar Roughs Wilderness Study Area.

Name: Chidago Canyon
Area number: CA-010-079
Size (acres): 20,246

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): There are no known mineral resources in the wilderness study area. The underlying Bishop Tuff has been mined in other localities for use as building stone. The Bishop Tuff as mapped by Bateman (1956) occurs as three varieties; one, a hard, consolidated tuff, is used for building stone, the second, a soft, pumiceous tuff, is mined in the Van Loon "fines" pit (sec. 18, T. 6 S., R. 33 E.), about eight mi south of the wilderness study area and used in making light-weight, concrete blocks. The third variety, a twenty-foot thick pumice horizon is suitable for light-weight aggregate, and acoustical plaster. Surface mapping in the area shows only the hard, consolidated variety (Bateman, 1956) but the other variety may underlie it, or occur as horizons or interbeds in the wilderness study area.

Mineral resource potential (undiscovered): The Bishop Tuff is a commonly used decorative building stone, and there is high resource potential for this commodity in the study area. There are extensive exposures of this material outside the study area, however. A one-half- to one-mile-wide strip along the western edge of the wilderness study area has moderate potential for gold, silver, lead, and tungsten. The northwest corner of the study area has moderate resource potential for metallic resources in the Triassic and Paleozoic rocks, probably as lode gold or silver similar to that in nearby mines such as Long Chance and Lone Star. Similarly, the northwest corner has low resource potential for molybdenum, and tungsten in skarn deposits, and for pyrophyllite in replacement deposits. A low potential exists for buried silver and gold lodes, but these deposits would probably be too small to be profitably explored and developed.

Mining activity: There has been no known production or other mineral activity within the wilderness study area. The Chidago mining district, which encompasses a dozen or more productive mines in T. 3 S., R. 31 E., and T. 4 S., R. 31 E., includes the northern and western portions of the wilderness study area. Probably less than $1,000,000 in gold and silver was produced in the Chidago district (Rinehart and Ross, 1956). The mineralized rock is characterized by metal-bearing quartz veins in Cretaceous intrusive rocks.

A number of formerly-producing mines occur in the Chidago district, one to three miles west of the wilderness study area. The Beckman mine is about one mile west of the wilderness study area. The Long Chance (aka Vanelmart) is located about one half-mile to the north of the Beckman. Together they have produced base- and precious-metals worth somewhat less than $200,000 (Rinehart and Ross, 1956). The Casa Diablo mine, which has produced about $100,000 in base- and precious-metals, is about three miles west of the wilderness study area. The Black Rock mine, about three miles north of the wilderness study area, produced at least 275,000 tons of tungsten ore averaging 0.5 percent WO_3 (U.S. Bureau of Land Management, 1983b).

As of October, 1988, there was one mining claim in the wilderness study area according to U.S. Bureau of Land Management records. It is an unpatented lode claim in section 36, T. 3 S., R. 31 E., in the northwestern corner of the wilderness study area.

Mineral setting: The Chidago Canyon area is part of a volcanic tableland underlain by the Bishop Tuff, which is an ash flow erupted from the Long Valley caldera about 0.7 million years ago. The tuff buries Late Triassic granodiorite and early Paleozoic(?) metasedimentary rocks, some of which are exposed in the northwest corner of the study area.

Recommendations: The wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines. Further geologic and geochemical investigations are warranted to assess the resource potential of Triassic and Paleozoic rocks in the northwest corner of the study area, in view of past mining activity within 1 or 2 miles of the study area.

References:

Bateman, P.C., 1956, Economic geology of the Bishop tungsten district, California: California Department of Natural Resources Division of Mines Special Report 47, 87 p.

_____1988, Pre-Tertiary bedrock geologic map of the Mariposa 1° x 2° quadrangle: U.S. Geologic Survey Open-File Report 87-670, scale 1:250,000.

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Jenkins, O.P., compiler, 1974, (second printing), Mariposa sheet: California Division of Mines and Geology Geologic Map of California, scale 1:250,000.

Rinehart, D.C., and Ross, D.C., 1956, Economic geology of the Casa Diablo Mountain quadrangle, California: California Division of Mines and Geology Special Report 48, 17 p.

U.S. Bureau of Land Management, 1983a, Benton Range G-E-M resource area (GRA No. CA-05) technical report (WSA CA 010-077): Great Basin GEM Joint Venture, Reno, NV, under contract YA-554-RFP2-1054, 33 p.

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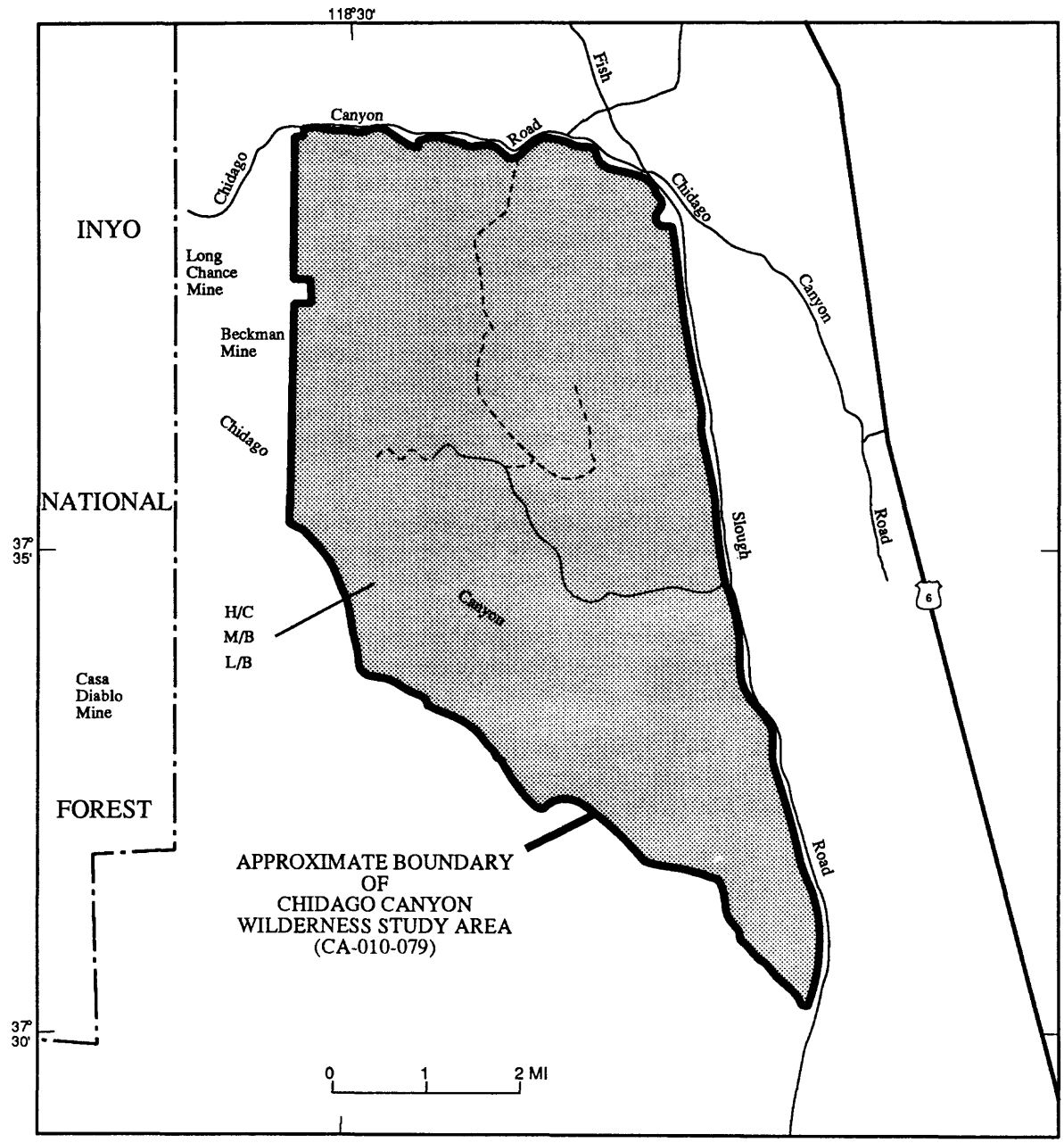
_____1989, Casa Diablo Wilderness Study Area, *in* U.S. Bureau of Land Management, California state-wide wilderness study report: draft copy, part 3, v. 3, 12 p.

U.S. Geological Survey, 1989, Unpublished data from Mineral Resource Data System (MRDS), Menlo Park, California.



EXPLANATION

H/C Geologic terrane having high mineral resource potential for building stone with certainty level C

M/B Geologic terrane having moderate mineral resource potential for gold, silver, lead, and tungsten with certainty level B

L/B Geologic terrane having low mineral resource potential for silver and gold with certainty level B

Mineral resources of the Chidago Canyon Wilderness Study Area.

Name: Coyote Southeast
Area number: CA-010-063
Size (acres): 3,211

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): No mineral resources have been identified in the wilderness study area. However, the entire wilderness study area is within the Bishop tungsten district, an area recognized for its significant past production and existing resources of tungsten contained in pendents in granite intrusive rocks. Molybdenum and antimony are also important commodities in this district and often are present with the tungsten minerals.

Mineral resource potential (undiscovered): Geochemical studies by the U.S. Geological Survey of the adjacent Coyote Southeast Roadless Area (Elliott and others, 1982; 1983) included this study area. No significant geochemical anomalies were noted in the area. The area has low potential for feldspar used as a filler. There is low potential for metallic resources, including gold, silver, and antimony in quartz veins in the granitic rocks, and low potential for tungsten, molybdenum, and marble in the metamorphic rocks in the south part of the study area. The Keough Hot Springs are situated just east of the study area, suggesting a moderate potential for geothermal resources in the study area.

Mining activity: The Bishop antimony mine is located about 0.25 mi northwest of the northernmost portion of the wilderness study area. Two 10-ton lots of antimony ore were shipped from the deposit during the early part of World War II. The Rossi tungsten mine is also just outside the northernmost portion of the wilderness study area, about one mi east of the Bishop Antimony mine. Between 1936 and 1940 an estimated 10,000 units of tungsten were produced. The Marble tungsten mine is located about two mi southwest of the wilderness study area. The mine was operated intermittently from 1942 to 1954, during which time about 7,890 units of tungsten were produced. The Nebicite feldspar-kaolin deposit and the Sierra White feldspar deposits have yielded a "clayey" feldspar for use as a filler material. These two deposits have produced 4000 tons of feldspar (Norman and Stewart, 1951).

There are 27 current mining claims in the wilderness study area according to January, 1989, U.S. Bureau of Land Management records.

Mineral setting: The Coyote Southeast study area lies along the eastern border of the previously studied Coyote Southeast (U.S. Forest Service) Roadless Area (Elliott and McKee, 1982). The study area is situated along the eastern Sierra Nevada rangefront and is underlain primarily by Mesozoic age granitic rocks. There are some small outcrops of highly metamorphosed Paleozoic sedimentary rocks, and the remainder of the area is covered by Quaternary stream and fan deposits, landslides, and glacial moraines derived from the Sierra Nevada. Numerous, mostly north-trending faults are present along the rangefront, and are part of the fault system along which the Sierra Nevada was uplifted.

Recommendations: The area contains a wide diversity of geologic environments, some of which have been demonstrated to contain deposits of valuable minerals. The wilderness study area should be studied as part of a comprehensive mineral survey by the Bureau of Mines and Geological Survey to increase the certainty that the mineralization within the adjacent U.S. Forest Service lands extend into this U.S. Bureau of Land Management land. Field mapping and sampling should be done around areas of previous mining activity. Geochemical and geophysical surveys should be conducted in the entire area to locate undiscovered resources.

References:

Bateman, P.C., 1956, Economic geology of the Bishop tungsten district: California Department of Natural Resources, Division of Mines Special Report 47, 87 p.

Capstick, D.O., and Stump, A.L., 1983, Mineral investigation of the Coyote Southeast RARE II Area (No. 5033), Inyo County, California: U.S. Bureau of Mines Open-File Report MLA 84-83, 17 p.

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Elliott, G.S., and McKee, E.H., 1982, Geologic map of the Coyote Southeast and Table Mountain Roadless Areas, Inyo County, California: U.S. Geological Survey Miscellaneous Field Studies Map MF-1426-A, scale 1:62,500.

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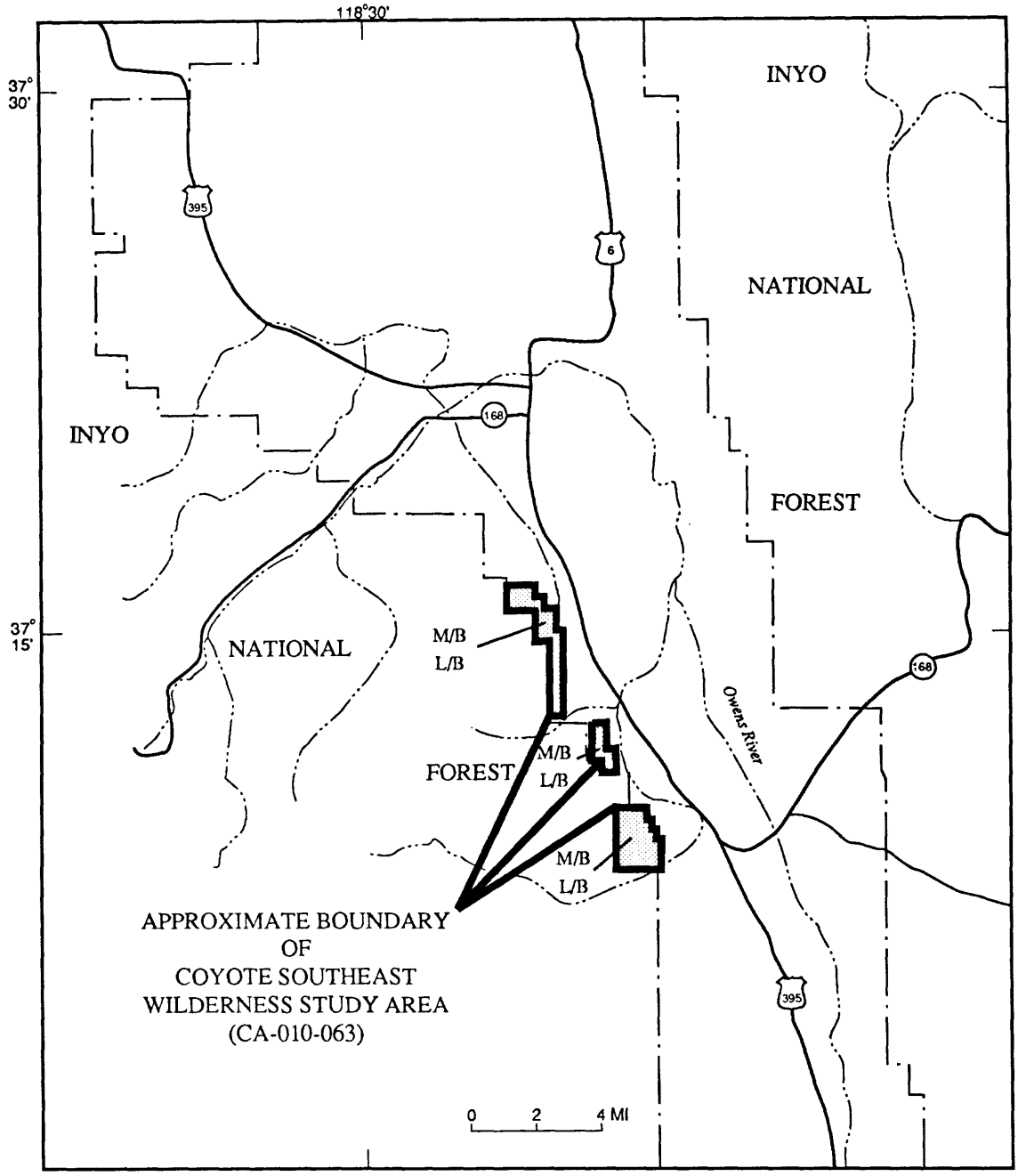
U.S. Bureau of Land Management, 1983, Big Pine G-E-M resources area (GRA No. CA-08) technical report (WSAs CA 010-059 and 010-063): Great Basin GEM Joint Venture, Reno, NV, under contract YA-553-RFP2-1054, 34 p.



EXPLANATION

M/B Geologic terrane having moderate mineral resource potential for geothermal energy with certainty level B

L/B Geologic terrane having low mineral resource potential for feldspar gold, silver, antimony, tungsten, molybdenum, and marble with certainty level B

Mineral resources of the Coyote Southeast Wilderness Study Area.

Name: Crater Mountain
Area number: CA-010-062
Size (acres): 6,760

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): The Fish Springs Hill area, in the southeastern portion of the wilderness study area, has produced gold, silver and copper. There are a number of mineralized veins that crop out in the intrusive rocks that may be the location of metallic mineral deposits. Further study is needed to appraise if any resources remain in the mine or are present in the outcrops. Areas to the south and east of the wilderness study area contain identified deposits of diatomite and perlite; some production has taken place from these deposits.

Mineral resource potential (undiscovered): The granitic rocks in the southeastern part of the study area host quartz veins containing gold, silver, and copper. There is moderate potential for additional undiscovered resources of these metals. The presence of surface hot springs in the vicinity, recent volcanic activity, and the presence of faults that provide pathways for the migration of hydrothermal fluids, suggest a moderate potential for geothermal resources. There is high potential for cinders; however, abundant cinders are present outside the study area. The area has low potential for diatomite, perlite, uranium, and thorium.

Mining activity: The earliest known production from the Fish Springs Hill area began in 1889, and continued intermittently until 1950.

At least two mines, the Cleveland and Commetti, on Fish Springs Hill had significant production. The Cleveland mine consists of about 50 adits on 10 or 12 different veins. The total production from 1893 to 1949 was 2,677 ounces of gold, 2,000 ounces of silver, and 1,551 pounds of copper (Bateman, 1956). The Commetti mine consists of three adits from 300 to 800 feet long. The total production from 1889 to 1941 was 1,566 ounces of gold, 1,418 ounces of silver, and 400 pounds of copper (Bateman, 1956). A cyanide-separation gold mill was in operation at the Cleveland mine in the late 1960's and early 1970's (U.S. Bureau of Land Management, 1988).

Many other mines may have been located here as well, with the only remaining evidence is the name of the former mine which lingers as the name of an outcropping vein. For instance, the United, Gold Bug, Magnet, Tombstone, Queen and Tip Top are names in use today for veins outcropping on Fish Springs Hill, and were probably names of mines which at one time worked those veins (Bateman, 1956).

The Poverty Hills diatomaceous earth deposit is about three miles southeast of the wilderness study area. (Cleveland, 1958). The deposit contains an estimated 2,500 tons, and about 600 tons have been mined for high-temperature insulating cement from 1947 to 1958 (Cleveland, 1958). Two perlite deposits are near the wilderness study area, one about two miles south of the wilderness study area, and another one mile east. The deposit to the east is the Fish Springs pit; the deposit to the south is the Tinemaha pit and has been operated by American Perlite.

According to 1988 U.S. Bureau of Land Management records, there are 52 lode, 29 placer, and 4 millsite claims currently located within the wilderness study area. The lode and placer claims are concentrated in the area of the Commetti and Cleveland mines. Most are probably for gold, but at least one claim in the wilderness study area is probably for perlite.

Mineral setting: The geology of the Crater Mountain area is dominated by a 2,000 foot high volcano (Crater Mountain) and its associated basaltic lava flows. The volcano is built on Cretaceous granitic rocks, which outcrop in the southeastern part of the study area. The southwestern part of the area is covered by sedimentary outwash derived from the Sierra Nevada to the west. The active north-south-trending Owens Valley fault system cuts the area.

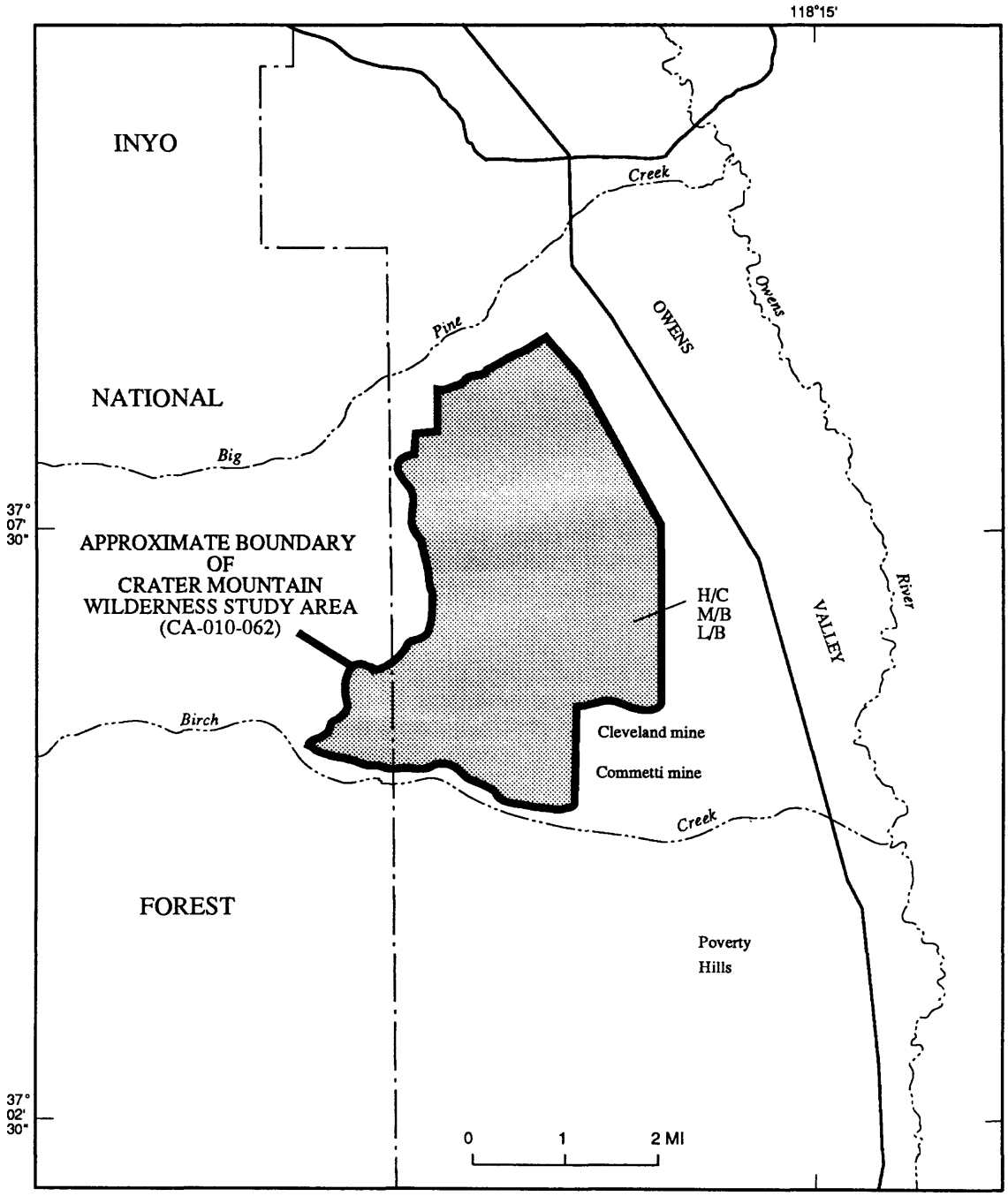
Recommendations: Additional studies are warranted to assess the possibilities of the presence of metallic and geothermal resources in the area. Due to the number of past-producing base- and precious-metal mines, the wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines.

References:

Bateman, P.C., 1956, Economic geology of the Bishop tungsten district, California: California Department of Natural Resources Division of Mines Special Report 47, 87 p.

U.S. Bureau of Land Management, 1983, Big Pine G-E-M resources area (GRA No. CA-08) technical report (WSA's CA 010-059 and 0120-063): Great Basin GEM Joint Venture, Reno, NV, under contract YA-553-RFP2-1054, 34 p.

_____1989, Casa Diablo Wilderness Study Area, *in* U.S. Bureau of Land Management, California state-wide wilderness study report: draft copy, part 3, v. 3, 12 p.



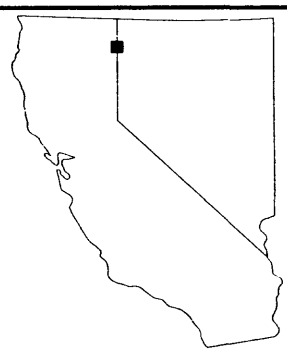
EXPLANATION

H/C Geologic terrane having high mineral resource potential for cinders with certainty level C

M/B Geologic terrane having moderate mineral resource potential for gold, silver, copper, and geothermal energy with certainty level B

L/B Geologic terrane having low mineral resource potential for diatomite, perlite, uranium, and thorium with certainty level B

Mineral resources of the Crater Mountain Wilderness Study Area.



Name: Dry Valley Rim
Area number: CA-020-615
Size (acres): 93,205 of which 54,480 were studied at the request of the U.S. Bureau of Land Management.

Status of mineral surveys: Only part of this wilderness study area has been studied as part of a mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines (Diggles and others, 1988a).

Identified mineral resources (known): No metallic resources are identified. The Red Rock and Willow Springs areas contain 85 million tons of altered basalt containing amygdules that host an inferred subeconomic resource of zeolites. More than 50 percent of this basalt consists of amygdules filled with chabazite (a zeolite mineral).

The Broken Shovel claims, located along the southeast boundary of the study area, contain a 100,000-ton occurrence of perlite. While usable for lightweight aggregate, the deposit is too small for economic production. However, if considered for perlite production with other nearby deposits, this occurrence could become a subeconomic resource.

Montmorillonitic clays are present in alluvial sediment in the Capricorn claims adjacent to but outside the study area. Alluvial sediments contain more than 30 percent (volume) clays.

Mineral resource potential (undiscovered): Amygdule-rich basalt that crops out in the Red Rock Canyon and Willow Springs areas has moderate resource potential for zeolites. The areas of alteration that contain the zeolites are proximal to a north-trending fault that probably controlled the movements of alteration fluids. The quality of the zeolites around Red Rock Canyon and west of Willow Springs may be adequate for use as an absorbent in animal husbandry.

The area of silicic volcanic rocks around the Broken Shovel claims has low resource potential for perlite. The perlite is hosted in displaced blocks of what possibly originated as a rhyolite flow-dome complex.

Montmorillonitic clay is present in alluvial sediment east of Red Rock Canyon at the Capricorn claims area east of the study area. This material is not suitable as a pozzolan but may qualify as fuller's earth, which is used as absorbents and for bleaching oils. The clay occurrence, however, does not extend into the study area.

Mining activity: The wilderness study area is not in a mining district and no mining activity has been recorded. There are no current mining claims in the wilderness study area according to October, 1988, U.S. Bureau of Land Management records.

Mineral setting: The Dry Valley Rim Wilderness Study Area is underlain by a 17-mi-long, north-trending fault block. Rocks in the study area are mostly middle Miocene andesite, andesitic lahar deposits and basalt and include minor amounts of rhyolitic ash-flow tuff. The oldest rocks in the study area are andesite flows and lahar deposits, commonly intercalated with olivine basalt. Rhyolite ash-flow tuff and lithic tuff are exposed in the fault scarp of the central part of Dry Valley Rim stratigraphically above the andesite. The rhyolite tuff is locally zeolitic. Olivine basalt flows cap the western dip slope of the study area. The major structure in the study area is the normal fault scarp that forms Dry Valley Rim.

Recommendations: As only part of this area has been studied as part of a mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines, further work is needed to assess the 38,720 acres that constitute the balance.

References:

Bonham, H.F., 1969, Geology and mineral deposits of Washoe and Storey Counties, Nevada: Nevada Bureau of Mines Bulletin 70, 140 p.

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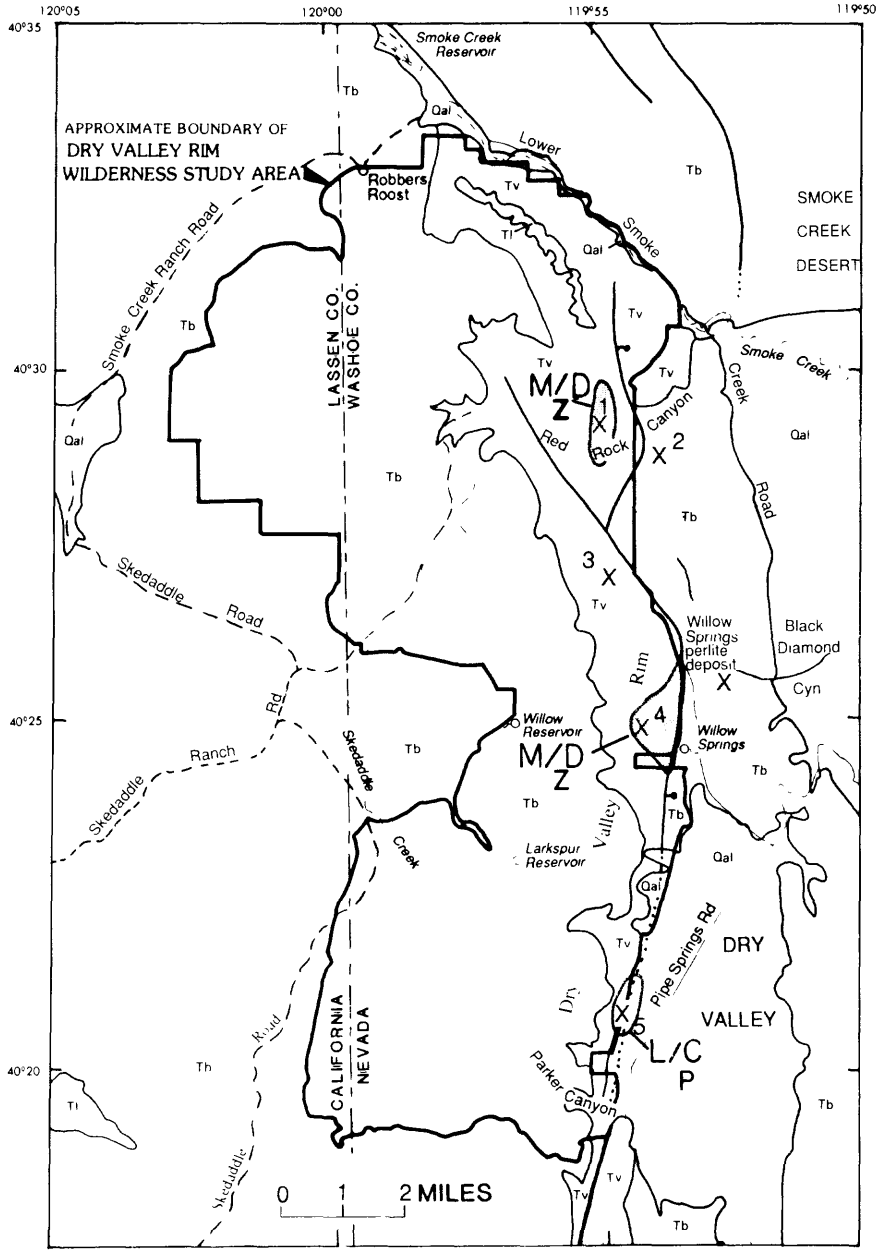

Mineral resources of the Dry Valley Rim Wilderness Study Area.

EXPLANATION

Area with moderate mineral resource potential

Area with low mineral resource potential

See appendix for definition of levels of mineral resource potential (M,L) and certainty of assessment (C,D)

Commodities

Z Zeolites
P Perlite

X Prospect—Red symbol indicates identified resources

1 Red Rock zeolite
2 Capricorn claims
3 Rocky Springs zeolite
4 Willow Springs zeolite
5 Broken Shovel claims

Correlation of map units

Qal — QUATERNARY

Unconformity

Tb
Tv
Tl — TERTIARY

Geologic map units

Qal Alluvium (Quaternary)—Unconsolidated silt, sand, and gravel deposited by fluvial processes; also includes colluvial, aeolian, lacustrine, and landslide deposits

Tb Basalt (Tertiary)—Olivine basalt flows consisting of fine-grained to aphanitic or glassy rocks with phenocrysts of olivine (less than 1 mm), often altered to iddingsite or with iddingsite rims

Tv Volcanic rocks (Tertiary)—Volcanic rocks consisting of intercalated basalt, andesite, rhyolite ash-flow tuff, and lahar deposits. Basalt is locally zeolitic and rhyolite is locally perlitic

Tl Lahar deposits (Tertiary)—Volcanic debris flow and breccia. Occurs as thick sequences of flows in northern part of study area, elsewhere as lobate flows filling channels and as crusts on sides of channels. Contain poorly sorted, angular to sub-rounded clasts of basaltic, andesitic, and (or) dacitic material, in a clast-supported matrix of fine lithic fragments and ash

——— Contact

—T··· Fault—Dotted where concealed; bar and ball on downthrown side

Explanation, mineral resources of the Dry Valley Rim Wilderness Study Area.

Name: East Fork High Rock Canyon Wilderness Study Area

Area number: CA-020-914/NV-020-006A

Size (acres): 52,000 of which 33,460 were studied at the request of the U.S. Bureau of Land Management.

Status of mineral surveys: Only part of this wilderness study area has been studied as part of a mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines (Ach and others, 1987).

Identified mineral resources (known): No mineral resources have been identified within the wilderness study area.

Mineral resource potential (undiscovered): Two areas in the northern and eastern part of the study area have moderate mineral resource potential for gold, silver, and mercury in epithermal deposits. One area along the west boundary of the study area has moderate mineral resource potential for zeolite minerals. A low potential also exists for geothermal energy resources, and potential for oil and gas is unknown.

Mining activity: No mining districts are situated in or near the wilderness study area. There has been no known prospecting activity or mineral production from the wilderness study area, however one pit was found dug in barren rock. There are no current mining claims in the wilderness study area according to October, 1988, U.S. Bureau of Land Management records.

Mineral setting: There are no pre-Miocene basement rocks exposed in the study area. The basement is assumed to be composed of granites and metamorphosed sedimentary rocks. If this is the case, there is no oil and gas resource potential. The oldest exposed rock unit is the middle Miocene Soldier Meadow Tuff. This tuff is overlain by a nonwelded air-fall tuff. The two tuffs have been intruded by rhyolite and are overlain by sedimentary rocks formed in lake-bottom settings. There are several dark basalt caps in the central part of the study area. Ring fractures formed during the eruption of the tuffs may have provided a "plumbing system" for ore-carrying and zeolite-forming hydrothermal fluids in the past and may provide avenues for geothermal fluids now.

Recommendations: As only part of this area has been studied as part of a mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines, further work is needed to assess the 18,540 acres that constitute the balance.

References:

Ach, J.A., Plouff, Donald, and Turner R.L., 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.

Bonham, H.F., 1969, Geology and mineral deposits of Washoe and Storey Counties, Nevada, *with a section on* industrial rock and mineral deposits by K.G. Papke: Nevada Bureau of Mines Bulletin 70, 14 p.

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Korringa, M.K., 1973, Linear vent area of the Soldier Meadow Tuff, an ash-flow sheet in northwestern Nevada: Geological Society of America Bulletin, v. 84, p. 3849-3865.

Noble, D.C., McKee, E.H., Smith, J.G., and Korringa, M.K., 1970, Stratigraphy and geochronology of Miocene volcanic rocks in northwestern Nevada: U.S. Geological Survey Professional Paper 700-D, p. D23-D32.

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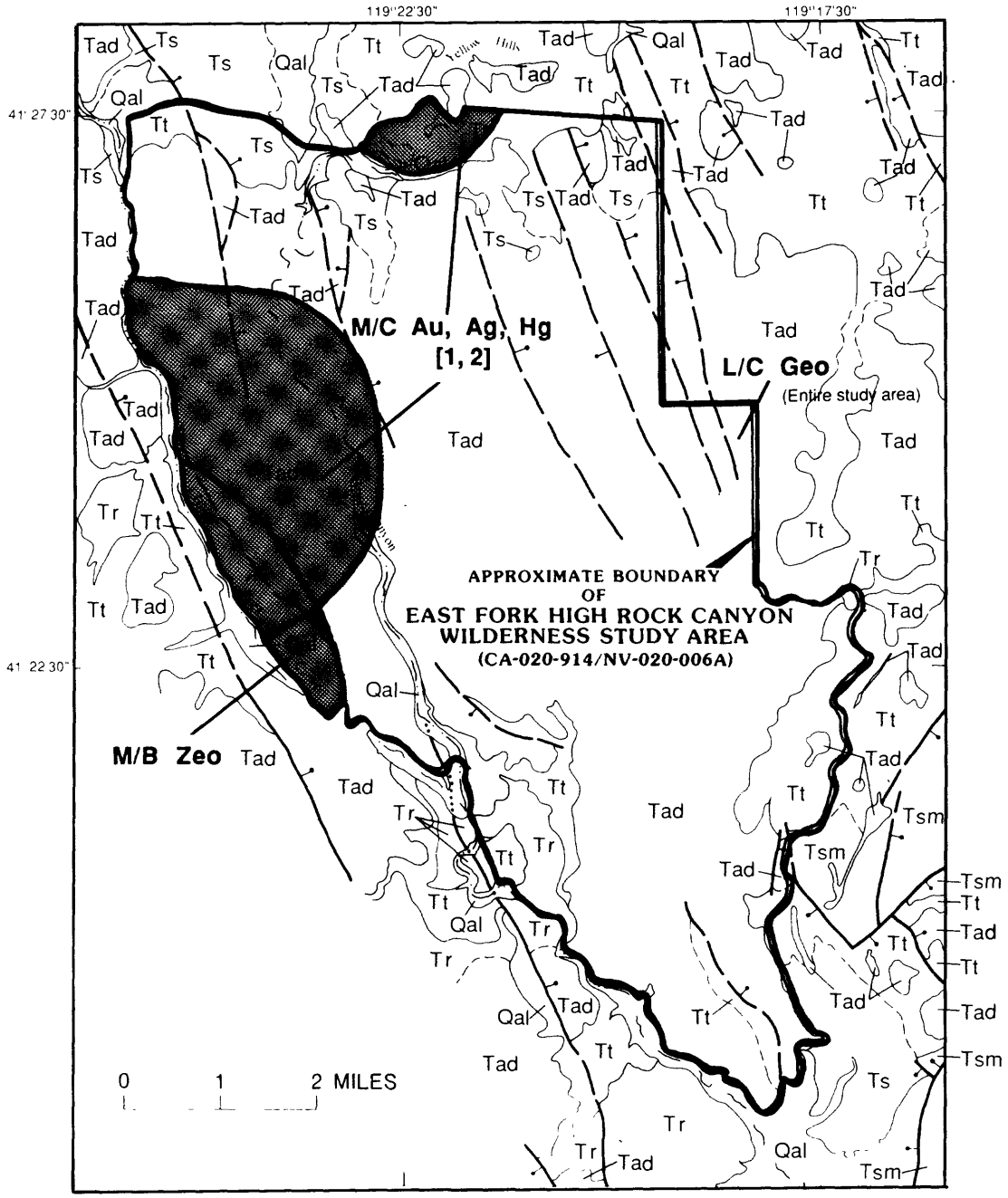
Ransome, F.L., 1909, Notes on some mining districts in Humboldt County, Nevada: U.S. Geological Survey Bulletin 414, 75 p.

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

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

Stewart, J.H., and Carlson, J.E., 1976, Cenozoic rocks of Nevada: Nevada Bureau of Mines and Geology Map 52, scale 1:1,000,000.

Wilden, Ronald, 1964, Geology and mineral deposits of Humboldt County, Nevada: Nevada Bureau of Mines and Geology Bulletin 59, 154 p.



Mineral resources of the East Fork High Rock Canyon Wilderness Study Area.

EXPLANATION

Area with moderate mineral resource potential

Area with low mineral resource potential

See appendix for definition of levels of mineral resource potential and certainty of assessment

Commodities

Au	Gold
Ag	Silver
Hg	Mercury
Zeo	Zeolites
Geo	Geothermal

[ ] Deposit types

1	Epithermal or hot-spring deposits of gold and silver in volcanic and volcaniclastic rocks
2	Epithermal mercury deposits in volcanic and volcaniclastic rocks

Geologic map units

Qal	Alluvium (Quaternary)
Ts	Lacustrine sedimentary rocks (Tertiary)
Tad	Andesite to dacite flows and dikes (Tertiary)
Tr	Rhyolite flows, domes, and dikes (Tertiary)
Tt	Air-fall tuff (Tertiary)
Tsm	Soldier Meadow Tuff (Tertiary)

Contact—Dashed where approximate

Normal fault—Dashed where approximate, dotted where concealed; bar and ball on downthrown side

Intermittent stream

Explanation, mineral resources of the East Fork High Rock Canyon Wilderness Study Area.

Name: Eden Valley
Area number: CA-050-214
Size (acres): 6,674

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): No mineral resources have been identified in the wilderness study area.

Mineral resource potential (undiscovered): The area has low mineral resource potential for copper, manganese, chromite, and platinum. The area also has low potential for coal and geothermal energy resources.

Mining activity: There is no known mineral production from the wilderness study area and no mining districts in the vicinity. One copper prospect is noted in the Mineral Industry Location System (U.S. Bureau of Mines, 1989) and a reference dating back to 1953 (O'Brien, 1953). There are no current claims in the wilderness study area, according to 1988 U.S. Bureau of Land Management records.

Mineral setting: This area is underlain by sedimentary rocks of the Franciscan Formation with accompanying serpentinite and peridotite. The structure is poorly known.

Recommendations: The wilderness study area should be studied as part of a comprehensive survey by the U.S. Geological Survey and the U.S. Bureau of Mines.

References:

Jennings, C.W., and Strand, R.G., compilers, 1960, Ukiah sheet: California Division of Mines and Geology Geologic Map of California, scale 1:250,000.

O'Brien, J.C., 1953, Mines and mineral resources of Mendocino County, California: California Journal of Mines and Geology, vol. 49, No. 4, 418 p.

U.S. Bureau of Land Management, 1988, Geographic index of mining claims.

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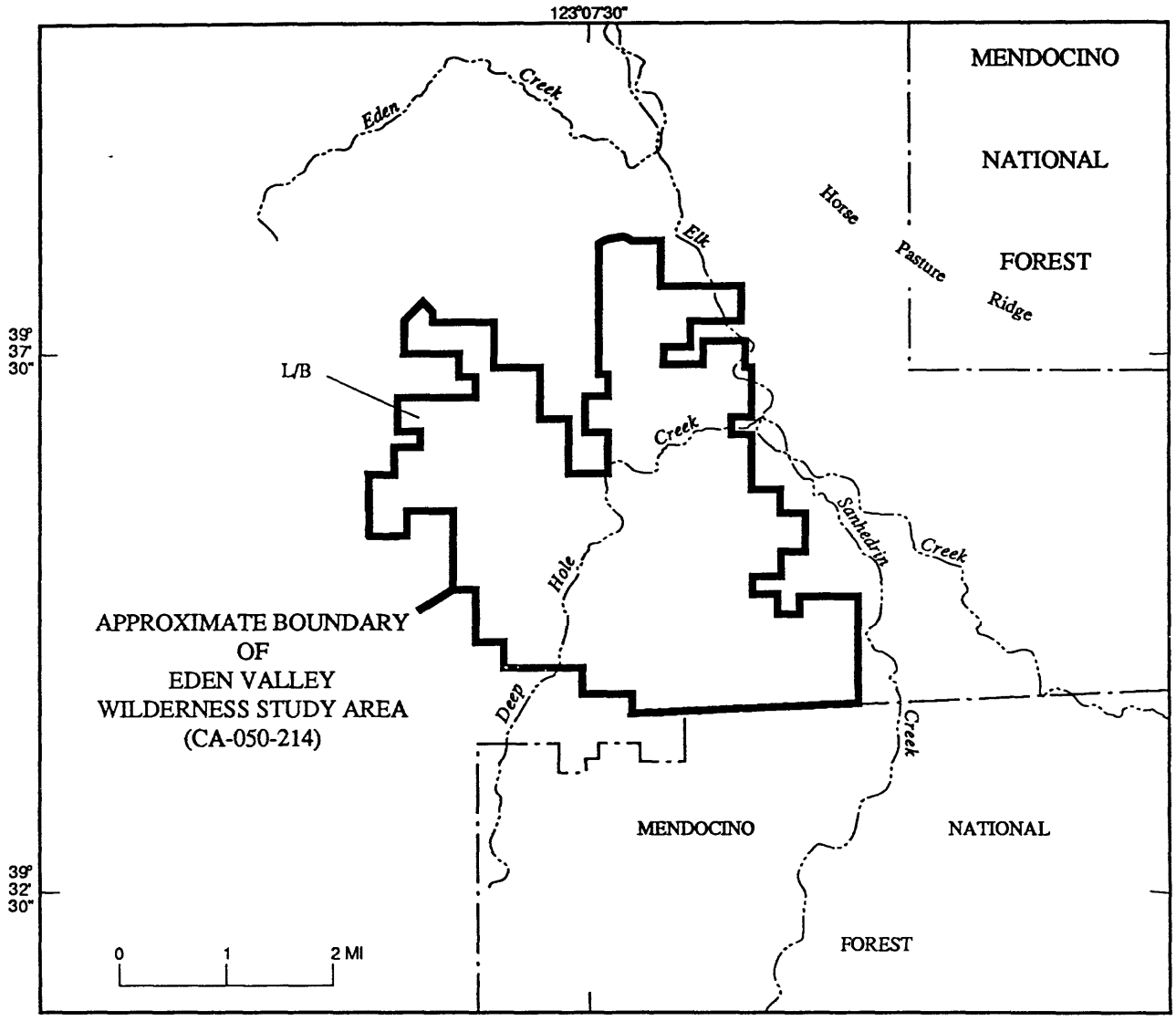
U.S. Bureau of Mines, 1989, Mineral Industry Location System (MILS).



EXPLANATION

L/B Geologic terrane having low mineral resource potential for copper, manganese, chromite, platinum, coal, and geothermal energy resources with certainty level B

Mineral resources of the Eden Valley Wilderness Study Area.

Name: Excelsior
Area number: CA-010-088
Size (acres): 9,383

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): No known mineral occurrences or deposits are present within the wilderness study area.

Mineral resource potential (undiscovered): There is moderate resource potential for geothermal energy, on the basis of the proximity of the late Pleistocene and Holocene volcanism in the Long Valley, Mammoth, and Mono Lake areas. There is low mineral resource potential for silver associated with volcanic rocks.

Mining activity: There is no known mineral production from the wilderness study area. The wilderness study area is not in a mining district. There are no known historical claims in the area and as of October, 1988, there were no current mining claims according to U.S. Bureau of Land Management records.

Mineral setting: The western part of the Excelsior area is blanketed by Quaternary lake deposits that formed during previous stands of Mono Lake (pluvial Lake Russell). The eastern part includes Miocene volcanic rocks.

Recommendations: The inferred low potential for metallic resources assumes that there is no "Comstock-type" epithermal vein deposits in the volcanic rocks, such as are present in the Bodie district, 10 mi north. Geochemical sampling is needed to confirm this evaluation. The wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines. The entire wilderness study area is mapped as Quaternary lake beds and playa deposits. The area should be evaluated for alkali salts, boron and other evaporite minerals.

References:

Koenig, J.B., compiler, 1963, Mariposa sheet: California Division of Mines and Geology Geologic Map of California, scale 1:250,000.

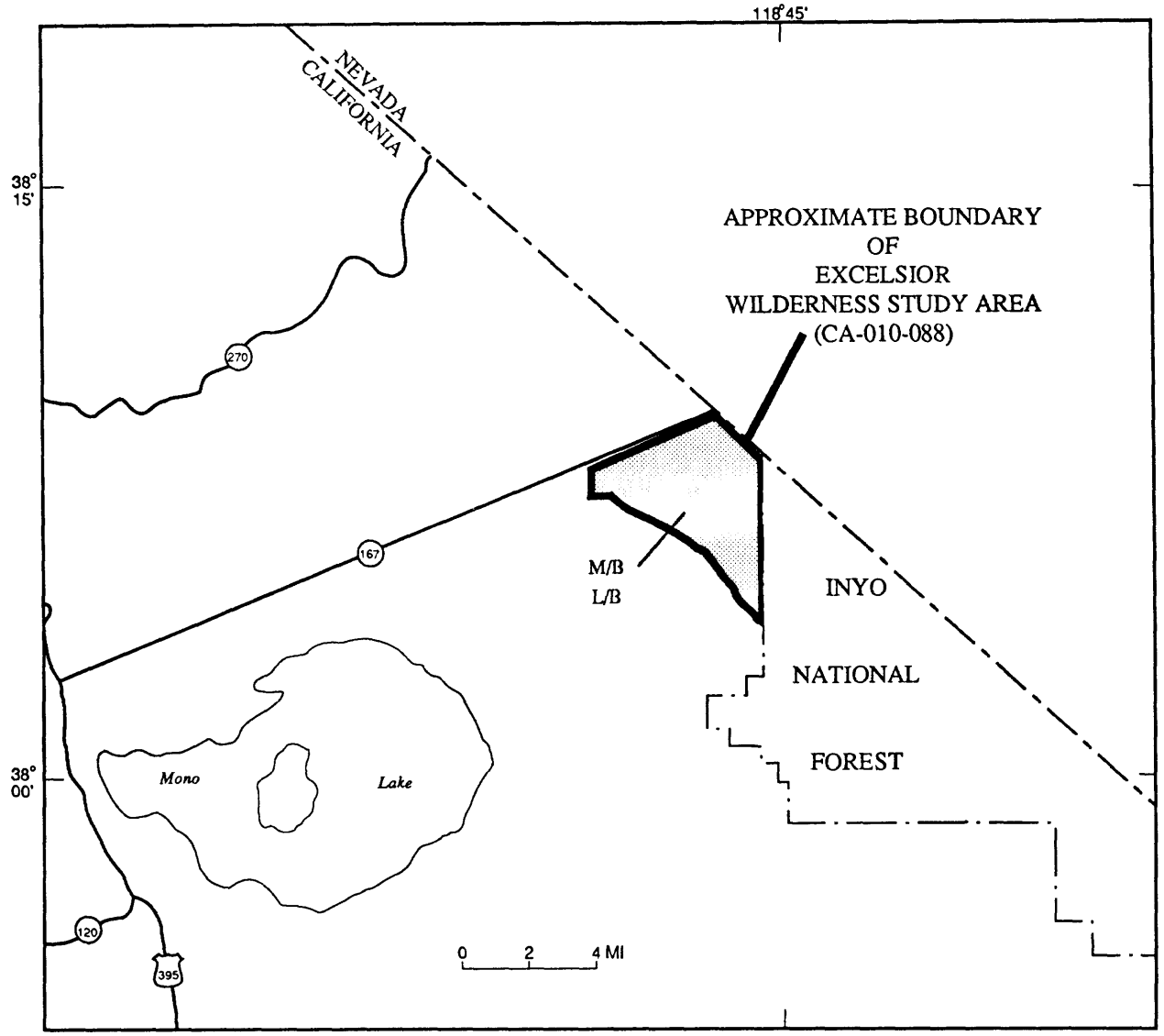
Stewart, J.H., Carlson, J.E., and Johannesen, D.C., 1982, Geologic map of the Walker Lake 1° x 2° quadrangle, California and Nevada: U.S. Geological Survey Miscellaneous Field Studies Map MF-1382-A, scale 1:250,000.

U.S. Bureau of Land Management, 1988, Geographic index of mining claims.

_____1989, California state-wide wilderness study report: draft copy, part 3, v. 1.

U.S. Bureau of Mines, 1989, Mineral Industry Location System (MILS).

U.S. Geological Survey, 1989, Unpublished data from Mineral Resource Data System (MRDS), Menlo Park, California.



EXPLANATION

M/B Geologic terrane having moderate mineral resource potential for geothermal energy with certainty level B

L/B Geologic terrane having low mineral resource potential for silver with certainty level B

Mineral resources of the Excelsior Wilderness Study Area.

Name: Fish Slough
Area number: CA-010-080
Size (acres): 14,450

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): There are no known mineral resources in the wilderness study area; however, the wilderness study area is underlain by the Bishop Tuff, which has been mined in other localities for use as building stone. The Bishop Tuff as mapped by Bateman (1956) occurs as three varieties; one, a hard, consolidated tuff, is used for building stone, the second, a soft, pumiceous tuff, is mined in the Van Loon "fines" pit (sec. 18, T. 6 S., R. 33 E.), about 0.75 mi southeast of the wilderness study area and used in making light-weight, concrete blocks. The third variety, a twenty-foot thick pumice horizon is suitable for light-weight aggregate, and acoustical plaster. The tuff occurring in the wilderness study area is the hard, consolidated variety, according to Bateman (1956), but the other types may underlie it, or occur as horizons or interbeds.

Mineral resource potential (undiscovered): The Bishop Tuff is a commonly used decorative building stone, and there is high resource potential for this commodity in the study area. There are extensive exposures of this material outside the study area, however. There is no evidence that there is any mineral potential for metallic resources exposed at the surface in the study area. There is low potential for buried lode gold or silver deposits, and perhaps tungsten deposits in underlying Triassic and Paleozoic rocks could be assessed with greater certainty through geophysical investigations. The area has been assigned no potential for oil and gas (U.S. Bureau of Land Management, 1989).

Mining activity: There has been no known mineral production or other mining activity within the wilderness study area. An unknown amount of stone has been removed from a number of pits just south of the wilderness study area. There are no current mining claims located in the wilderness study area according to October, 1988, U.S. Bureau of Land Management records.

The Chidago mining district is located about 8 miles north of the wilderness study area, and includes a number of mines which produced base- and precious-metals. If the same terranes underlie the Bishop Tuff in the Fish Slough Wilderness Study Area at depth, there is little possibility that a deposit could be discovered or developed.

Mineral setting: The Fish Slough area is underlain entirely by Bishop Tuff, a Pleistocene ash-flow tuff that forms a broad sloping tableland on the south and east flank of the Benton Range. The tuff probably buries Triassic granodiorite and Paleozoic metasedimentary rocks at shallow depth (less than 400 ft).

Recommendations: The wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines. This is particularly important because of building stone potential.

References:

Bateman, P.C., 1956, Economic geology of the Bishop tungsten district, California: California Department of Natural Resources Division of Mines Special Report 47, 87 p.

Eric, J.H., 1948, Tabulation of copper deposits of California, in Copper in California: California Department of Natural Resources Division of Mines Bulletin 144, p. 199-357.

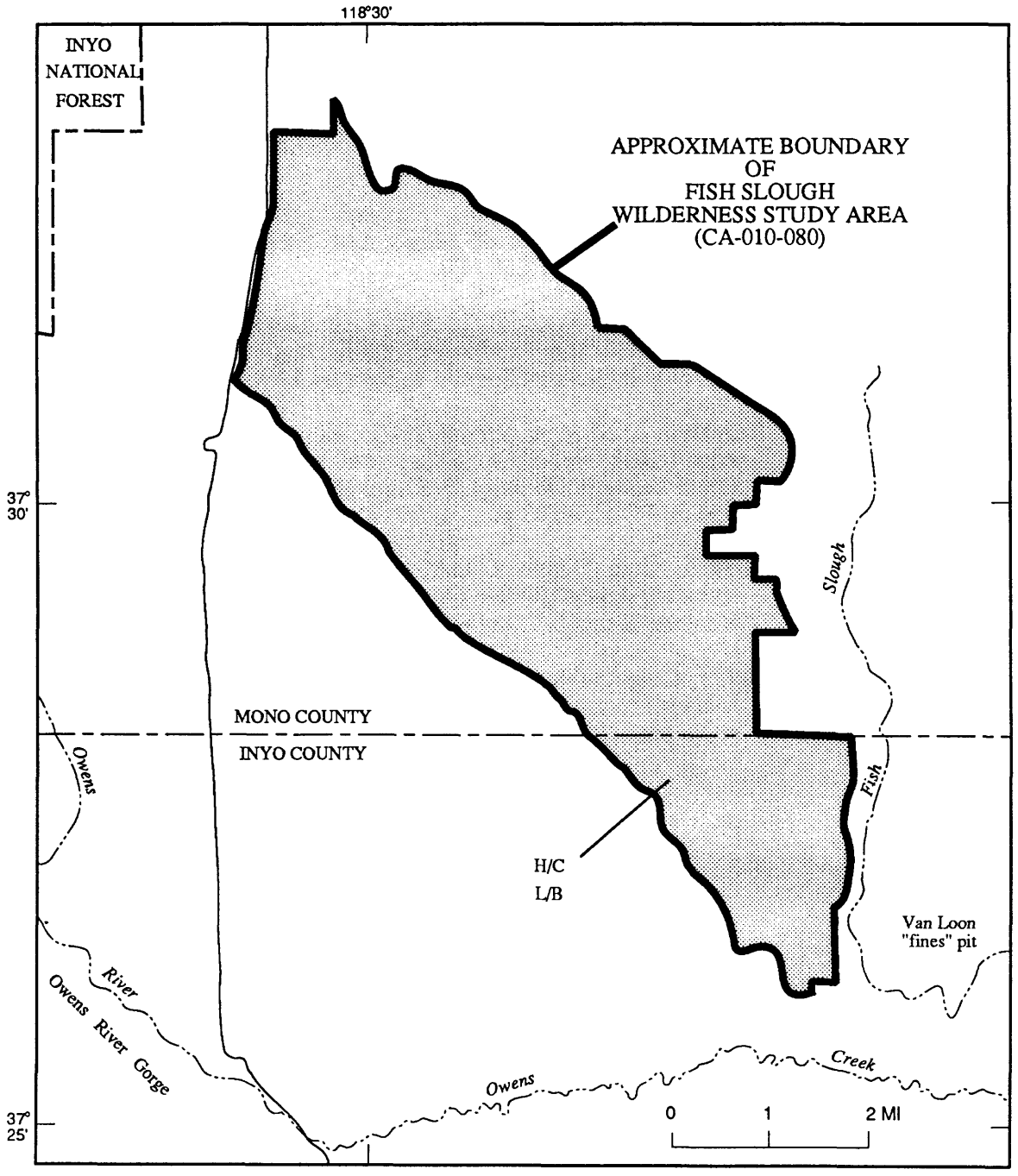
Jenkins O.P., compiler, 1974, (second printing), Mariposa sheet: California Division of Mines and Geology Geologic Map of California, scale 1:250,000.

Rinehart, D.C., and Ross, D.C., 1956, Economic geology of the Casa Diablo Mountain quadrangle, California: California Division of Mines and Geology Special Report 48, 17 p.

U.S. Bureau of Land Management, 1983a, Benton Range G-E-M resource area (GRA No. CA-05) technical report (WSA CA 010-077): Great Basin GEM Joint Venture, Reno, NV, under contract YA-554-RFP2-1054, 33 p.

_____1983b, Casa Diablo G-E-M resources area (GRA No. CA-06) technical report (WSA CA 010-082): Great Basin GEM Joint Venture, Reno, NV, under contract YA-553-RFP2-1054, 29 p.

_____1989, Casa Diablo Wilderness Study Area, *in* U.S. Bureau of Land Management, California state-wide wilderness study report: draft copy, part 3, v. 3, 12 p.



EXPLANATION

H/C Geologic terrane having high mineral resource potential for decorative building stone with certainty level C

L/B Geologic terrane having low mineral resource potential for gold, silver, and tungsten with certainty level B

Mineral resources of the Fish Slough Wilderness Study Area.

Name: Five Springs
Area number: CA-020-609
Size (acres): 47,160

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): The only known mineral commodity in the wilderness study area is about 2,000,000 tons of clay at the Hillside deposit in the Stoney Creek drainage in T. 31 N., R. 16 E., Sec. 3. The deposit was investigated and rejected as a potential source of aluminum in 1944. No records of investigations of other potential uses of the clay are known.

Mineral resource potential (undiscovered): There is high mineral resource potential for clay and low mineral resource potential for diatomite deposits in the wilderness study area. The area probably does not contain any metallic mineral commodities and is also unlikely to have geothermal energy resources.

Mining activity: The wilderness study area is not in a mining district, contains no current claims or leases, according to 1988 U.S. Bureau of Land Management records, and has had no known mineral production.

Mineral setting: The area is underlain by late Tertiary and minor Quaternary basaltic rocks with some Tertiary Lake bed deposits and Quaternary alluvium in the southern part of the area.

Recommendations: The type, quality, and potential uses for the clay from the Hillside deposit should be investigated as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines. References used (see below) did not indicate whether the lake beds might contain diatomite. A further literature search would probably provide this information. If indicated in the literature, field work to determine the extent and quality of diatomite might be warranted.

References:

Gay, T.E., 1966, Economic mineral deposits of the Cascade Range, Modoc Plateau, and Great Basin region of northeastern California in Geology of northern California: California Division of Mines and Geology Bulletin 190, p. 104-107.

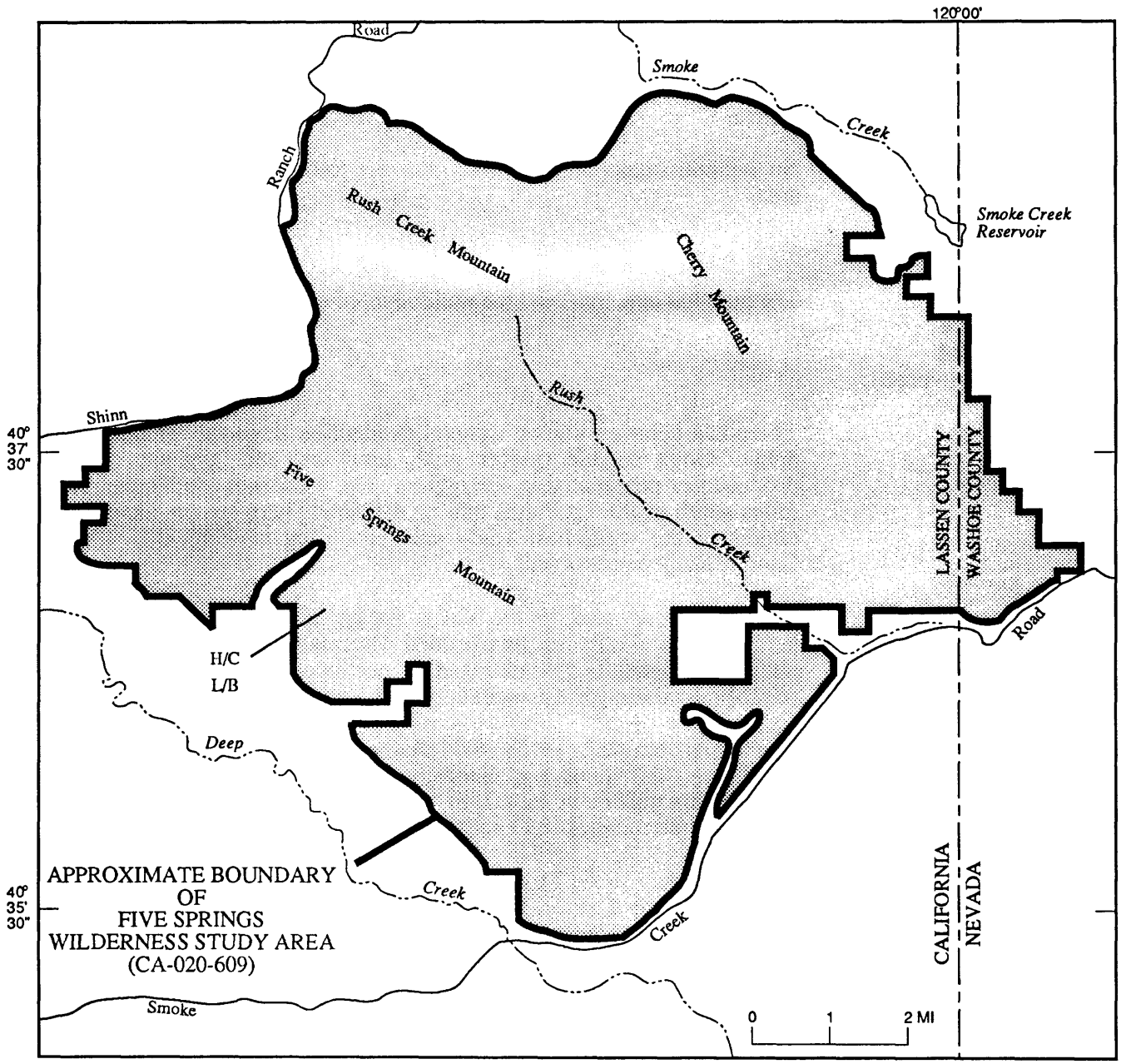
Lydon, P.A., Gay, T.E., Jr., and Jennings, C.W., compilers, 1960, Westwood (Susanville) sheet: California Division of Mines and Geology Geologic Map of California, scale 1:250,000.

U.S. Bureau of Land Management, 1984, Preliminary wilderness recommendations, Eagle Lake-Cedarville study areas: U.S. Bureau of Land Management Draft Environmental Impact Statement.

_____1988, Geographic index (of) all claims.

U.S. Bureau of Mines, 1989, Mineral property file (006-035-0121) on the Hillside clay deposit: Available at the U.S. Bureau of Mines, Western Field Operations Center, E. 360 Third Avenue, Spokane, WA 99202.

_____1989, Mineral Industry Location System (MILS).



EXPLANATION

H/C Geologic terrane having high mineral resource potential for clay with certainty level B as well as identified resources of clay

L/B Geologic terrane having low mineral resource potential for diatomite with certainty level B

Mineral resources of the Five Springs Wilderness Study Area.

Name: Garcia Mountain
Area number: CA-010-012
Size (acres): 78

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): No mineral occurrences or resources are known in the wilderness study area.

Mineral resource potential (undiscovered): The area has low potential for undiscovered oil and gas resources.

Mining activity: There has been no known mineral production from the wilderness study area. Onyx marble, placer gold, uranium, and gypsum have been produced or prospected in the region. The wilderness study area is a few miles south of the La Panza mining district. There are no current mining claims in the wilderness study area according to 1988 U.S. Bureau of Land Management records.

Mineral setting: The area is situated in the Coast Range geomorphic province and is composed primarily of interbedded Cretaceous marine sandstones and shales. The area is characterized by northwest trending folds and faults, roughly paralleling the mountain ranges.

Recommendations: The wilderness study area should be studied as part of a mineral survey by the Bureau of Mines and Geological Survey. This area has not been mapped in sufficient detail to confidently evaluate the potential for undiscovered mineral and energy resources.

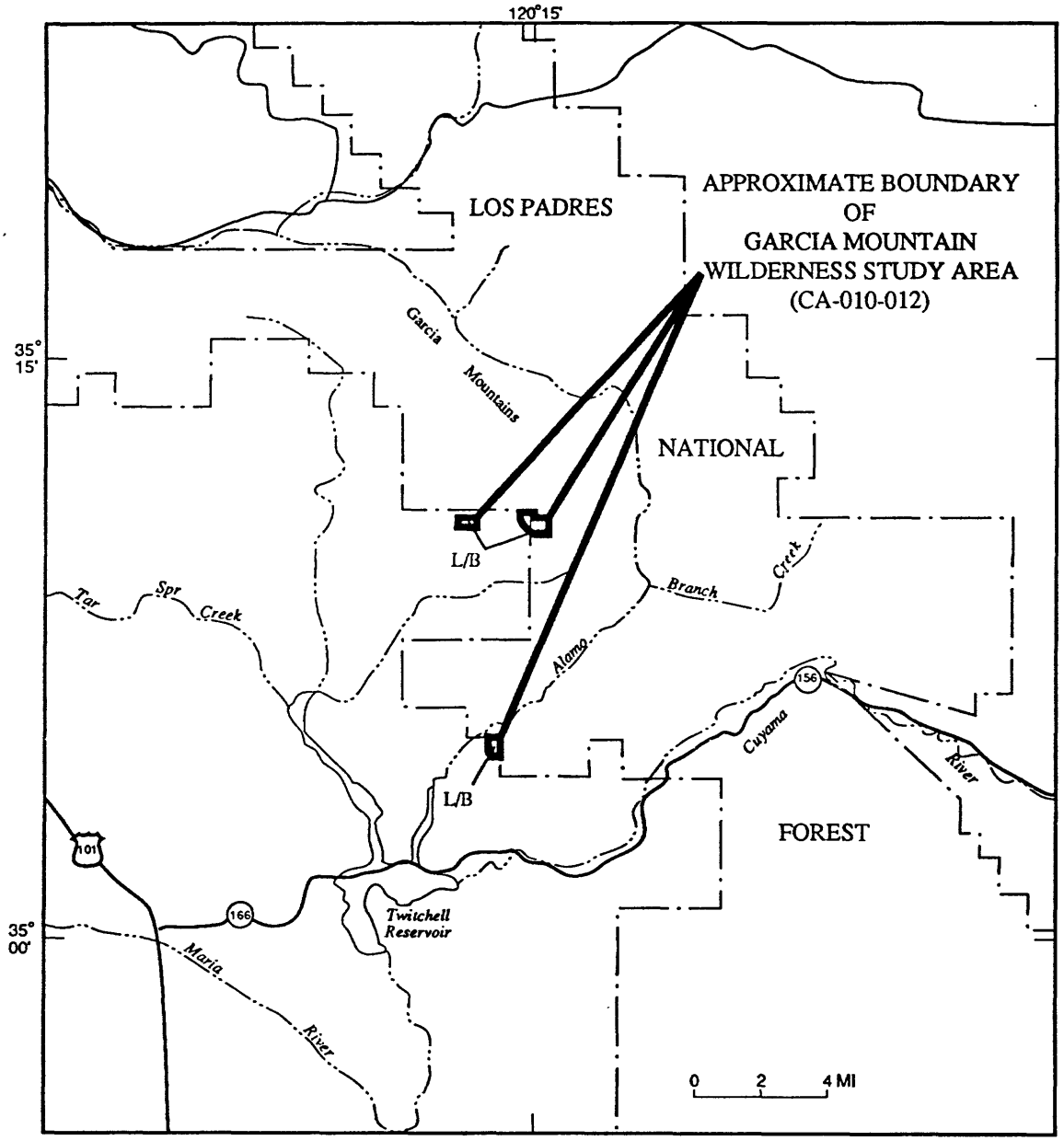
References:

Franke, H.A., 1935, Mines and mineral resources of San Luis Obispo County: California Division of Mines and Geology 31st Report of the State Mineralogist, p. 402-461.

Jenkins, O.P., compiler, 1958, San Luis Obispo sheet: California Division of Mines and Geology Geologic Map of California, scale 1:250,000.

U.S. Bureau of Land Management, 1988, Geographic index (of) all claims.

_____1989, California state-wide wilderness study report: draft copy, part 3.



EXPLANATION

L/B Geologic terrane having low mineral resource potential for oil and gas with certainty level B

Mineral resources of the Garcia Mountain Wilderness Study Area.

Name: Granite Mountains
Area number: CA-010-090
Size (acres): 52,781

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): Except for sand and gravel, no known mineral occurrences or deposits are present within the wilderness study area.

Mineral resource potential (undiscovered): The wilderness study area has moderate mineral resource potential for molybdenum and uranium as well as moderate potential for sand and gravel deposits. The area also has low potential for gold, silver, and thorium. The volcanic rocks are of the wrong composition to host perlite deposits. There is high resource potential for igneous-related geothermal energy, as interpreted from nearby late Pleistocene and Holocene volcanic rocks in the Long Valley, Mammoth, and Mono Lake areas.

Mining activity: There is no known mineral production from the wilderness study area. The wilderness study area is not in a mining district. The 1983 Mono GEM resources report identifies an unconfirmed molybdenum exploration drilling program, more than 100 claims (many of which are for pumice), and speculates that the adit and prospect symbols on the Contract Mountain topographic map, in granite, are quite old works suggesting precious metals or tungsten. As of October, 1988, there were 48 current mining claims in the wilderness study area according to U.S. Bureau of Land Management records.

Mineral setting: The southern part of the Granite Mountains study area encloses Triassic and Jurassic granodiorite and granite. The northern part contains Pliocene and Miocene basalt and andesite. Quaternary lake deposits occur near the northwest margin adjacent to Mono Lake.

Recommendations: With various documents cited in the GEM paper reporting unconfirmed molybdenum exploration, unknown metallic mineralization, speculation on the presence of precious metals or tungsten, workings for unknown commodities, and potential for uranium, it is recommended that the wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines.

Koenig, J.B., compiler, 1963, Walker Lake sheet: California Division of Mines and Geology Geologic Map of California, scale 1:250,000.

Stewart, J.H., Carlson, J.E., and Johannesen, D.C., 1982, Geologic map of the Walker Lake 1° x 2° quadrangle, California and Nevada: U.S. Geological Survey Miscellaneous Field Studies Map MF-1382-A scale 1:250,000.

Strand, R.G., compiler, 1967, Mariposa sheet: California Division of Mines and Geology Geologic Map of California, scale 1:250,000.

U.S. Geological Survey, 1989, Unpublished data from Mineral Resource Data System (MRDS), Menlo Park, California.

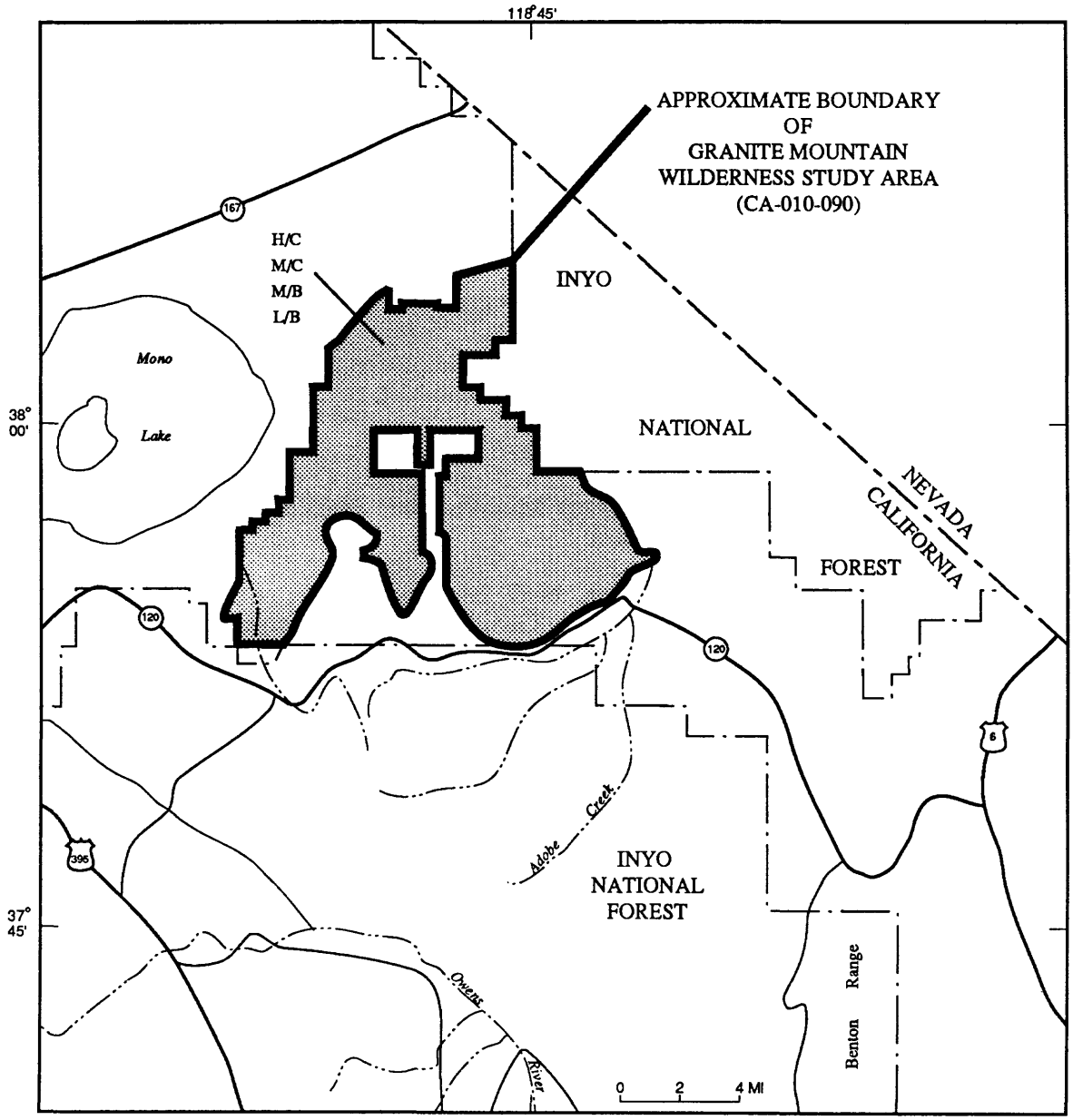
U.S. Bureau of Land Management, 1987, Wilderness recommendations, Benton-Owens Valley/Bodie-Coleville study areas: Environmental Impact Statement.

_____1988, Geographic index of mining claims.

_____1989, California state-wide wilderness study report: draft copy, part 3, v. 1.

U.S. Bureau of Mines, 1989, Mineral Industry Location System (MILS).

U.S. Forest Service, 1988, Mono Basin National Forest Scenic Area: Draft Environmental Impact Statement, 266 p.



EXPLANATION

H/C Geologic terrane having high mineral resource potential for geothermal energy with certainty level C

M/C Geologic terrane having moderate mineral resource potential for sand and gravel with certainty level C as well as identified resources of sand and gravel

M/B Geologic terrane having moderate mineral resource potential for molybdenum and uranium with certainty level B

L/B Geologic terrane having low mineral resource potential for gold, silver, and thorium with certainty level B

Mineral resources of the Granite Mountains Wilderness Study Area.

Name:	Hauser Mountain C
Area number:	CA-060-027C
Size (acres):	5,489
Status of mineral surveys:	This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.
Identified mineral resources (known):	No mineral resources have been identified in the wilderness study area nor were any mineral resources found in a similar geologic environment in the nearby USFS Hauser Roadless Area.
Mineral resource potential (undiscovered):	The wilderness study area has low mineral resource potential for sand and gravel in the surficial deposits. There is no evidence that there is any metallic mineral resource potential in the study area. The study area has no energy resource potential.
Mining activity:	The area is not in a mining district nor have historic or current claims been located according to January, 1989, U.S. Bureau of Land Management records. Feldspar was produced from pegmatite nearby.
Mineral setting:	The study area is underlain predominantly Cretaceous granitic rock with Cenozoic surficial deposits.
Recommendations:	The wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines.

References:

Peters, T.J., 1983, Mineral investigation of the Hauser RARE II area (No. 5021), San Diego County, California: U.S. Bureau of Mines Open-File Report MLA 45-83, 11 p.

Rogers, T.H., 1965, Geologic map of California, San Diego sheet: scale 1:250,000.

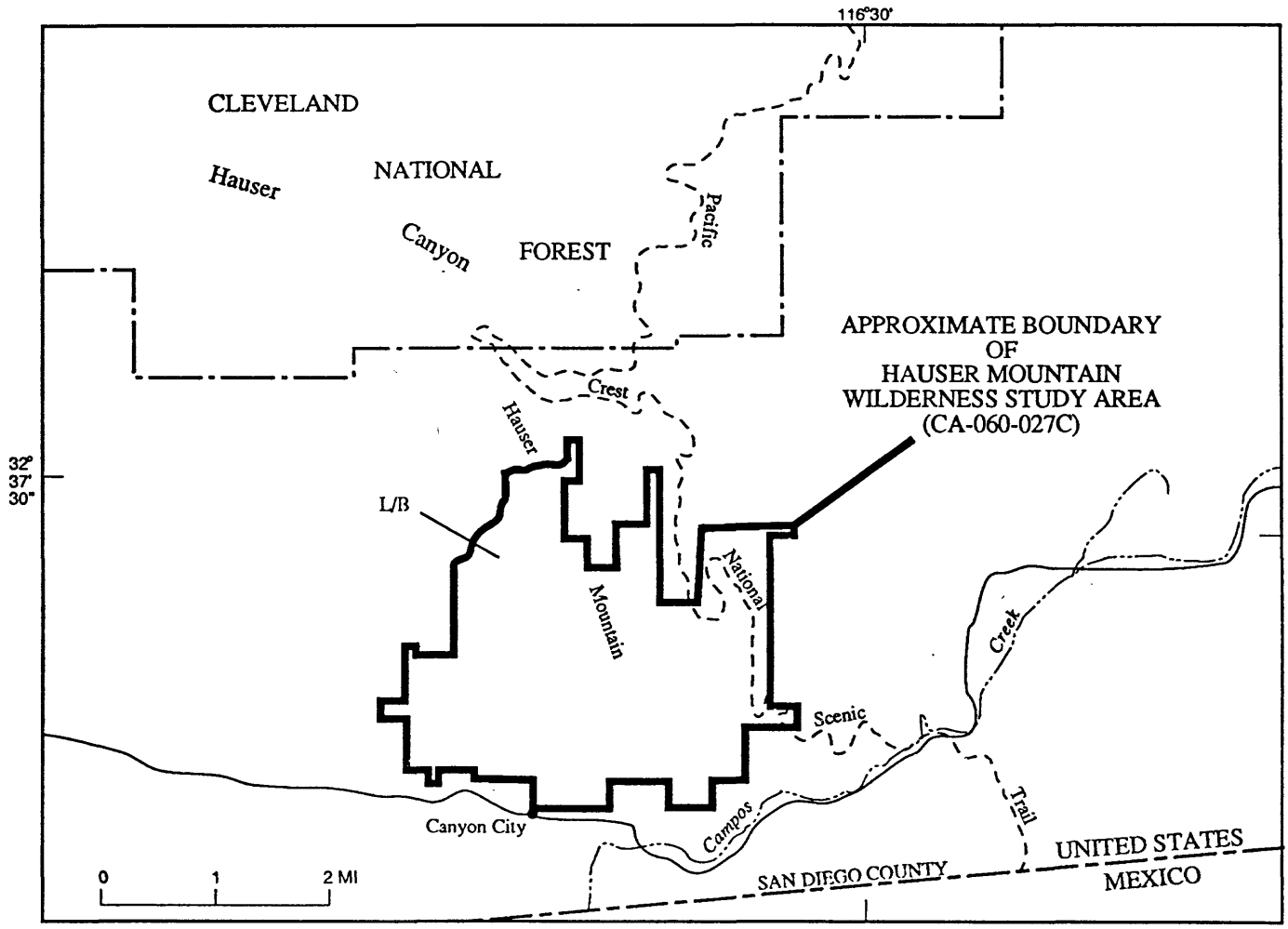
Strand, R.G., compiler, 1962, San Diego-El Centro sheet: California Division of Mines and Geology Geologic Map of California, scale 1:250,000.

U.S. Bureau of Land Management, 1988, California state-wide wilderness study report: draft copy, part 3, v. 3.

_____1989, Geographic index of mining claims.

U.S. Bureau of Mines, 1989, Mineral Industry Location System (MILS).

Weber, F.H., 1963, Geology and mineral resources of San Diego County, California: California Division of Mines and Geology County Report 3, 309 p.



EXPLANATION

L/B Geologic terrane having low mineral resource potential for sand and gravel with certainty level B

Mineral resources of the Hauser Mountain C Wilderness Study Area.

Name: High Rock Canyon
Area number: CA-020-913B
Size (acres): 33,300 of which 11,980 were studied at the request of the U.S. Bureau of Land Management.

Status of mineral surveys: Only part of this wilderness study area has been studied as part of a mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines (Turrin and others, 1988).

Identified mineral resources (known): No mineral resources are identified in the wilderness study area.

Mineral resource potential (undiscovered): Studies show that parts of the study area have a high potential for zeolite mineral resources in altered tuffaceous sediments, a moderate resource potential for gold, silver, and mercury in epithermal-type precious-metal deposits, and a low potential for uranium, lithium, geothermal energy, oil, and gas resources.

Mining activity: The wilderness study area is not in a mining district. Six placer claims were located in 1911. There are no current mining claims in the wilderness study area according to October, 1988, U.S. Bureau of Land Management records. Major mining companies have explored for disseminated gold-silver-mercury deposits near the wilderness study area.

Mineral setting: The area is underlain by a sequence of Tertiary rhyolitic to dacitic ash-flow tuffs and flows. Two major sets of faults that trend northwest and northeast are present within the study area.

Recommendations: As only part of this area has been studied as part of a mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines, further work is needed to assess the 21,320 acres that constitute the balance. Massive opal and opalized breccia is present in the area, the same rock types that have been explored for gold-mercury deposits nearby. It is recommended that a detailed evaluation of these opalized areas be conducted.

References:

Ach, J.A., Plouff, Donald, and Turner R.L., 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.

Bonham, H.F., 1969, Geology and mineral deposits of Washoe and Storey Counties, Nevada: Nevada Bureau of Mines Bulletin 70, 140 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 YA-553-CT1-1096 by Barringer Resources, Inc., Golden, CO, 72 p. and appendices.

Geodata International, Inc., 1979, Aerial radiometric and magnetic survey-Vya national topographic map-Nevada: U.S. Department of Energy Open-File Report GJBX-136(79), vol. 1, 51 p., and appendices; vol. 2, 72 p.

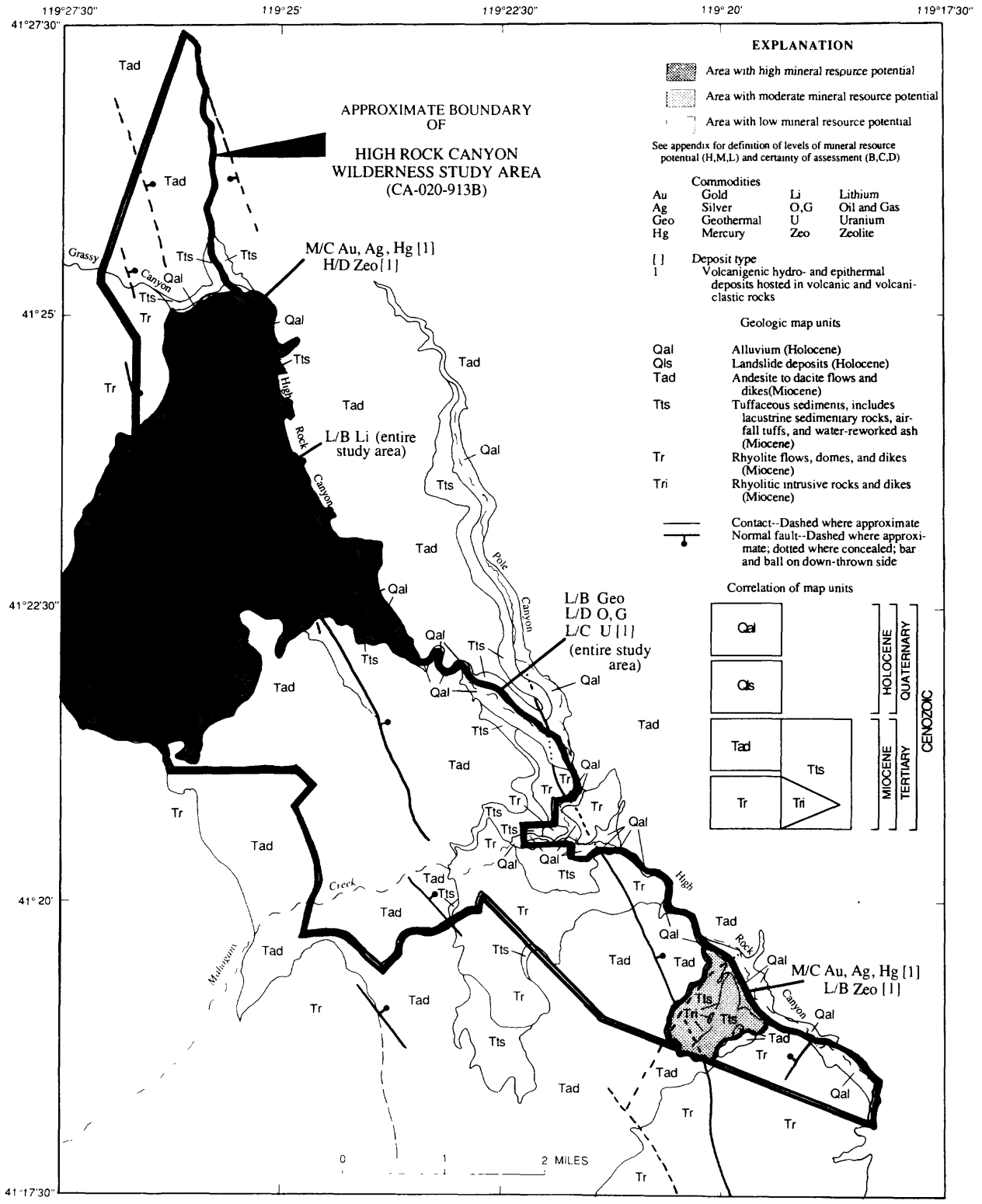
Neumann, T.R., and Close T.J., 1985, Mineral resources of the High Rock Lake Wilderness Study Area, Humboldt County, Nevada: U.S. Bureau of Mines Open-File Report MLA 38-85, 14 p.

Schmauch, S.W., 1986, Mineral resources of the East Fork High Rock Canyon study area, Humboldt and Washoe Counties, Nevada: 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.

Stewart, J.H., and Carlson, J.E., compilers, 1978, Geologic map of Nevada: U.S. Geological Survey in cooperation with the Nevada Bureau of Mines and Geology, scale 1:500,000.

Turrin, B.D., Bergquist, J.R., Turner, R.L., Plouff, Donald, 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.



Mineral resources of the High Rock Canyon Wilderness Study Area.

Name: Independence Creek
Area number: CA-010-057
Size (acres): 6,250

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): There are no known mineral occurrences or resources in the wilderness study area.

Mineral resource potential (undiscovered): The study area has low mineral resource potential for silver, lead, and zinc that is associated with metavolcanic rocks. The metavolcanic rocks, if present, are buried beneath alluvial cover. The area has an abundance of poorly sorted sand and gravel; more well-sorted deposits are located outside the study area and closer to markets.

Mining activity: There are no known mines in or mineral production from the wilderness study area. There are four current claims in the southwestern part of the wilderness study area according to July, 1988, U.S. Bureau of Land Management records. No known mining districts encompass this area.

Mineral setting: The Independence Creek study area is situated mostly in the George Creek basin, eight miles south of Independence Creek. It is out on the range front and bajada from the John Muir Wilderness. The bedrock in the study area consists Mesozoic or Paleozoic mafic and felsic metavolcanic rocks that have been intruded by plutonic rocks of Jurassic or Cretaceous age. The plutonic rocks consist of granodiorite with minor alaskite and mafic rocks, primarily diorite. The bedrock is covered in much of the area by alluvial fan deposits of poorly sorted sand, gravel, and boulders, some of which is derived from glacial till.

Recommendations: The wilderness study area should be studied as part of a comprehensive mineral survey by the Bureau of Mines and Geological Survey to increase the certainty that the mineralization within the adjacent U.S. Forest Service lands extend into this U.S. Bureau of Land Management land.

References:

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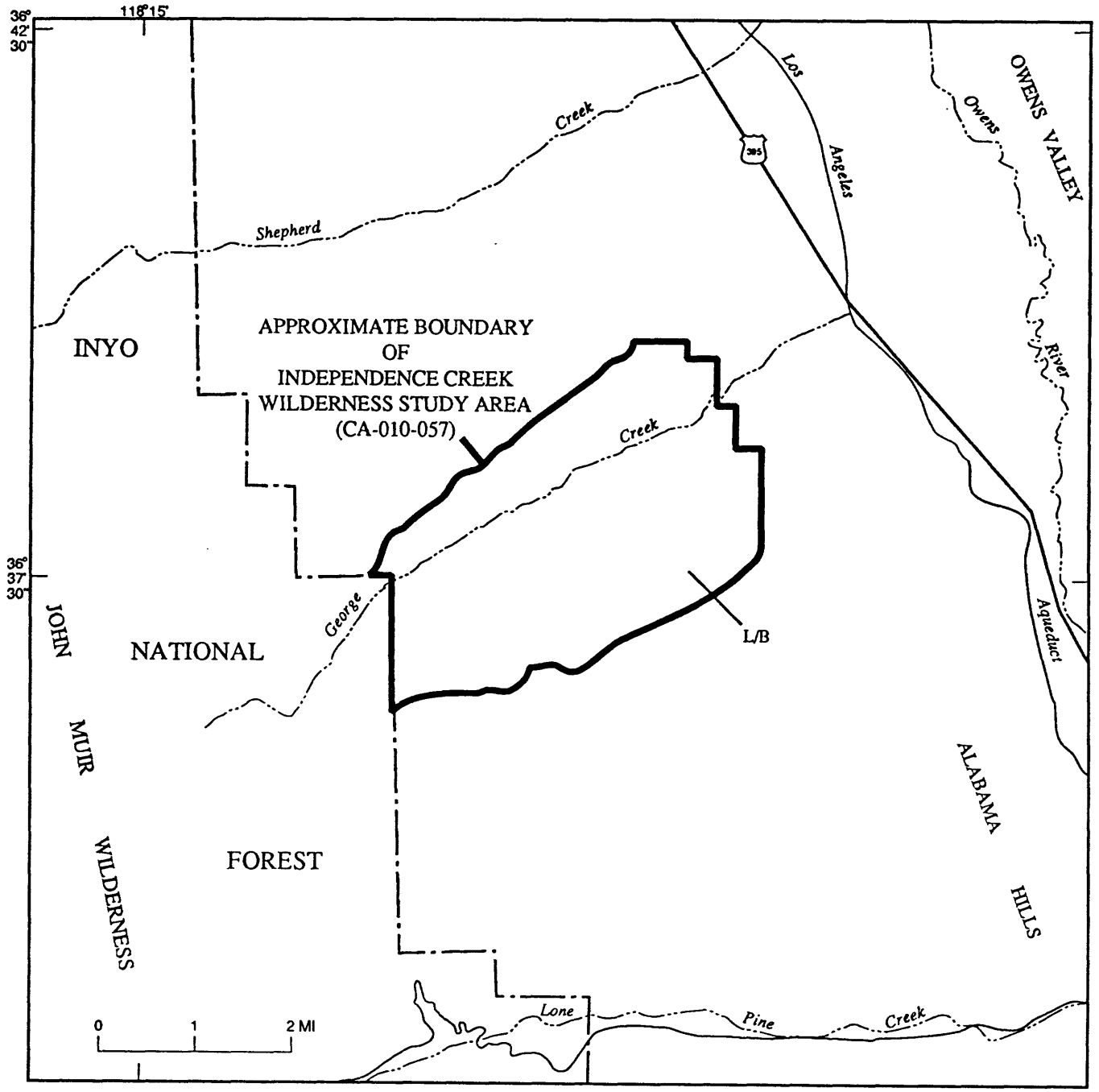

EXPLANATION

L/B Geologic terrane having low mineral resource potential for silver, lead, and zinc with certainty level B

Mineral resources of the Independence Creek Wilderness Study Area.

Names: King Range Wilderness Study Area and Chemise Mountain Instant Study Area

Area numbers: CA-050-112 and CA-050-111

Size (acres): 31,709 and 3,941 (3,200 studied on Chemise Mountain at the request of the U.S. Bureau of Land Management.)

Status of mineral surveys: Most of these study areas has been studied as part of a mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines (McLaughlin and others, 1981).

Identified mineral resources (known): No mineral resources have been identified within the instant study area or wilderness study area.

Mineral resource potential (undiscovered): Both areas have low potential for lead, zinc, copper, silver, and manganese resources. Both areas have low potential for geothermal energy, oil and gas, uranium, thorium, sand and gravel.

Mining activity: There is no known prospecting activity or mineral production from within the instant study area and wilderness study area. Adjacent to these areas there has been minor production of oil and manganese, and prospecting for gold, silver, copper, lead and zinc. North of and adjacent to the King Range wilderness study area intermittent prospecting occurred for oil in the Mattole district from 1865 to 1960. Total production for the district is approximately 350 barrels.

Just southeast of the King Range wilderness study area, the Queen Peak mine produced 1,651 short tons of manganese ore during 1958 and 1959. A 4-ft-wide mineralized northeast-striking fault zone is present between the Chemise Mountain Instant Study Area and King Range Wilderness Study Area. Four samples averaged 10.9 ounces per ton silver, 0.56 percent copper, 7.6 percent lead, and 17.7 percent zinc. The full extent of the mineralized zone is unknown.

Mineral setting: These areas are underlain by the Sedimentary Rocks of the King Range, a unit believed to be Early to Middle Tertiary in age and consisting of silty argillite, arkosic and andesitic sandstone, conglomerate and mudstone grading to melange with local blueshist, volcanic rocks and chert.

Recommendations: The 741 acres for which U.S. Bureau of Land Management did not request mineral surveys in the Chamise Mountain Instant Study Area should be studied as part of a mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines.

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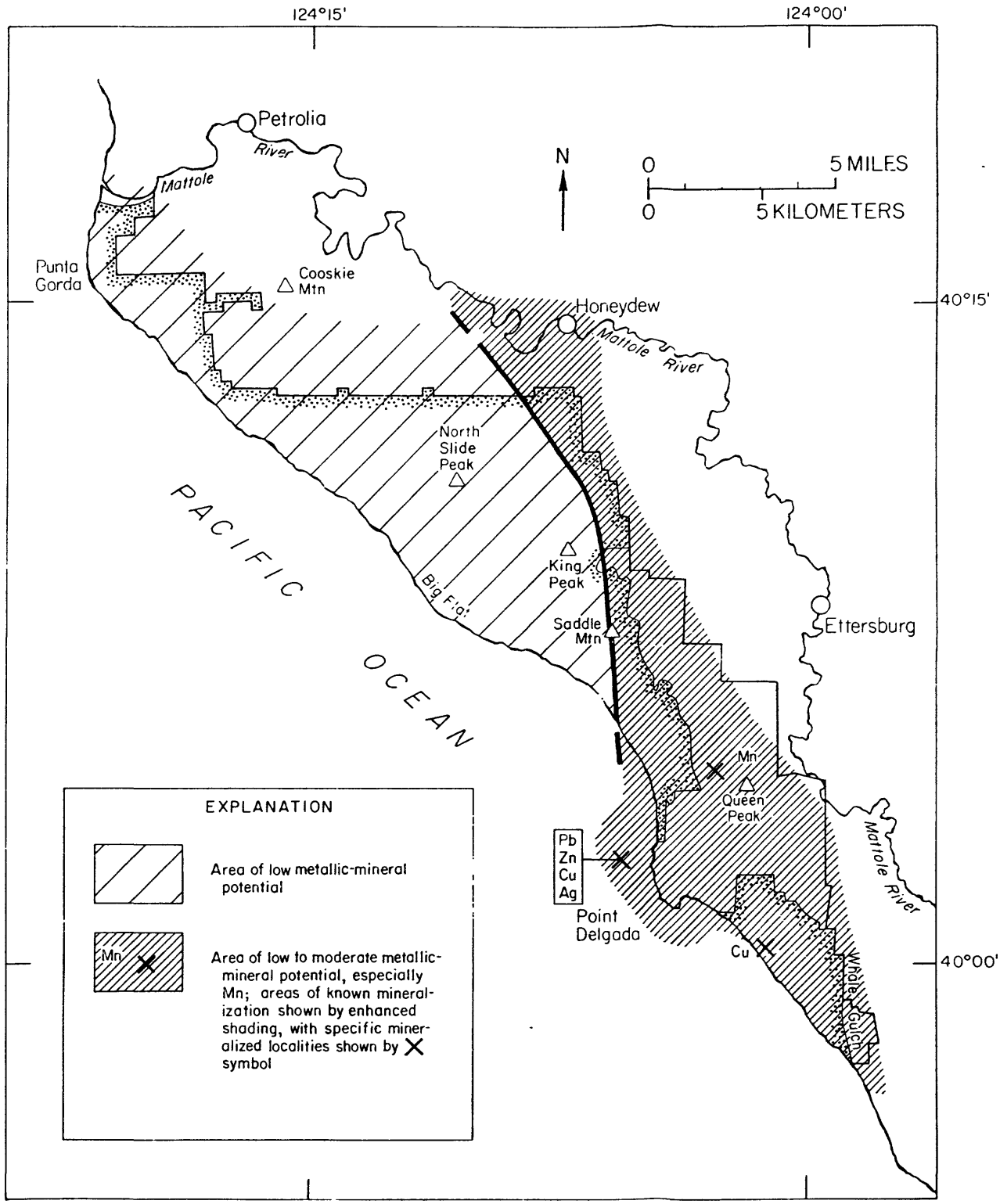

Mineral resources of the King Range Wilderness Study Area and Chemise Mountain Instant Study Area.

Name: Laurel-McGee
Area number: CA-010-072
Size (acres): 110

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): The entire wilderness study area is apparently underlain by glacial till and outwash which would serve as a large sand and gravel resource if a point of use were nearby. Presently, demand for sand and gravel is being met by closer sources.

Mineral resource potential (undiscovered): Surface hot springs in the vicinity, recent volcanic activity, and the presence of faults that could serve as channels for hydrothermal fluids indicate a high potential for geothermal resources. There is no evidence that there is any mineral potential metallic resources in the study area. The presence of nearby tungsten mines and resources suggests a low mineral resource potential for tungsten-bearing rock that may underlie the glacial material.

Mining activity: There are no current mining claims in the wilderness study area according to January, 1989, U.S. Bureau of Land Management records.

Mineral setting: This small area (about 0.5 mi^2) is located on the southern edge of the Long Valley caldera, site of a large volcanic eruption 700,000 years ago. The area is underlain by Quaternary glacial moraine deposits, gravel, and alluvium.

Recommendations: The wilderness study area should be studied as part of a mineral survey by the Bureau of Mines and Geological Survey to increase the certainty that the mineralization within the adjacent U.S. Forest Service lands extend into this U.S. Bureau of Land Management land.

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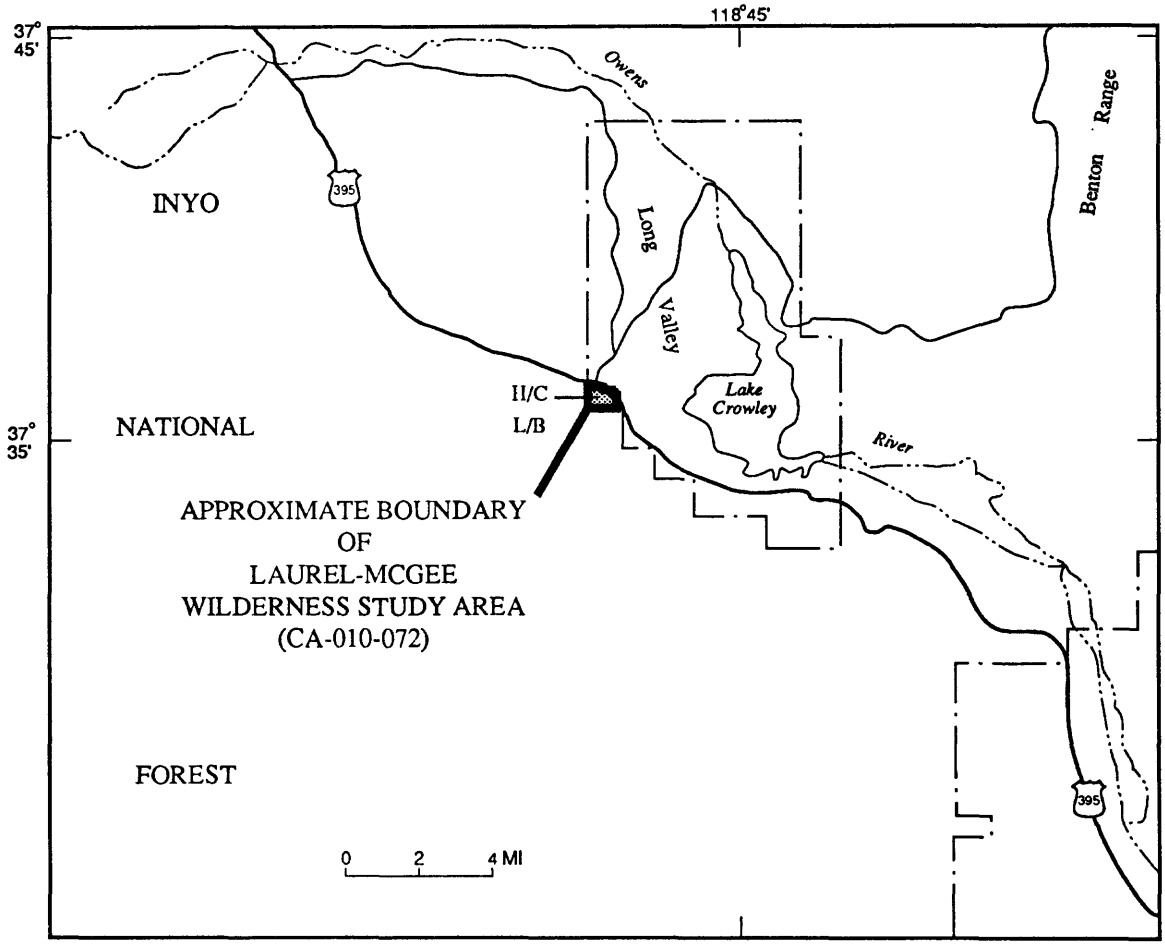

EXPLANATION

H/C Geologic terrane having high mineral resource potential for geothermal energy with certainty level C as well as identified resources of sand and gravel

L/B Geologic terrane having low mineral resource potential for tungsten with certainty level B

Mineral resources of the Laurel-McGee Wilderness Study Area.

Name: Lava
Area number: CA-030-203
Size (acres): 11,632

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): The only known mineral resources in the Lava study area are volcanic cinders. Five cinder cones are situated within the wilderness study area and several are present nearby.

Mineral resource potential (undiscovered): The study area has moderate potential for placer gold resources; moderate potential for geothermal and oil and gas resources; and moderate potential for zeolite and cinder resources.

Mining activity: One placer, the Blue Sage, located in 1948 for cinders, extends into the southwest corner of the wilderness study area. Cinders from the Blue Sage is bagged and sold as decorative stone for landscaping. Cinders have been mined by Perk-O-Lite Concrete for the last 35 years from the Pittville Silica #2 placer claim, located adjacent to the southeast corner of the wilderness study area. Perk-O-Lite mines between 5,000 and 8,000 cubic yards of cinder per year and uses it as an additive for lightweight concrete block, road metal, and fill material for leach fields.

Two non-competitive oil and gas leases (3,640 acres) have been issued in the northernmost and southernmost portions of the wilderness study area.

Mineral setting: The study area is located entirely within an area of Tertiary to Quaternary basaltic to andesitic flows. A north-northwest trending fault cuts the eastern edge of the study area.

Recommendations: The wilderness study area should be studied as part of a comprehensive mineral survey by the Bureau of Mines and Geological Survey. This is particularly important because of the potential for cinders. Future work in the form of geologic mapping, geochemical sampling, and heat flow measurements, is necessary to accurately assess the resource potential of the study area.

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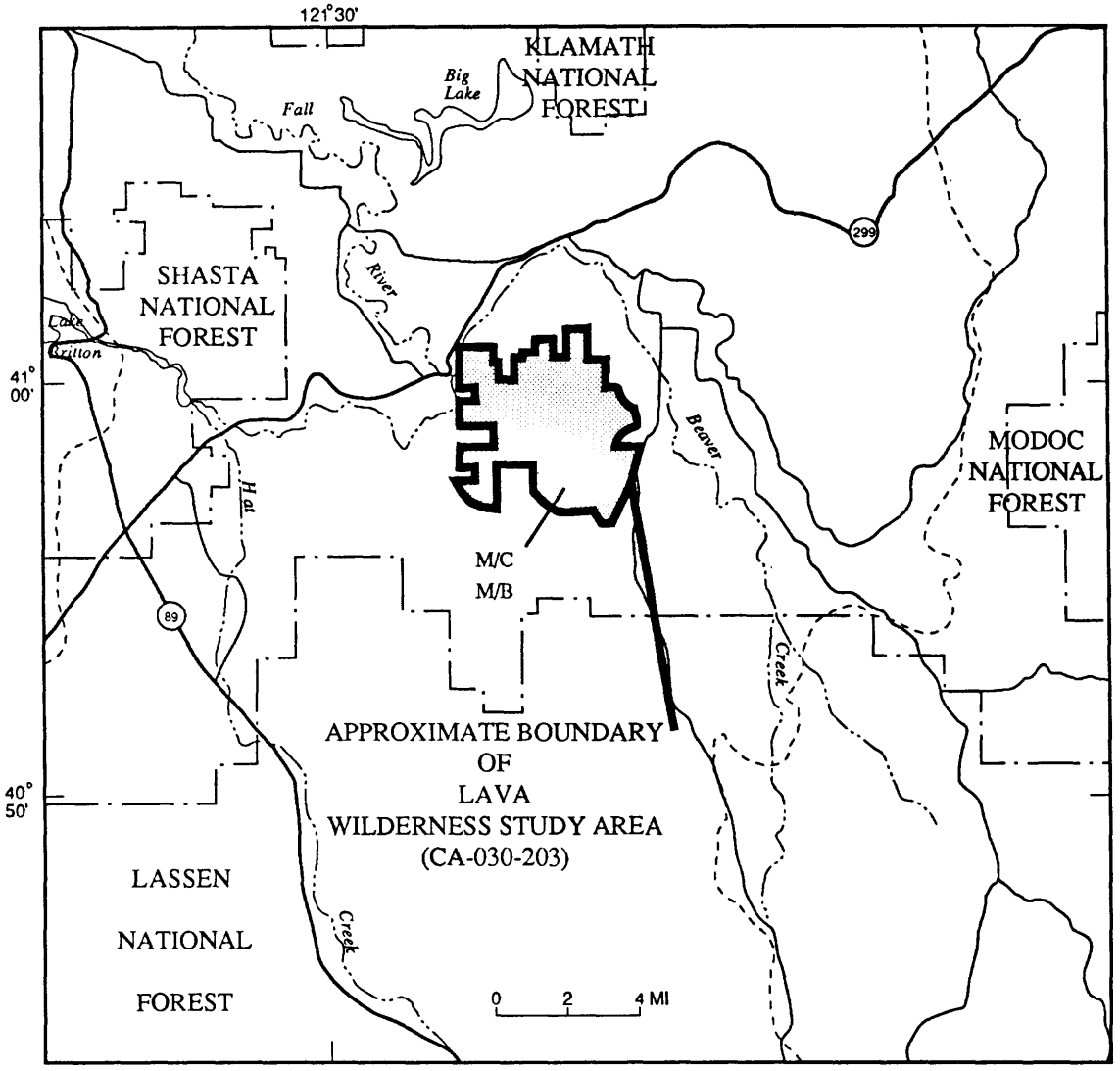

EXPLANATION

M/C Geologic terrane having moderate mineral resource potential for cinders with certainty level C

M/B Geologic terrane having moderate mineral resource potential for gold, geothermal energy, oil and gas, and zeolites with certainty level B

Mineral resources of the Lava Wilderness Study Area.

Name: Little High Rock Canyon
Area number: CA-020-913
Size (acres): 52,143 of which 17,320 were studied at the request of the U.S. Bureau of Land Management.

Status of mineral surveys: Only part of this wilderness study area has been studied as part of a mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines (Keith and others, 1987).

Identified mineral resources (known): There are no known mineral resources in the wilderness study area.

Mineral resource potential (undiscovered): The results of studies suggest three areas with moderate resource potential for gold and silver in epithermal deposits in the northwestern, central, and southern parts of the area. Elsewhere within the study area, the potential for these resources is low. Two small areas in the southeastern part of the study area have low potential for uranium resources; one small area has low potential for pozzolan resources, and one area has low potential for perlite resources. Potential for geothermal resources is low in the entire study ares.

Mining activity: The area is not in a mining district. Claim blocks for gold, uranium, and perlite have been staked near the wilderness study area. The uranium and perlite have been determined to be uneconomic; gold exploration is ongoing. There are no current mining claims in the wilderness study area according to October, 1988, U.S. Bureau of Land Management records.

Mineral setting: The study area is underlain by a sequence of lava flows and pyroclastic deposits that overlie and interfinger with lake and stream sediments; all are of Miocene age. These volcanic and sedimentary rocks are faulted and locally altered.

Recommendations: As only part of this area has been studied as part of a mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines, further work is needed to assess the 34,823 acres that constitute the balance. The structural lineament hosting the gold extends into the wilderness study area. A comprehensive study of this structure is recommended.

References:

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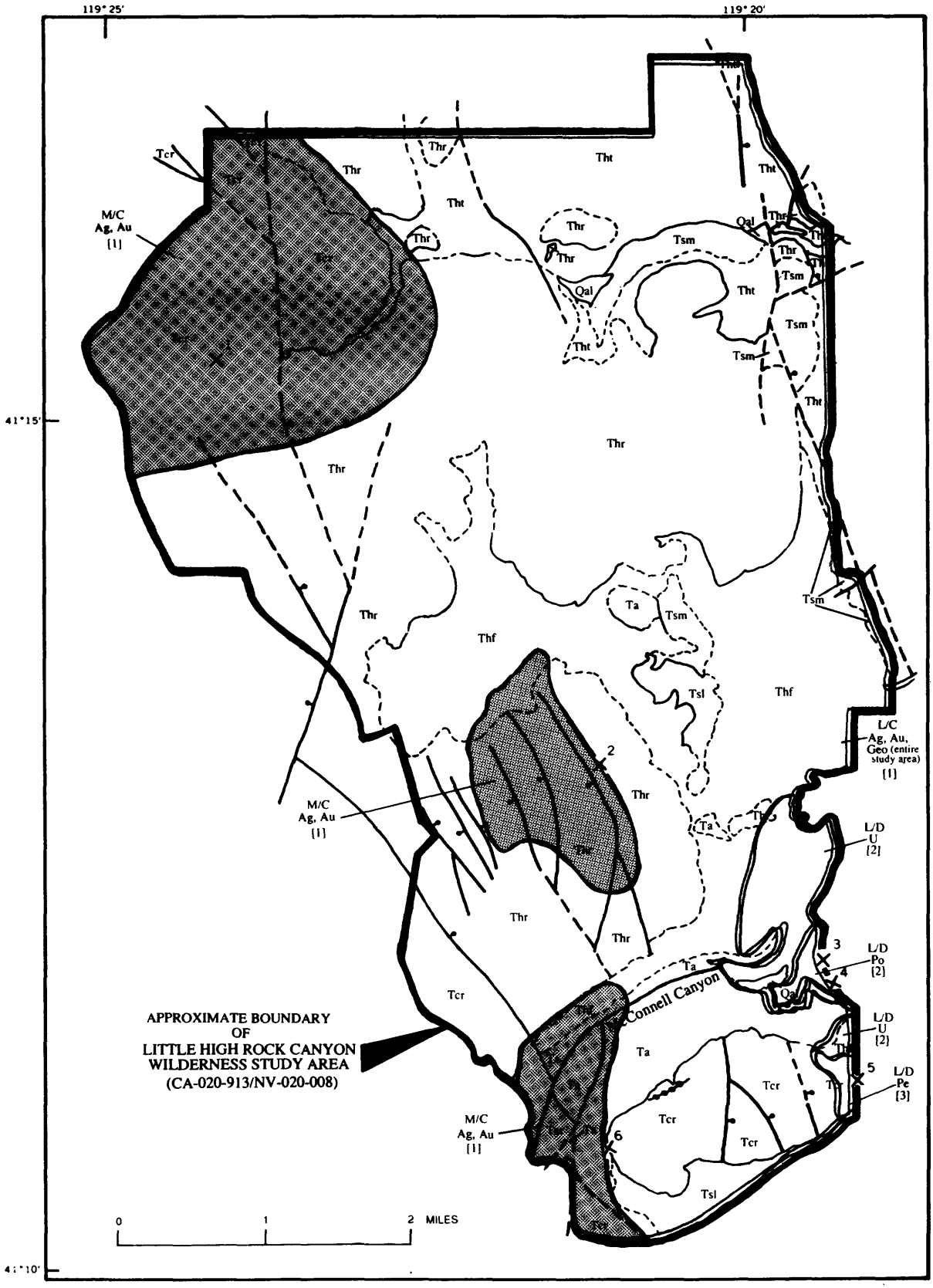


Mineral resources of the Little High Rock Canyon Wilderness Study Area.

EXPLANATION

Area with low mineral and geothermal resource potential

Area with moderate mineral resource potential

See appendixes for definition of levels of mineral resource potential and certainty of assessment

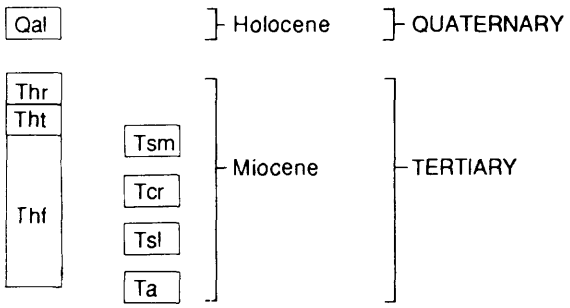
Commodities

Ag	Silver
Au	Gold
Geo	Geothermal
Pe	Perlite
Po	Pozzolan
U	Uranium

[ ] Types of deposits or occurrences

1	Epithermal hot-spring low-grade bulk-mineable
2	Tuffaceous sediments
3	Basal vitrophere

Correlation of Map Units



Geologic map units

Qal	Alluvium (Holocene)
	High Rock Sequence of Bonham (1969) (Miocene)
Thr	Rhyolite of Little High Rock Canyon
Tht	Tuff of Little High Rock Canyon
Thf	Fluviolacustrine sediments--Locally includes air-fall tuffs
Tsm	Soldier Meadow Tuff (Miocene)
Tcr	Cañon Rhyolite of Merriam (1910) (Miocene)
Tsl	Summit Lake Tuff (Miocene)
Ta	Andesite lava flows (Miocene)--Rocks equivalent to the Steens Basalt

Contact--Dashed where approximately located

Fault--Dashed where approximately located. Bar and ball on downthrown side

2 Prospect or mineralized area--See table 1 for description

Fissure

Explanation, mineral resources of the Little High Rock Canyon Wilderness Study Area.

Name: Masonic Mountains
Area number: CA-010-102
Size (acres): 6,600

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): There are no identified resources in the study area but a mercury occurrence that is not economic is present in the wilderness study area.

Mineral resource potential (undiscovered): The study area has moderate mineral resource potential for small deposits of gold and silver in quartz veins in both the volcanic rocks and in small windows of pre-Tertiary metamorphic and granitic rocks. There is high mineral resource potential for mercury in opalized and otherwise altered rhyolite. There is high resource potential for geothermal energy at the southern margin of the study area owing to the occurrence of hot springs nearby to the south.

Mining activity: There is no known mineral production from the wilderness study area. The wilderness study area is not in a mining district; however, the northern boundary is the southern edge of the Masonic gold mining district. As of October, 1988, there were 12 current mining claims in the wilderness study area according to U.S. Bureau of Land Management records.

Mineral setting: Most of the study area consists of basaltic to rhyolitic volcanic extrusive rocks of Tertiary age, and varied sediments of both Quaternary and Tertiary ages. The other five percent is composed of metamorphosed volcanic and volcaniclastic rocks, intermediate and silicic in composition, and epiclastic sedimentary rocks, all of Jurassic and Triassic age. The study area is relatively free of major faulting but is flanked by areas cut by numerous northwest- to northeast-trending normal faults.

Recommendations: Further investigation of the potential for the occurrence of mineral resources should include a geochemical sampling program and a reconnaissance search for bleached areas, and for opalization of silicic volcanic rocks. The proximity of the wilderness study area to both the Masonic and the Bodie mining districts and hydrothermal alteration common to all three areas indicates that the wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines.

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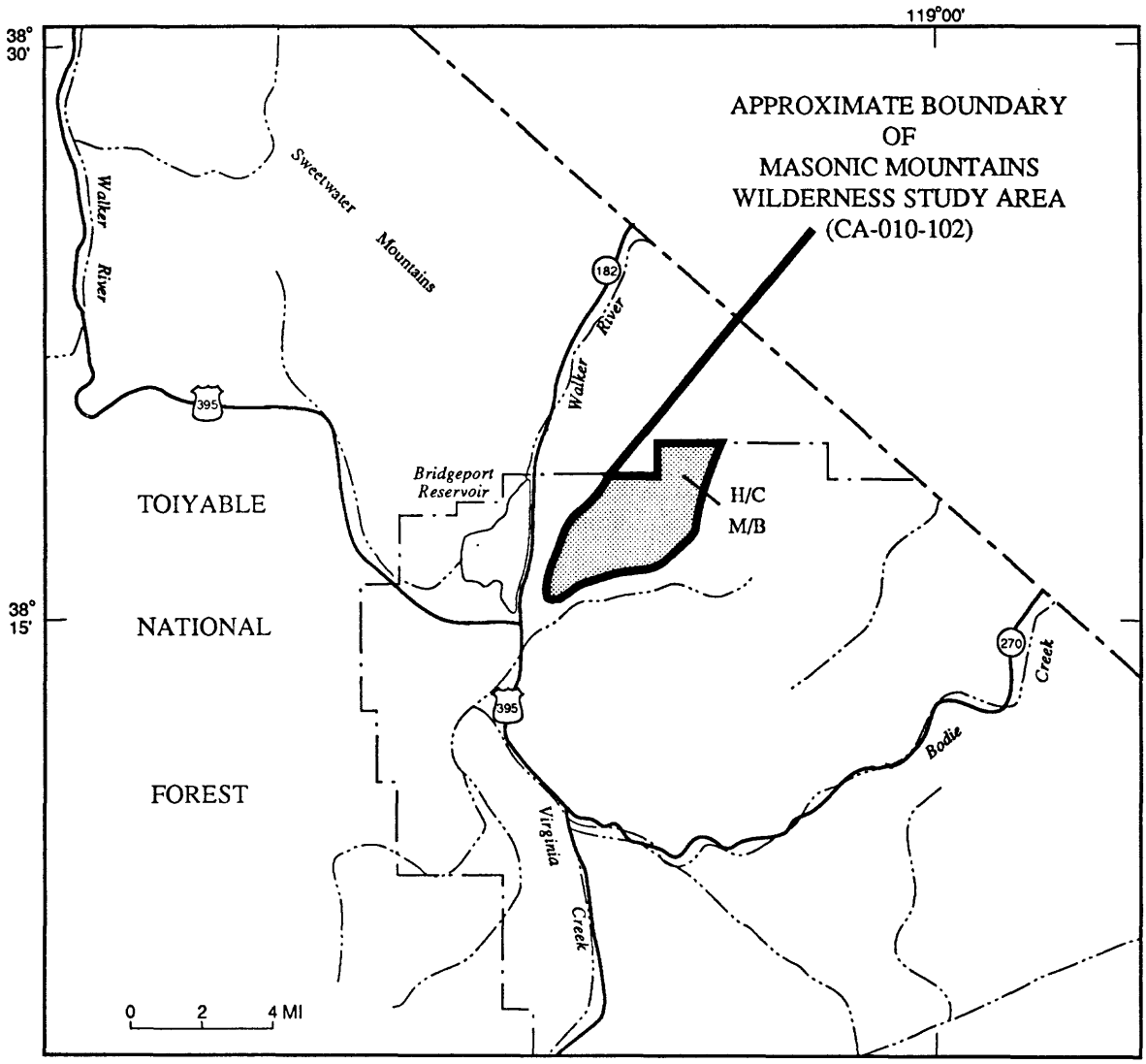

EXPLANATION

H/C Geologic terrane having high mineral resource potential for mercury and geothermal energy with certainty level C

M/B Geologic terrane having moderate mineral resource potential for gold and silver with certainty level B

Mineral resources of the Masonic Mountains Wilderness Study Area.

Name: Massacre Rim
Area number: CA-020-1013
Size (acres): 110,000 of which 23,260 were studied at the request of the U.S. Bureau of Land Management.

Status of mineral surveys: Only part of this wilderness study area has been studied as part of a mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines (Bergquist and others, 1988).

Identified mineral resources (known): There are no identified mineral resources in the wilderness study area.

Mineral resource potential (undiscovered): There is moderate mineral resource potential for gold, silver, and mercury in hydrothermal deposits in the eastern part of the study area. There is moderate mineral resource potential for uranium throughout the study area. There is no potential for oil and gas in the study area. The potential for geothermal resources is unknown.

Mining activity: There has been no known prospecting activity or mineral production from the wilderness study area. The wilderness study area is not part of any organized mining district and there are no current mining claims according to October, 1988, U.S. Bureau of Land Management records.

Mineral setting: The study area is underlain mostly by basalt flows of Miocene age. The basalt mostly covers older Tertiary rhyolite and tuffaceous sediments. Because the tuffaceous sediments which underlie the basalt flows are relatively incompetent, there has been extensive landsliding in the region.

Recommendations: As only part of this area has been studied as part of a mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines, further work is needed to assess the 86,740 acres that constitute the balance.

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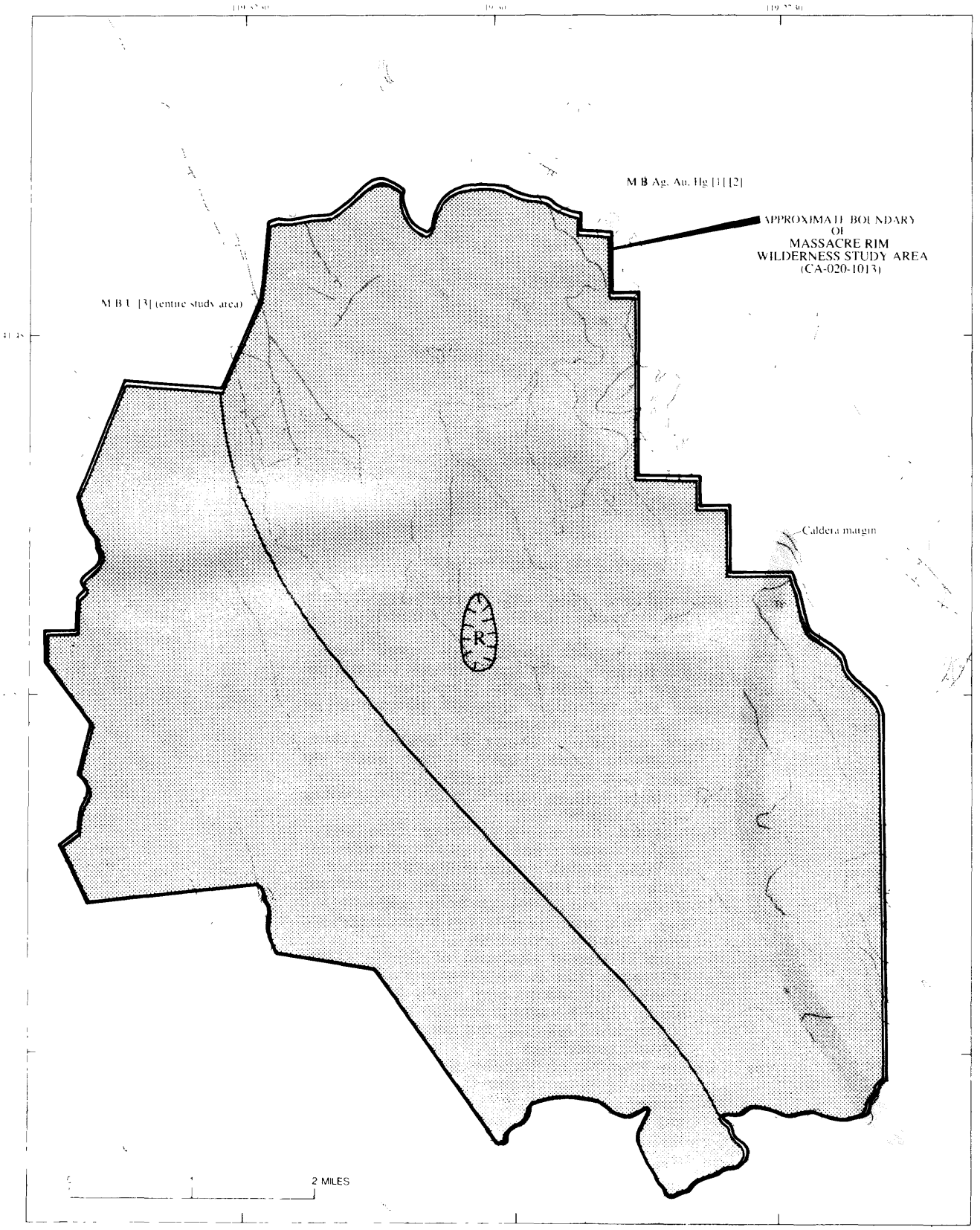


Mineral resources of the Massacre Rim Wilderness Study Area.

EXPLANATION

Area with moderate mineral resource potential (M); data only suggest certainty level (B)

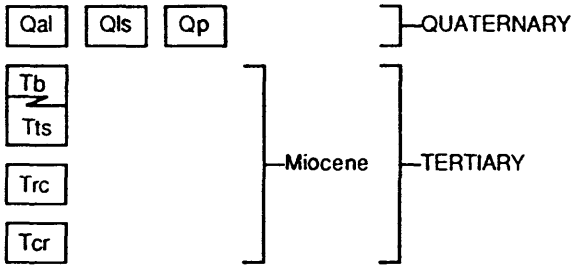
Commodities

Au	Gold
Ag	Silver
Hg	Mercury
U	Uranium

[ ] Types of deposits

1	Hot-spring gold-silver
2	Hot-spring mercury
3	Volcanogenic uranium

Correlation of map units



Description of geologic map units

Qal **Alluvium and colluvium (Quaternary)**--Stream deposits of clay, silt, sand, gravel, and boulders, and colluvium

Qls **Landslide deposits (Quaternary)**--Chaotic masses and blocks of basalt and tuffaceous sedimentary rocks; arrow shows direction of movement

Qp **Playa and lacustrine deposits (Quaternary)**--Clay, silt, sand, and alkali salts

Tb **Basalt of Catnip Creek of Greene (1984) (Miocene)**--Brownish-black- to black-weathering basalt flows; dark to medium gray on fresh surfaces; individual flows typically 10 to 20 ft thick; locally vesicular to scoriaceous

Tts **Tuffaceous sedimentary rocks (Miocene)**--Unconsolidated to weakly consolidated, weakly to distinctly bedded, mostly lacustrine deposits of volcanic ash, claystone, siltstone, volcaniclastic sandstone, and pumice-rich, air-fall, and water-laid tuffs. Rock colors are white, light shades of gray and brown, light pink, and reddish

Trc **Rhyolite of Catnip Mountain of Greene (1984) (Miocene)**--Light- to medium-gray rhyolite, locally streaked light reddish gray; locally pumiceous or glassy; minor amounts of obsidian; phenocrysts of quartz, alkali feldspar, and sodic amphibole in aphanitic groundmass

Tcr **Canon Rhyolite of Merriam (1910) (Miocene)**--Reddish-gray to maroon rhyolite, streaked and mottled medium to light gray; banded, lithophysal, and vesicular textures; phenocrysts of quartz, alkali feldspar, and biotite in aphanitic groundmass

Contact--Dashed where approximate

Fault--Dashed where approximate. Bar and ball on downthrown side

Flow ridges in basalt

Inferred margin of buried caldera

Area of anomalous radioactivity

Explanation, mineral resources of the Massacre Rim Wilderness Study Area.

Name: Merced River
Area number: CA-040-203
Size (acres): 12,835

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): Gold, silver, copper, and jade have been produced in and adjacent to the wilderness study area. Further study is needed to appraise if any resources remain in the mines. Mineral commodities either prospected for or produced from similar geologic settings in the region include: platinum, lead, zinc, mercury, manganese, chromium, nickel, cobalt, asbestos, calcium carbonate, ornamental stone, talc, and mica.

Mineral resource potential (undiscovered): The study area has high mineral resource potential for deposits of gold, accompanied by lesser amounts of silver, along and adjacent to northwest-trending, quartz-bearing fissures. Dikes of granitoid rocks injected along these fissures historically are also reported to have been the locus of ore deposition. In the past decade or more, interest has grown in the search for fine-grained disseminated gold ("gray ore") in altered wallrock, for example greenstone and schist, along and near the northwest-trending fissures. Such deposits have the promise of significantly greater yields as a result of modern bulk mining and beneficiation techniques. The area has moderate mineral resource potential for copper and jade near mines that formerly produced these commodities as there may be still be resources left. The area has low mineral resource potential for platinum, lead, zinc, mercury, manganese, chromium, nickel, cobalt, asbestos, calcium carbonate, ornamental stone, talc, and mica.

Mining activity: U.S. Bureau of Mines production records, which go back to 1890, show that mines within one mi of or in the wilderness study area produced more than 126,000 ounces of gold, 38,900 ounces of silver, and 22,000 pounds of copper. When partial production estimates found in the literature for the 1848 to 1890 period are added in, gold production totals over 220,000 ounces. The largest producers are the Pine Tree-Josephine, Mountain King, Schroeder, and French mines.

Nearly every drainage in the wilderness study area has been mined for placer gold. Placer mining (mostly suction dredging) continues on the Merced River, North Fork Merced River, Sherlock Creek, and Solomon Gulch. At the Pine Tree-Josephine mine, ore chutes are present in an immense, multiple-vein system (Mother Lode), which averages 125 feet wide, strikes N. 30°-35° W., and dips 55°-60° northeast. The vein system occupies a thrust fault bordered on the east by serpentine and on the west by the Mariposa slate. The property is less than one mi from the southwest boundary of the wilderness study area.

Adjacent to the wilderness study area, the Mountain King mine has five persistent quartz veins and numerous smaller veins. At the Schroeder mine, early production came from ground sluicing the residual weathered upper portion of the vein system. Lode ore is from a system of narrow parallel north-trending veins that dip steeply to the east. This vein system is cross cut by a discontinuous blanket-vein, that is inches to 3 feet wide, and dips to the east 15° to 35°. Wall rocks are massive, schistose and slaty pyroxene andesite greenstone. The property is less than one mi from the southeast boundary of the wilderness study area.

Adjacent to the study area, the French mine has two parallel quartz veins that average 20 inches thick, strike N. 70° E., and dips 30° S. Wall rocks are metapyroxene andesite greenstone and slaty metasediments of the Calaveras group.

Inside the wilderness study area at the White Porphyry group, there are two parallel lines of open stopes, aligned for more than one mi, which are 3 to 7 feet wide. The stopes are on either sides of a 30 to 50 foot wide white albite dike that strikes N. 40°-45° W., dips 75° northeast, and is enclosed in slate, schist and metachert of the Calaveras group. Gold occurs in rust-colored pockets in the albite at the contacts, and quartz stringers in both rock types at the contacts. Nothing is known about the history or production of these workings but it must have been significant.

Six nephrite jade prospects line up across the western most part of the wilderness study area. Jade is present in irregularly shaped, discontinuous bodies of steep east-dipping talc rich rock in sheared serpentine.

The wilderness study area is partially in the Bagby, Cat Town, Quartz Mountain, Mother Lode, and East Belt mining districts. There are 336 current placer, lode, mill site, and tunnel site claims in or adjacent to the wilderness study area according to 1988 U.S. Bureau of Land Management records.

Mineral setting: Situated within a few miles of the southern end of the Mother Lode gold belt, the typical Jurassic rocks of the Mother Lode - greenstone, slate, metagraywacke, serpentinized peridotic ultramafic rocks, and mafic granitoid rocks, all of which lie adjacent on the east to the large, through-going Melones fault zone - compose most of the bedrock terrane in the study area. The area is characterized by strong regional northwest-trending structure defined by both bedding and faulting, the latter dipping moderately to steeply northeast. Metamorphic rocks are locally intruded by small bodies of intermediate to mafic granitoid rocks that are presumably satellitic to the Sierra Nevada batholith, which crops out several miles to the east.

Recommendations: The wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines. Geochemical sampling is probably the exploration tool of choice in further investigation of the study area. It should be supported by detailed geologic mapping with especial emphasis on delineating zones of altered rock. Specific resource data concerning the study area is incomplete and from old sources of regional scope. Additional work is needed to inventory resources, indications of resources, mine workings and areas of resource potential.

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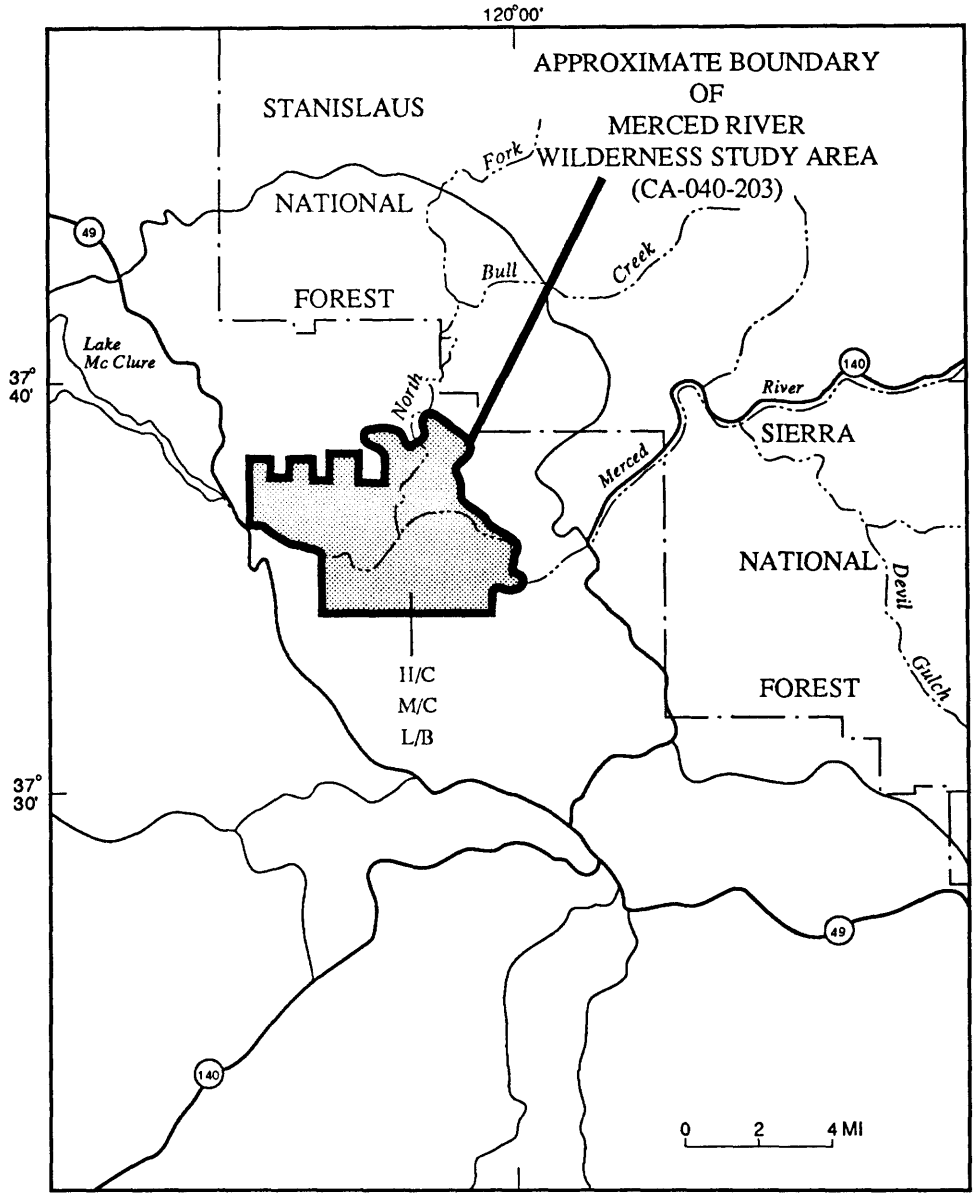

EXPLANATION

H/C Geologic terrane having high mineral resource potential for gold and silver with certainty level C

M/B Geologic terrane having moderate mineral resource potential for copper and jade with certainty level B

L/B Geologic terrane having low mineral resource potential for platinum, lead, zinc, mercury, manganese, chromium, nickel, cobalt, asbestos, calcium carbonate, ornamental stone, talc, and mica with certainty level B

Mineral resources of the Merced River Wilderness Study Area.

Name: Milk Ranch/Case Mountain
Area number: CA-010-023
Size (acres): 8,970

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): There are no identified mineral resources in the study area. Two mineral commodities are known to be present in the wilderness study area but neither appears to be of economic significance. Uranium in section 12, T 17 S., R 29 E. and feldspar in sections 24 and 25, T 17 S., R 29 E. are occurrences.

Mineral resource potential (undiscovered): The study area has moderate mineral resource potential for uranium and feldspar. The study area has low potential for skarn-related, tungsten and molybdenum mineralization in small localized metasedimentary rocks.

Mining activity: There is no known mineral production from the wilderness study area. The area contains only two known mineral locations. No other mines, prospects or current mineral claims are known to exist in the wilderness study area according to 1988 U.S. Bureau of Land Management records. No mining districts encompass the wilderness study area.

Mineral setting: The bedrock in the area consists of Jurassic to Cretaceous plutonic rocks of the Sierra Nevada batholith which intrude older metasedimentary rocks crop out sporadically in the area.

Recommendations: The wilderness study area should be studied as part of a comprehensive mineral survey by the Bureau of Mines and Geological Survey. The size of the wilderness study area and lack of detailed geologic information warrants further examination.

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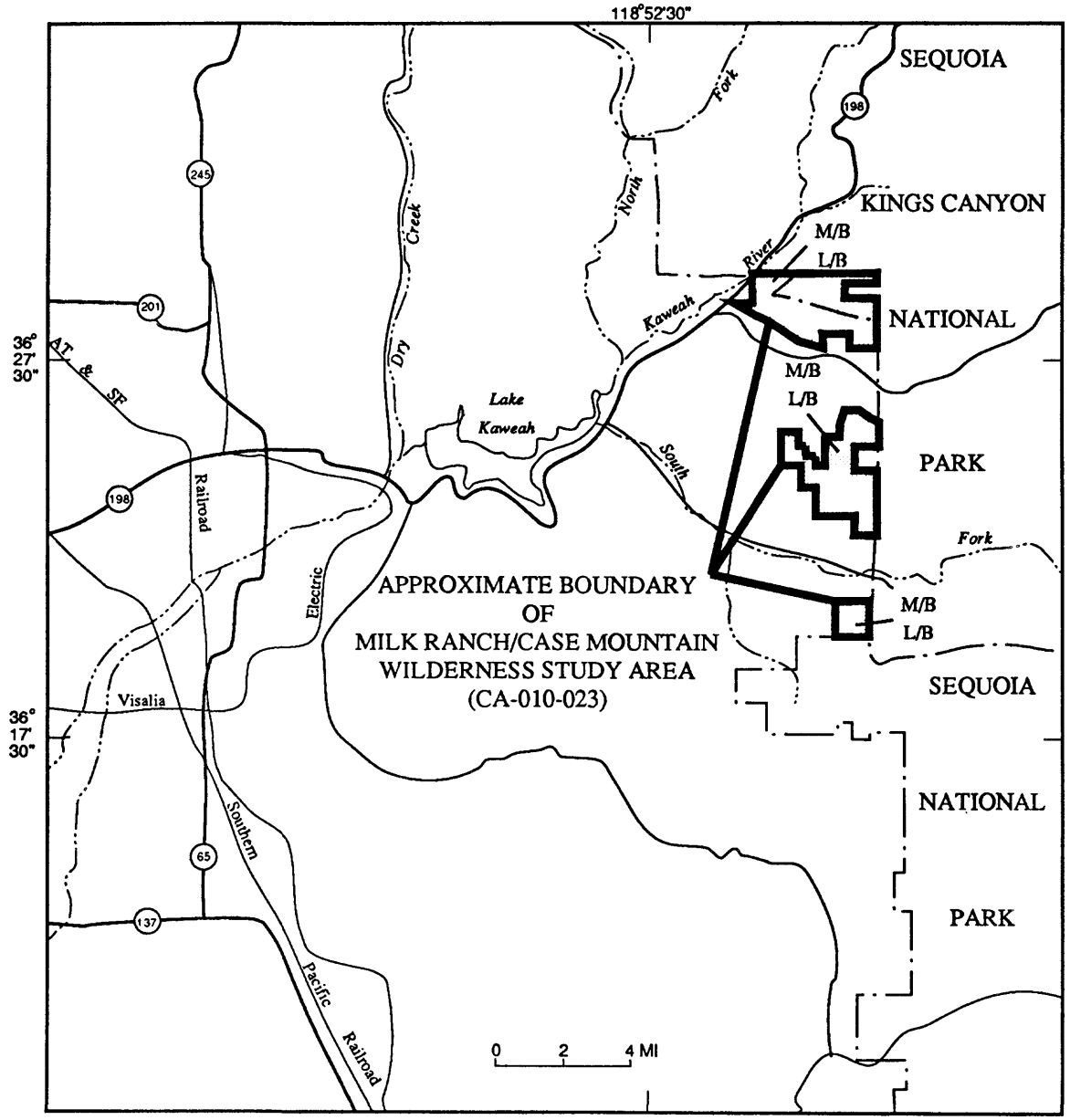

EXPLANATION

M/B Geologic terrane having moderate mineral resource potential for uranium and feldspar with certainty level B

L/B Geologic terrane having low mineral resource potential for tungsten and molybdenum with certainty level B

Mineral resources of the Milk Ranch/Case Mountain Wilderness Study Area.

Name: Morman Meadow
Area number: CA-010-094
Size (acres): 7,280

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): No known mineral occurrences or deposits are present in the wilderness study area; however, a lode gold mine and a placer gold mine, both past producers, are situated less than 0.5 mi from the western wilderness study area boundary. These mines are located in the same kind of rocks in which the Benton-Owens Valley/Bodie-Coleville Environmental Impact Statement states that there is a high potential for metallic minerals in the north margin of the wilderness study area.

Mineral resource potential (undiscovered): The northern part of the study area has high mineral resource potential for gold and silver because of its proximity to "Comstock-type" epithermal vein deposits in the Bodie district, six mi to the northeast. Additional data are needed, however, to place a very high degree of certainty on this assessment. There is high resource potential for igneous-related geothermal energy, as indicated by nearby Pleistocene and Holocene volcanic rocks in the Long Valley, Mammoth, and Mono Lake areas.

Mining activity: There is no known mineral production from the wilderness study area. The wilderness study area is not in a mining district. Within one mi of the wilderness study area boundary there are: six gold mines or prospects, three of which are past producers, a block of 6 graphite claims, and a manganese mine that produced in 1942. As of October, 1988, there were 31 current mining claims in the wilderness study area according to U.S. Bureau of Land Management records.

Mineral setting: The Mormon Meadow study area is underlain by Miocene andesite and Paleozoic metasedimentary rocks.

Recommendations: The wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines. The area is 5 mi southwest of the Bodie mining district and 13 mi south of the Masonic mining district. Production of gold and silver from these districts came from quartz vein systems closely associated with hydrothermal alternation. Hydrothermal alteration is common in the wilderness study area. The inferred moderate resource potential for metallic resources assumes the possible occurrence of "Comstock-type" deposits in the volcanic rocks. Geochemical sampling is needed to reliably estimate the resource potential for metallic minerals.

References:

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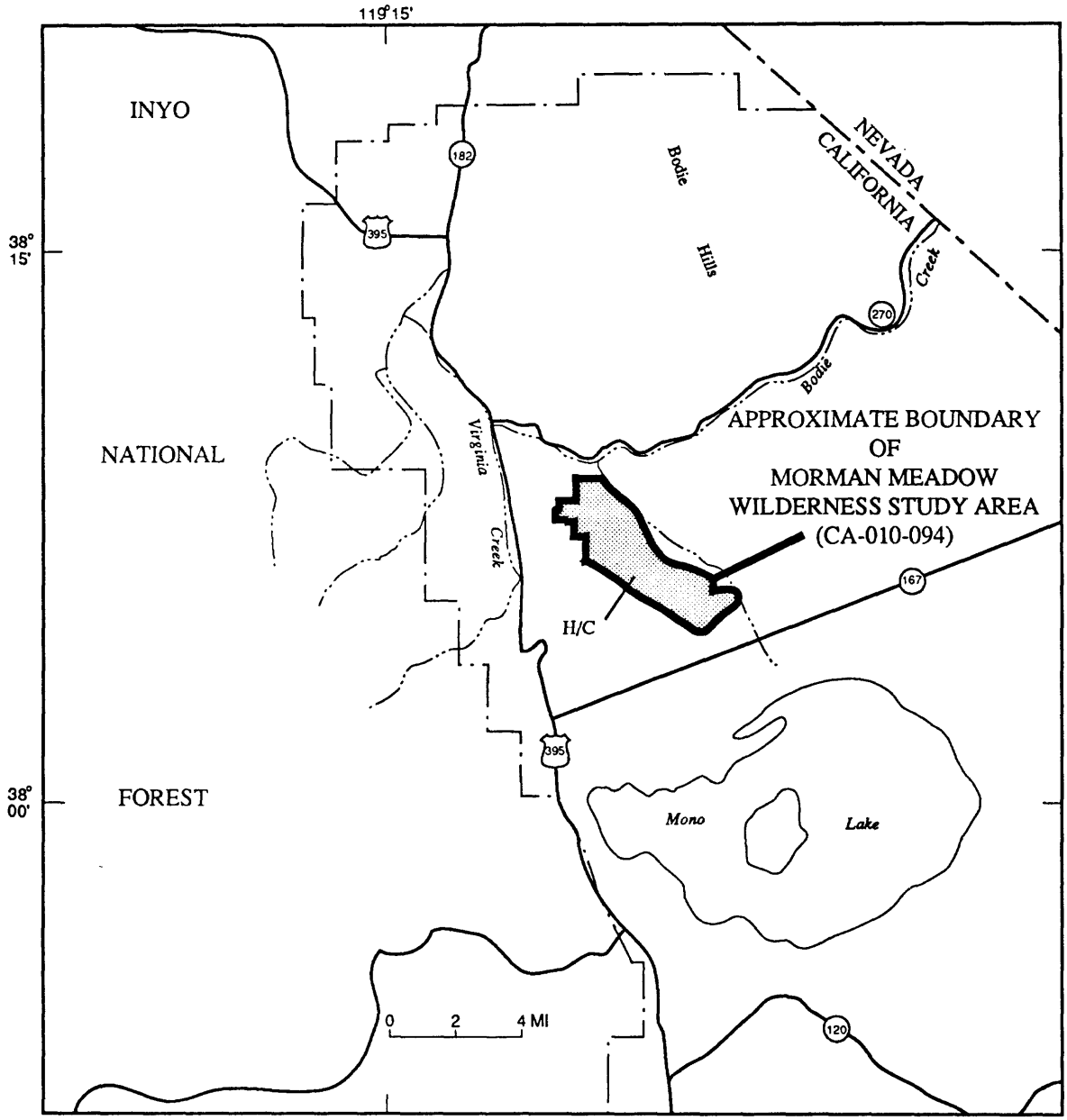

EXPLANATION

H/C Geologic terrane having high mineral resource potential for gold, silver, and geothermal energy with certainty level C

Mineral resources of the Morman Meadow Wilderness Study Area.

Name: Moses
Area number: CA-010-025
Size (acres): 558

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): There are no known mineral occurrences or resources in the wilderness study area.

Mineral resource potential (undiscovered): There is low mineral resource potential for skarn deposits of zinc, tungsten, silver, lead, copper in small, very local areas within the Tule River roof pendant.

Mining activity: There is no known mineral production from the wilderness study area. There are no known mines, prospects, or current claims within its boundary. No known mining districts encompass the wilderness study area.

Mineral setting: Predominantly composed of Jurassic to Cretaceous plutons of the Sierra Nevada batholith. Includes small amounts of metasedimentary and metavolcanic quartzite, pelite, limestone, and greenstone as part of the Tule River roof pendant.

Recommendations: The wilderness study area should be studied as part of a mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines to increase the certainty that the mineralization within the adjacent U.S. Forest Service lands extend into this U.S. Bureau of Land Management land. Further study to evaluate nature and extent of skarn mineralization in metasedimentary host rocks.

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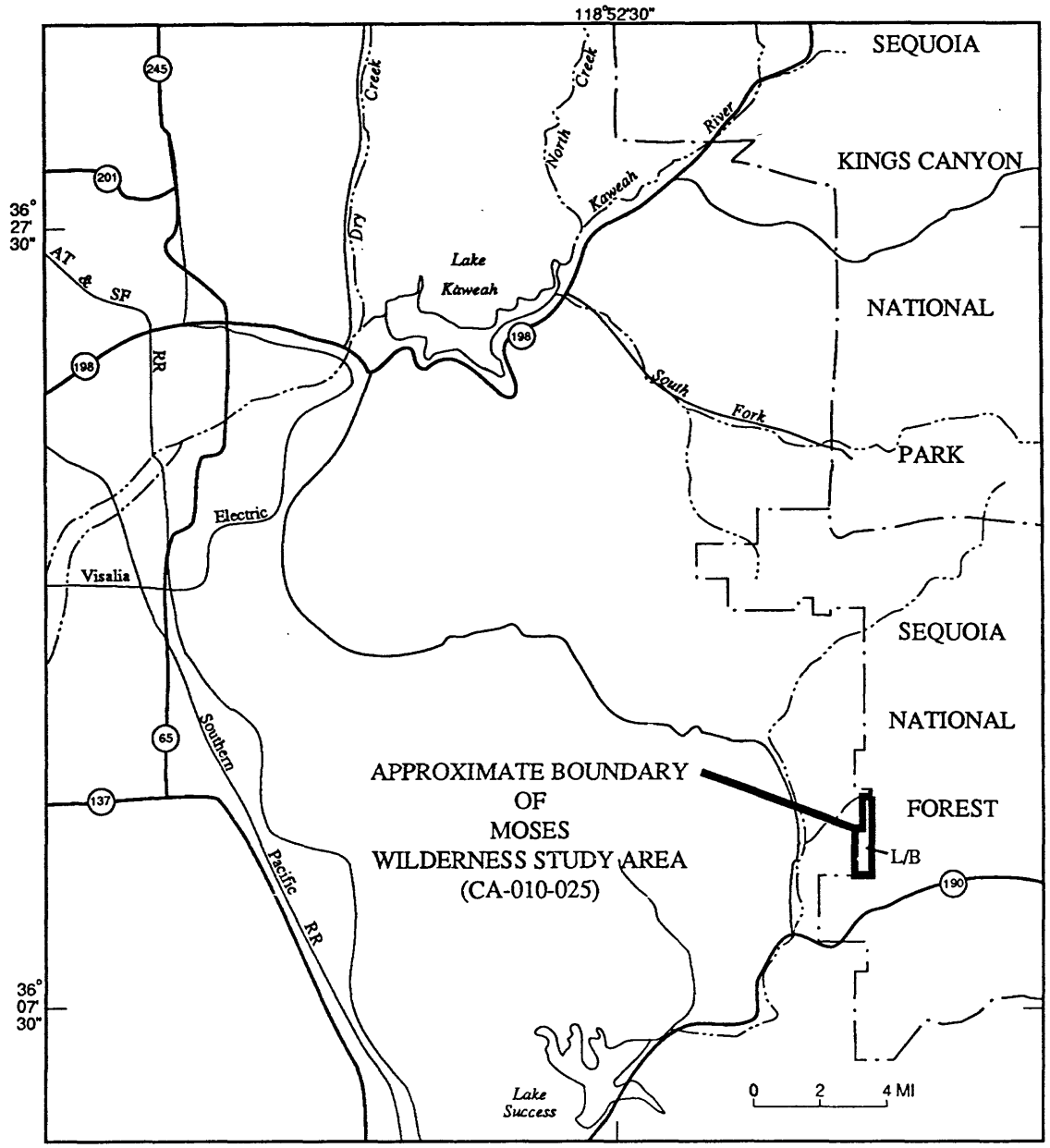

EXPLANATION

L/B Geologic terrane having low mineral resource potential for zinc, tungsten, silver, lead, copper with certainty level B

Mineral resources of the Moses Wilderness Study Area.

Name: Mt Biedeman
Area number: CA-010-095
Size (acres): 12,420

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): No known mineral occurrences or deposits are present within the wilderness study area; however, the northeast boundary is but a few thousand feet from several past producing gold mines of the Bodie mining district. The mines are located in the same kind of rocks as that portion of the wilderness study area the Benton-Owens Valley/Bodie-Coleville Study Area Environmental Impact Statement rates as having a high potential for metallic minerals.

Mineral resource potential (undiscovered): The study area, particularly the northeastern part, has high mineral resource potential for gold and silver because of its proximity to "Comstock-type" epithermal vein deposits in the Bodie district. Additional data are needed, however, to place a very high degree of certainty on this assessment. There is high resource potential for geothermal energy, on the basis of the proximity of late Pleistocene and Holocene volcanism in the Long Valley, Mammoth, and Mono Lake areas.

Mining activity: There is no known mineral production from the wilderness study area. The wilderness study area is not in a mining district. As of October, 1988, there were 162 current mining claims in the wilderness study area according to 1988 U.S. Bureau of Land Management records.

Mineral setting: The area is underlain by Miocene volcanic rocks and shallow intrusions ranging from andesite to rhyolite. Rocks in the Mount Biedeman area are geologically similar to volcanic rocks in the adjacent Bodie mining district, which borders the northeastern part of the Mount Biedeman area.

Recommendations: The wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines. Production of gold and silver from the nearby mining district came from several quartz vein systems closely associated with hydrothermal alteration. Hydrothermal alteration is common in the wilderness study area. The inferred high potential for metallic resources assumes the possible occurrence of "Comstock-type" deposits. Geochemical sampling is needed to reliably estimate the resource potential for metallic minerals.

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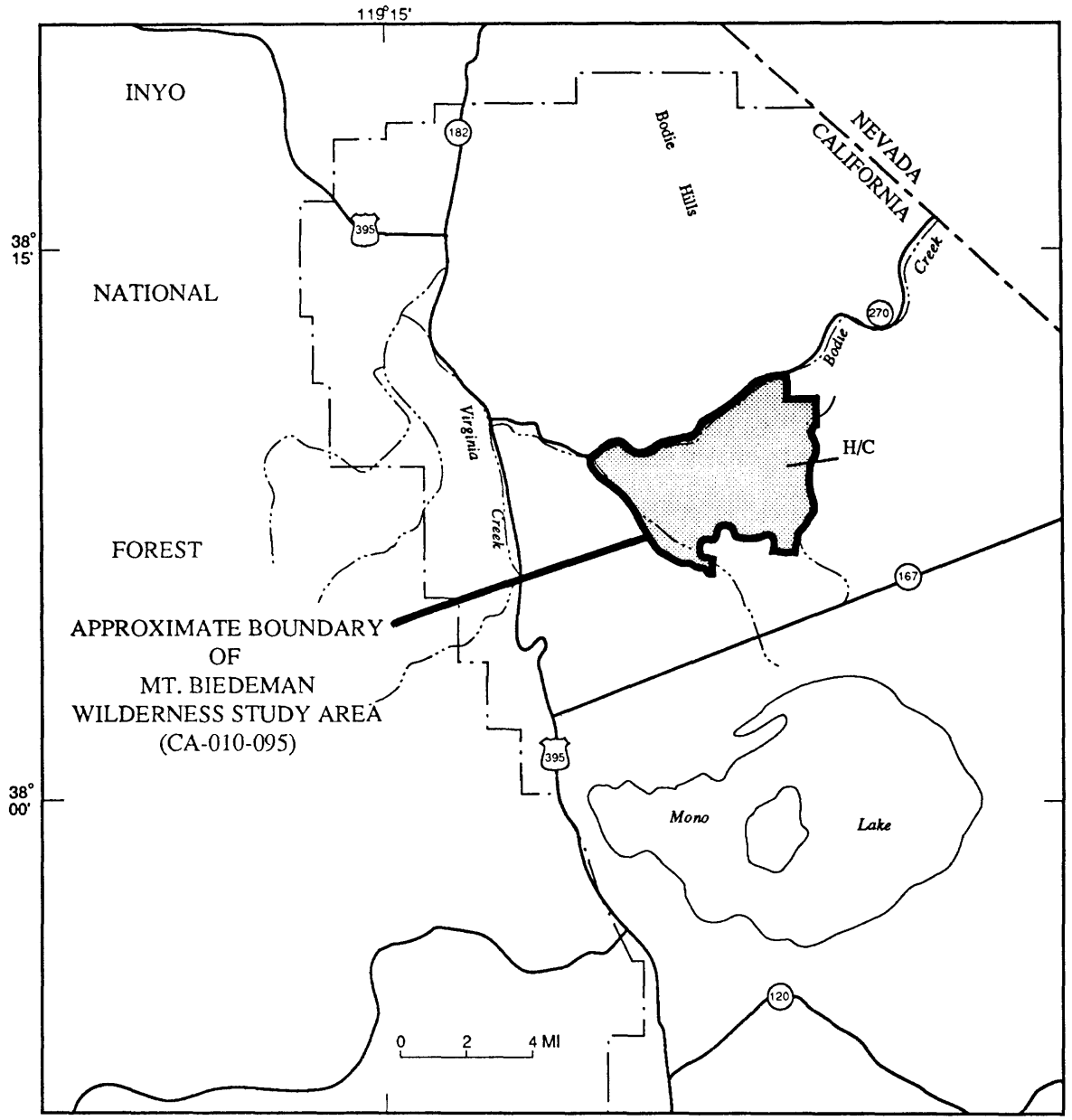

EXPLANATION

H/C Geologic terrane having high mineral resource potential for gold, silver, and geothermal energy with certainty level C

Mineral resources of the Mt. Biedeman Wilderness Study Area.

Name: Paiute
Area number: CA-010-060
Size (acres): 5,100

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): Mineral resources have not been identified in the wilderness study area, however, mines in and near the wilderness study area have produced gold, silver, copper, lead, zinc, tungsten, and marble (Schmauch and others, 1983). The Betty Jumbo mine, 2 mi east of the wilderness study area, has an estimated 52,000 tons of indicated and inferred tungsten ore and 5,100 tons of low-grade molybdenum resources. The Copper Empire mine, about 1.5 mi north of the southernmost block of the wilderness study area, has an estimated 460,000 tons of silver-copper ore. The Black Eagle mine, 2 mi east of the southernmost portion of the wilderness study area, has an estimated 63,000 tons of gold ore.

Mineral resource potential (undiscovered): This area is adjacent to the Mazourka Roadless Area (U.S. Forest Service), for which a mineral resource study has been completed (McKee and others, 1982). Results from this study indicate that the central and southern parts of this study area have low resource potential for silver, lead, zinc, copper, and gold. Surface hot springs in the vicinity, recent volcanic activity, and the presence of faults that could serve as channels for hydrothermal fluids indicate a moderate potential for geothermal resources. There is high potential for cinders; however, abundant cinders are present outside the study area.

Mining activity: In 1917, the Copper Empire mine, in the southernmost segment of the wilderness study area, produced some 500 tons of hand-sorted ore averaging 3 percent copper. Production from mines in the wilderness study area, the San Carlos and others took place before accurate records were kept, and production figures are not available.

The southernmost segment of the wilderness study area contains the Russ mining district. This district contains five significant past-producing mines: the San Carlos, Old Whiteside, Copper Queen, Green (-eyed) Monster, and the Snow Caps. Several more important mines in the district are within eight mi, in the Paiute Roadless Area (Schmauch and others, 1983). The San Carlos was the first important discovery in the district (DeGroot, 1890; Ross, 1965). There are 18 current mining claims in the wilderness study area according to January, 1989, U.S. Bureau of Land Management records.

Mineral setting: The Paiute study area consists of five areas located along the western Inyo Mountain rangefront. These areas are underlain by a variety of rocks types including Paleozoic sedimentary rocks in the south, Mesozoic granitic rocks in the southern and central areas, Pliocene sedimentary deposits in the northern area, and Quaternary cinder cones and basalt flows in the central area. Quaternary sedimentary outwash derived from the Inyo Mountains covers parts of all the areas.

Recommendations: Due to the number of mines in and around the wilderness study area, the wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines to increase the certainty that the mineralization within the adjacent U.S. Forest Service lands extend into this U.S. Bureau of Land Management land. Surface mapping, sampling should be done to discover and define any undeveloped resources associated with previous mining activity in the wilderness study area. Geophysical and geochemical studies covering the entire area should be done to identify resources.

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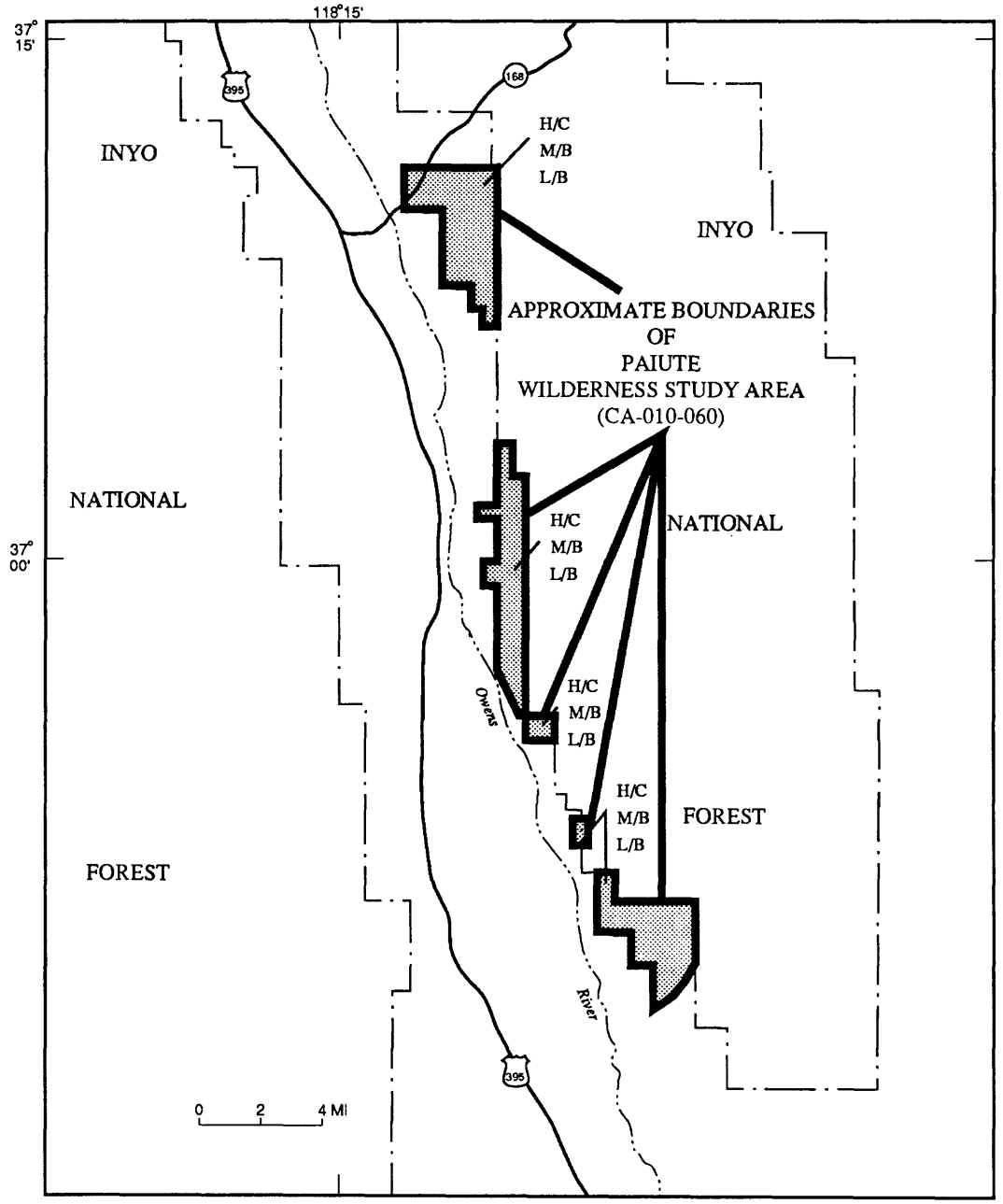
Schmauch, S.W., Lipton, D.A., and Gabby, P.N., 1983, Mineral investigations of the Mazourka, Paiute, and Andrew Mountain RARE II Areas (Nos. A5064, B5064, and 5063), Inyo County, California: U.S. Bureau of Mines Open-File Report MLA 86-83, 57 p.



EXPLANATION

H/C Geologic terrane having high mineral resource potential for cinders with certainty level C

M/B Geologic terrane having moderate mineral resource potential for geothermal energy with certainty level B

L/B Geologic terrane having low mineral resource potential for silver, lead, zinc, copper, and gold with certainty level B

Mineral resources of the Paiute Wilderness Study Area.

Names: Panoche Hills North and South
Area numbers: CA-040-301A and CA-040-301B
Size (acres): 6,670 and 11,267

Status of mineral surveys: These areas were not studied by the U.S. Geological Survey and the U.S. Bureau of Mines.

Identified mineral resources (known): There are no identified mineral resources in the study area. Diatomite was produced from and limestone and gypsum were produced adjacent to the wilderness study areas. Further study is needed to appraise if any resources remain in the mines. Also, companies have prospected for oil and gas near the wilderness study areas.

Mineral resource potential (undiscovered): The areas have low mineral resource potential for gypsite, marl (limestone), phosphate and uranium. The areas have moderate resource potential for diatomite and oil and gas.

Mining activity: Diatomite, limestone and gypsum were produced from and adjacent to the wilderness study areas, but no production records are available. Inside the wilderness study areas from 1929 to 1935 the Insulator mine produced diatomite. The diatomite occurs in the Upper Cretaceous Moreno formation. Adjacent to the wilderness study areas, gypsum was produced at the Valley View mine.A guaranteed 50 percent gypsum product was produced from gypsite layers in the Upper Cretaceous Moreno formation. Adjacent to the wilderness study areas agricultural limestone was produced at the Burkhart and Teaford mine. The limestone was produced from a marl layer in the Tulare formation. Stratigraphic settings in the area are similar to those that have produced oil and gas in the region. The wilderness study areas are situated in the Mexican mining district; there are 3 current lode claims adjacent to the wilderness study areas according to 1988 U.S. Bureau of Land Management records.

Mineral setting: The study areas are underlain predominantly of Upper Cretaceous marine sedimentary rocks. Paleocene and Eocene marine sedimentary rocks crop out on the eastern edge of the areas.

Recommendations: These areas have not been mapped in sufficient detail to confidently evaluate the potential for undiscovered mineral and energy resources. Further detailed geologic mapping is recommended. There is little specific resource data available concerning the areas. The wilderness study areas should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines.

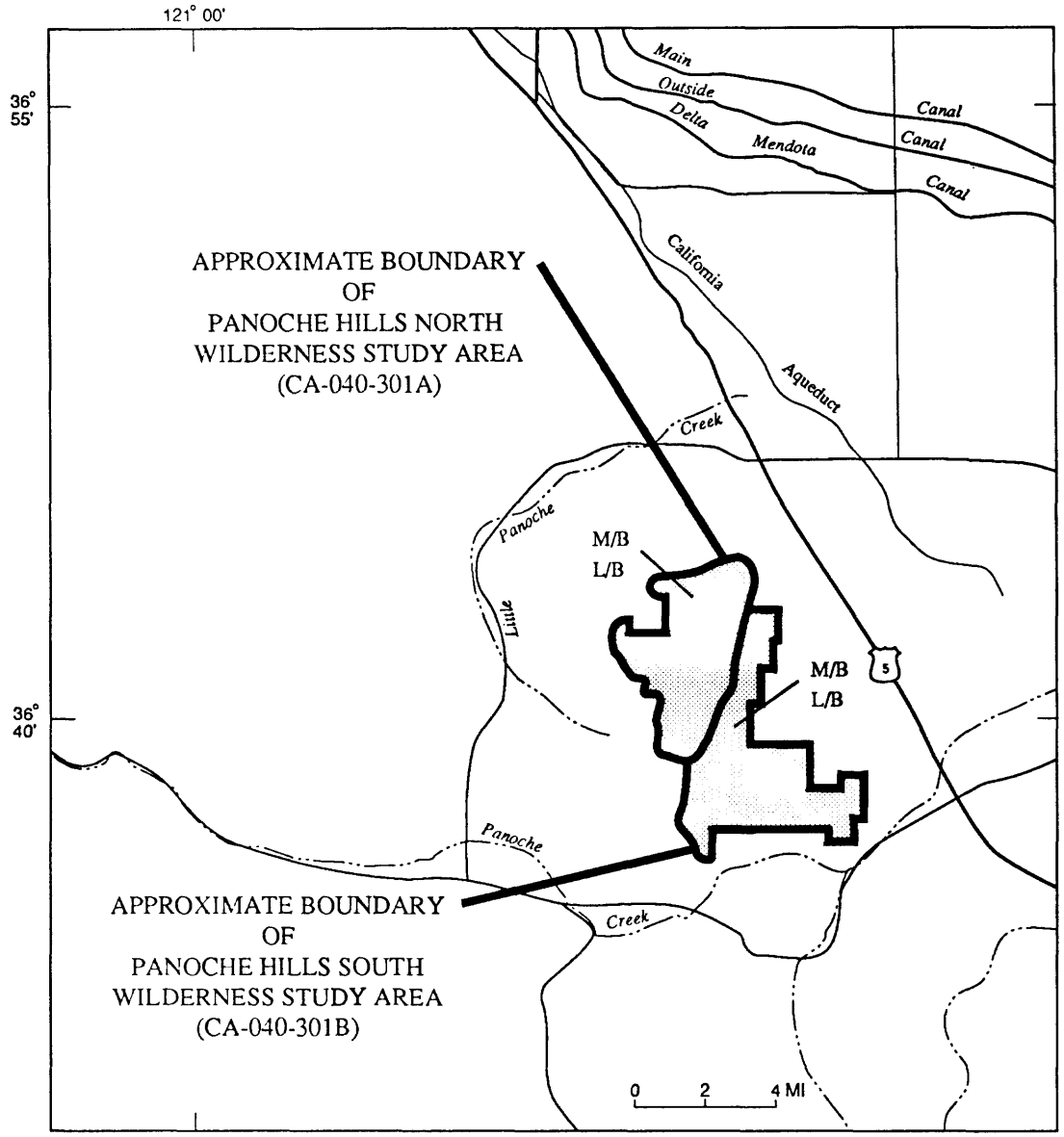
References:

Anderson, Robert, and Pack, R.W., 1915, Geology and oil resources of the west border of the San Joaquin Valley north of Coalinga, California: U.S. Geological Survey Bulletin 603, 220 p.

Logan, C.A., Braun, L.T., and Vernon, J.W., 1951, Mines and mineral resources of Fresno County, California: California Journal of Mines and Geology Volume 47, p. 485-552.

U.S. Bureau of Land Management, 1988, Geographic index (of) all claims.

_____1989, California state-wide wilderness study report: draft copy, part 3.



EXPLANATION

M/B Geologic terrane having moderate mineral resource potential for diatomite and oil and gas with certainty level B

L/B Geologic terrane having low mineral resource potential for gypsite, marl, phosphate and uranium with certainty level B

Mineral resources of the Panoche Hills North and South Wilderness Study Area.

Name: Pinnacles Contiguous
Area number: CA-040-303
Size (acres): 5,838 of which 2,200 were studied at the request of the U.S. Bureau of Land Management.

Status of mineral surveys: Only part of this wilderness study area has been studied as part of a mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines (Ludington, 1987).

Identified mineral resources (known): There are no identified resources within the wilderness study area. There are occurrences of diatomite in the northern part of the study area but they do not constitute a resource.

Mineral resource potential (undiscovered): Portions of the area have low potential for hot-springs-gold-type gold-silver deposits associated with rhyolitic intrusive and volcanic rocks. Portions of the Miocene marine rocks have low potential for oil and gas and low potential for diatomaceous shale resources.

Mining activity: There were no mines, prospects, mining claims, leases, or mineral resources in or within one mile of the study area as of 1985. an oil well was drilled in 1951 in the northern part of the wilderness study area; it was a dry hole.

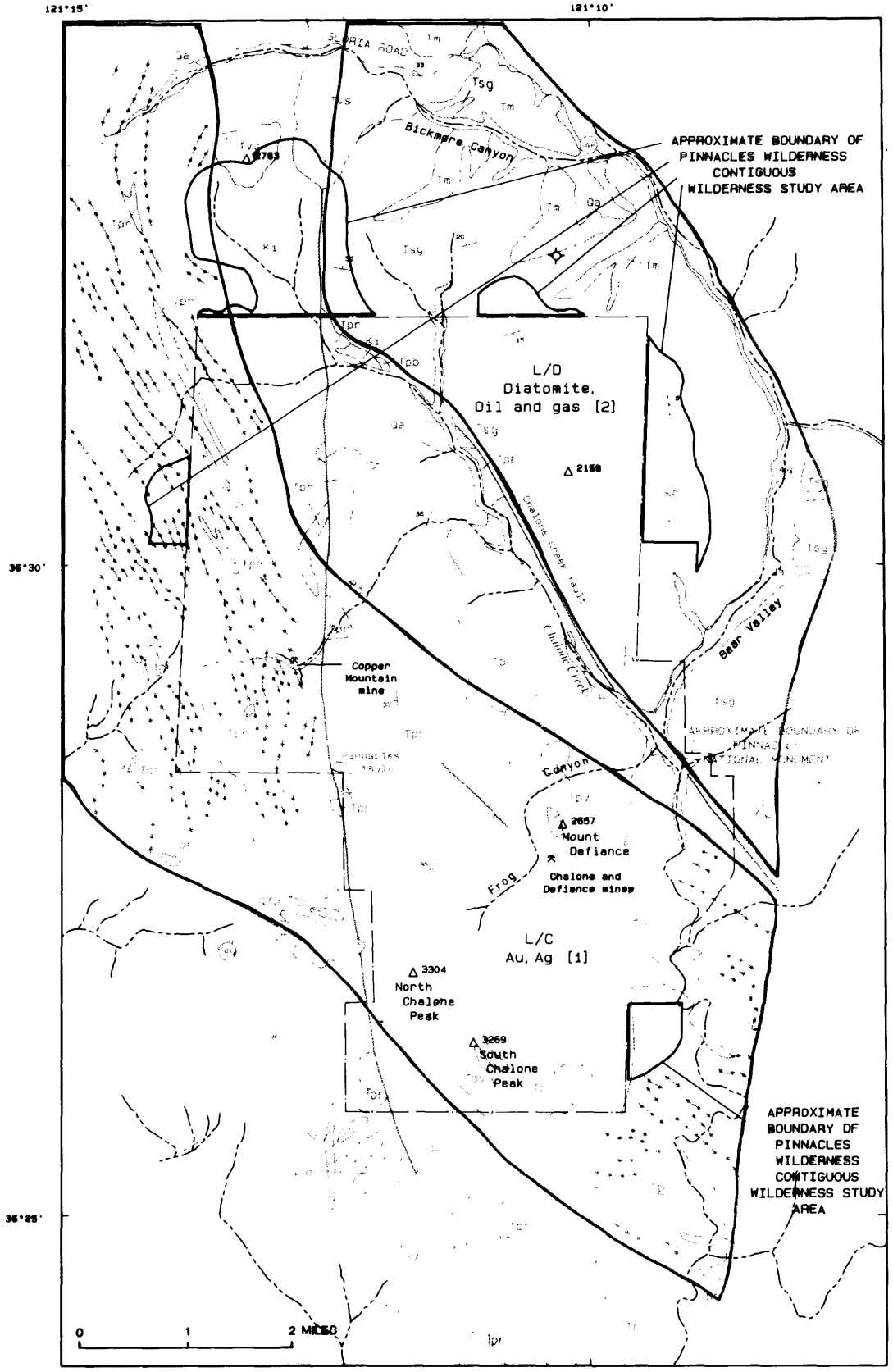
Mineral setting: The oldest rocks in the study area are Cretaceous granitic rocks, which are cut by a graben that preserves Miocene volcanic rocks. Overlying the volcanic rocks are Miocene marine and continental sedimentary rocks, including units formed by erosion of the older igneous rocks.

Recommendations: As 3,638 acres were not requested for mineral surveys by the U.S. Bureau of Land Management, this unstudied part of the wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines. The area has not been mapped in sufficient detail to confidently evaluate the potential for undiscovered mineral and energy resources. Further detailed geologic mapping is recommended.

References:

Kuizon, Lucia, 1985, Mineral resources of the Pinnacles Wilderness Contiguous Wilderness Study Area (BLM NO. CA-040-303), San Benito and Monterey Counties, California: U.S. Bureau of Mines Open-File Report MLA 29-85, 12 p.

Ludington, Steve, Gray, Karen, and Kuizon, Lucia, 1987, Mineral resources of the Pinnacles Wilderness Contiguous Wilderness Study Area, Monterey and San Benito Counties, California: U.S. Geological Survey Bulletin 1705-C, 13 p.



Mineral resources of the Pinnacles Contiguous Wilderness Study Area.

EXPLANATION

Area with low mineral resource potential--See appendix for definition of mineral resource potential and certainty of assessment

Commodities

Au	Gold
Ag	Silver

[ ] Deposit types

1	Hot-spring precious-metal
2	Diatomaceous shale

Geologic map units

Qa	Alluvium (Quaternary)
QTp	Paso Robles Formation (Quaternary and Tertiary)
Tvs	Volcaniclastic sediments (Miocene)
Tm	Monterey Formation (Miocene)
Tsg	Sandstone and conglomerate (Miocene)
Tpb	Breccia of Pinnacles Formation (Miocene)
----	Rhyolite dikes (Miocene)
Tpv	Vent breccia (Miocene)
Tpr	Rhyolite of Pinnacles Formation (Miocene)
Ki	Intrusive rocks (Cretaceous)

——— Contact
——— Fault--Dotted where concealed
$\nearrow_{42}$ Strike and dip of beds
⊹ Dry hole
– – – – Drainage

Explanation, mineral resources of the Pinnacles Contiguous Wilderness Study Area.

Name: Pit River Canyon
Area number: CA-020-103
Size (acres): 11,575 of which 5,400 were studied at the request of the U.S. Bureau of Land Management.

Status of mineral surveys: Only part of this wilderness study area has been studied as part of a mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines (Sherlock and Campbell, 1986).

Identified mineral resources (known): No mineral resources or prospects with mineral development potential have been identified in the area.

Mineral resource potential (undiscovered): The entire study area has low resource potential for gold, silver, diatomite, oil and gas, and geothermal energy.

Mining activity: The area is not in a mining district nor is there any known mining activity in the area. There are no current mining claims in the wilderness study area according to October, 1988, U.S. Bureau of Land Management records.

Mineral setting: The area is underlain primarily by late Miocene and Pliocene basalt. Small areas of alluvium project into the area along the western side.

Recommendations: As 6,175 acres were not requested for mineral surveys by the U.S. Bureau of Land Management, this unstudied part of the wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines.

References:

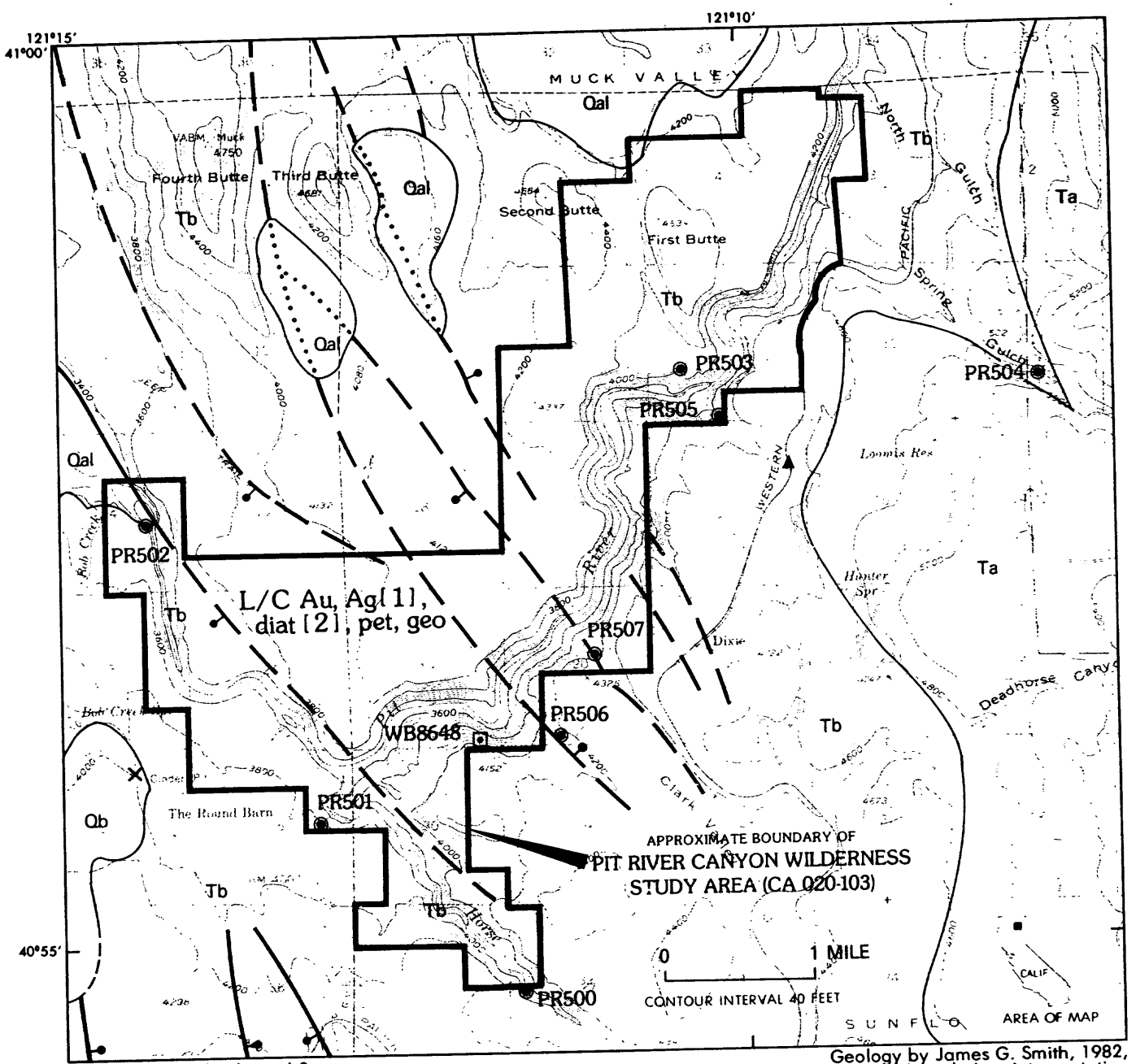
Campbell, H.W., 1984, Mineral resources of the Pit River Canyon Wilderness Study Area (BLM NO. CA-020-103), Lassen County, California: U.S. Bureau of Mines Open-File Report MLA 33-84, 11 p.

Lydon, P.A., Gay, T.E., Jr., and Jennings, C.W., compilers, 1960, Westwood (Susanville) sheet: California Division of Mines and Geology Geologic map of California, scale 1:250,000.

MacDonald, G.A., 1966, Geology of the Cascade Range and Modoc Plateau, *in* Bailey, E.H., Geology of northern California: California Division of Mines and Geology Bulletin 190, p. 65-96.

Sherlock, M.G., and Campbell, H.W., 1986, Mineral resources of the Pit River Canyon Wilderness Study Area, Lassen County, California: U.S. Geological Survey Bulletin 1706-E, 8 p.

Sherlock, M.G., Frisken, J.G., Adrian, Betty, and Zorich, Eugenia, 1985, Geochemical analyses of stream-sediment samples from the Pit River Canyon Wilderness Study Area, Lassen County, California: U.S. Geological Survey Open-File Report 85-390, 12 p.



Base from U.S. Geological Survey
1:62,500 Little Valley, 1957

Geology by James G. Smith, 1982, unpublished photointerpretation

Mineral resources of the Pit River Canyon Wilderness Study Area.

EXPLANATION

Area with low mineral or geothermal energy resource potential, certainty level C (L/C). Applies to entire wilderness study area. See Appendix 1 and Figure 3 for definition of levels of mineral resource potential and certainty of assesment

COMMODITIES

Au	Gold
Ag	Silver
Diat	Diatomite
Pet	Oil and gas
Geo	Geothermal

[ ] TYPES OF DEPOSITS AND OCCURENCES

1 Epithermal precious-metal deposits in dacite volcanic rocks

2 Diatomite deposits in lake-bed sediments

CORRELATION OF MAP UNITS

Qal / Qb — Quaternary

Tb | Ta — Tertiary

GEOLOGIC MAP UNITS

Qal ALLUVIUM (HOLOCENE AND PLEISTOCENE)

Qb BASALT (QUATERNARY)

Tb BASALT (PLIOCENE AND MIOCENE)

Ta ANDESITE (PLIOCENE AND MIOCENE)

MAP SYMBOLS

———— CONTACT-Dashed where approximately located

NORMAL FAULT-Dashed where approximately located; dotted where concealed; ball and bar on downthrown side

◉ GEOCHEMICAL STREAM-SEDIMENT SITE

⊡ GEOCHEMICAL ROCK SAMPLE SITE

▲ DIATOMACEOUS (?) LAKE BED DEPOSIT

× CINDER PIT

Explanation, mineral resources of the Pit River Canyon Wilderness Study Area.

Name: Piute Cypress Instant Study Area
Area number: CA-010-046
Size (acres): 5,213

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): No mineral occurrences or resources have been identified within the instant study area. However, gold and silver have been mined adjacent to the instant study area.

Mineral resource potential (undiscovered): The southwestern part of this area is included in a mineral resource potential study of the Cypress Roadless Area (Kennedy and others, 1983). This study determined several small areas of moderate potential for gold resources and low potential for tungsten. The remaining part of this area has moderate potential for gold and silver in quartz veins cutting the granitic and metamorphic rocks. There is also moderate potential for tungsten in and adjacent to the metamorphic rocks.

Mining activity: There is no known history of production from the instant study area. However, three mines (Laurel, Glen Olive and Illinois, and Gold Belt) with a history of production are immediately adjacent to the instant study area boundary. Bureau of Mines mineral production records indicate more than 4,700 ounces of gold and 2,700 ounces of silver was produced from the Glen Olive mine on the southern boundary. There are five mining districts that encompass part of the instant study area. Bureau of Land Management claim records (1988) indicate 39 current claims are located in the instant study area.

Mineral setting: The geology of the Piute Cypress study area is typical of the southern Sierra Nevada. Intensely deformed metamorphic rocks occur as roof pendants scattered through an intrusive country rock of Cretaceous age granitic rocks.

Recommendations: Further studies would be required to accurately assess and locate areas of resource potential in the part of the area not covered by the existing mineral resource report. That remaining part of the area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines. The instant study area lies in an area that has several past-producing gold mines, some proximate to the boundary. Geologic environments in the instant study area are similar to the environment in which the nearby gold mines are located.

Miller, W.J., and Webb, R.W., 1940, Descriptive geology of the Kernville quadrangle, California: California Division of Mines State Mineralogists Report XXXVI, p. 343-378.

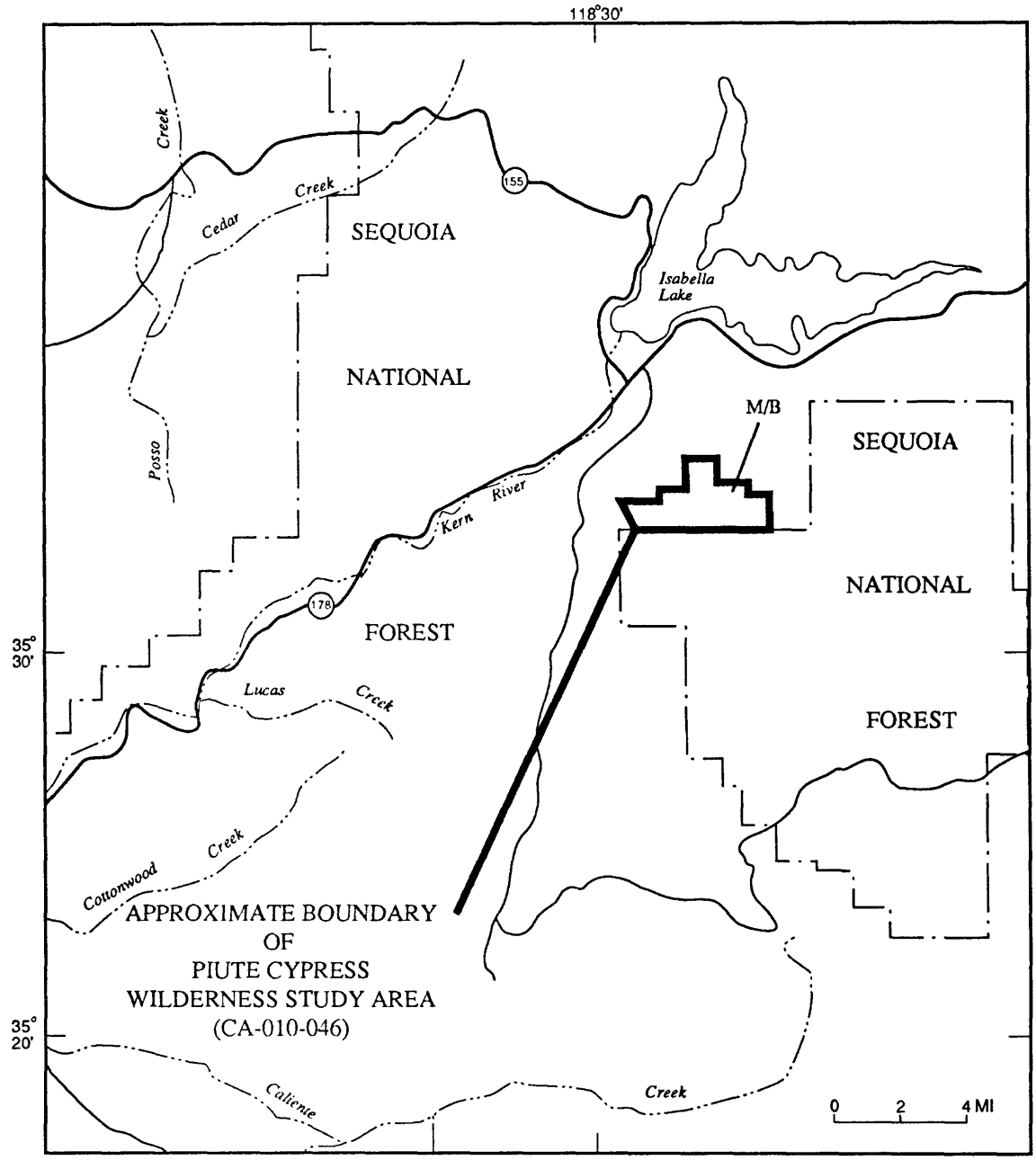
Smith, A.R., compiler, 1964, Bakersfield sheet: California Division of Mines and Geology Geologic Map of California, scale 1:250,000.

Sutley, S.J., Chaffee, M.A., Fey, D.L., and Hill, R.H., 1983, Chemical analyses and statistical summaries for samples of rock, minus-60-mesh (0.25-mm) stream sediment, and nonmagnetic heavy-mineral concentrate, Cypress Roadless Area, Kern County, California: U.S. Geological Survey Open-File Report 83-643, 19 p.

Tucker, W.B., and Sampson, R.J., 1940, Mineral resources of the Kernville quadrangle, California Division of Mines State Mineralogists Report XXXVI, p. 322-333.

U.S. Bureau of Land Management, 1988, Geographic index (of) all claims.

U.S. Bureau of Mines, 1989, Mineral Industry Location System (MILS).



EXPLANATION

M/B Geologic terrane having moderate mineral resource potential for gold, silver, and tungsten with certainty level B

Mineral resources of the Piute Cypress Instant Study Area.

Name: Poodle Mountains
Area number: CA-020-618/621
Size (acres): 25,000 in this report (there is another 110,000 acres in the Winnemucca, Nevada U.S. Bureau of Land Management District)

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): There are no known mineral resources in the wilderness study area. Along the Gerlach-Cedarville road about 18 miles northwest of Gerlach, and, therefore, presumably within the northwestern portion of the WR claims and private lands, andesites contain small, dark lenses enriched in titanium-bearing magnetite and magnetite (Beal, 1963, p. 23). Gullies and watercourses draining the area also contain minor placer (black sand) deposits of these minerals. Irregular masses of perlite are reported to be associated with the volcanic rocks in the area (Beal, 1963, p. 25).

Mineral resource potential (undiscovered): The study area has moderate mineral resource potential for gold, silver, copper, lead, and zinc as lode deposits, moderate mineral resource potential for titanium and iron resources as placer deposits, and moderate mineral resource potential for perlite, clay, zeolite, and pozzolan.

Mining activity: The wilderness study area is not in a mining district and has had no known mineral production. There are 121 current claims in the WR groups (WRW 1-54, WRS 1-59, and the WRX 1-8) along the northeast boundary of the wilderness study area in T. 34 N., R. 21 E., secs. 15 and 24, and in T. 34 N., R. 22 E., secs. 6, 7, 18-20, and 28-30. About 35 of the WR claims are wholly or partially in the wilderness study area. In addition, there are two current claims in the southern portion of the wilderness study area in T. 32 N., R. 21 E., sec. 30. All of the claims are presumably for gold. The titanium-bearing lenses and placer deposits were explored in about 1957 at the Last Stand prospect. There are no geothermal or sand and gravel resources nor are there any oil or gas leases in the wilderness study area.

Mineral setting: The study area is entirely within an extensive area of Miocene to Pliocene olivine basalt flows and dikes issued from fissures and vents such as Poodle Mountains to the east. There are no identified faults in the study area.

Recommendations: The wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines. Future work in the study area, in the front of detailed geologic mapping and geochemical sampling is necessary to accurately assess the potential for precious and metallic minerals and to determine the potential for clay, zeolite, and pozzolan resources associated with sediments derived from the volcanic rocks.

References:

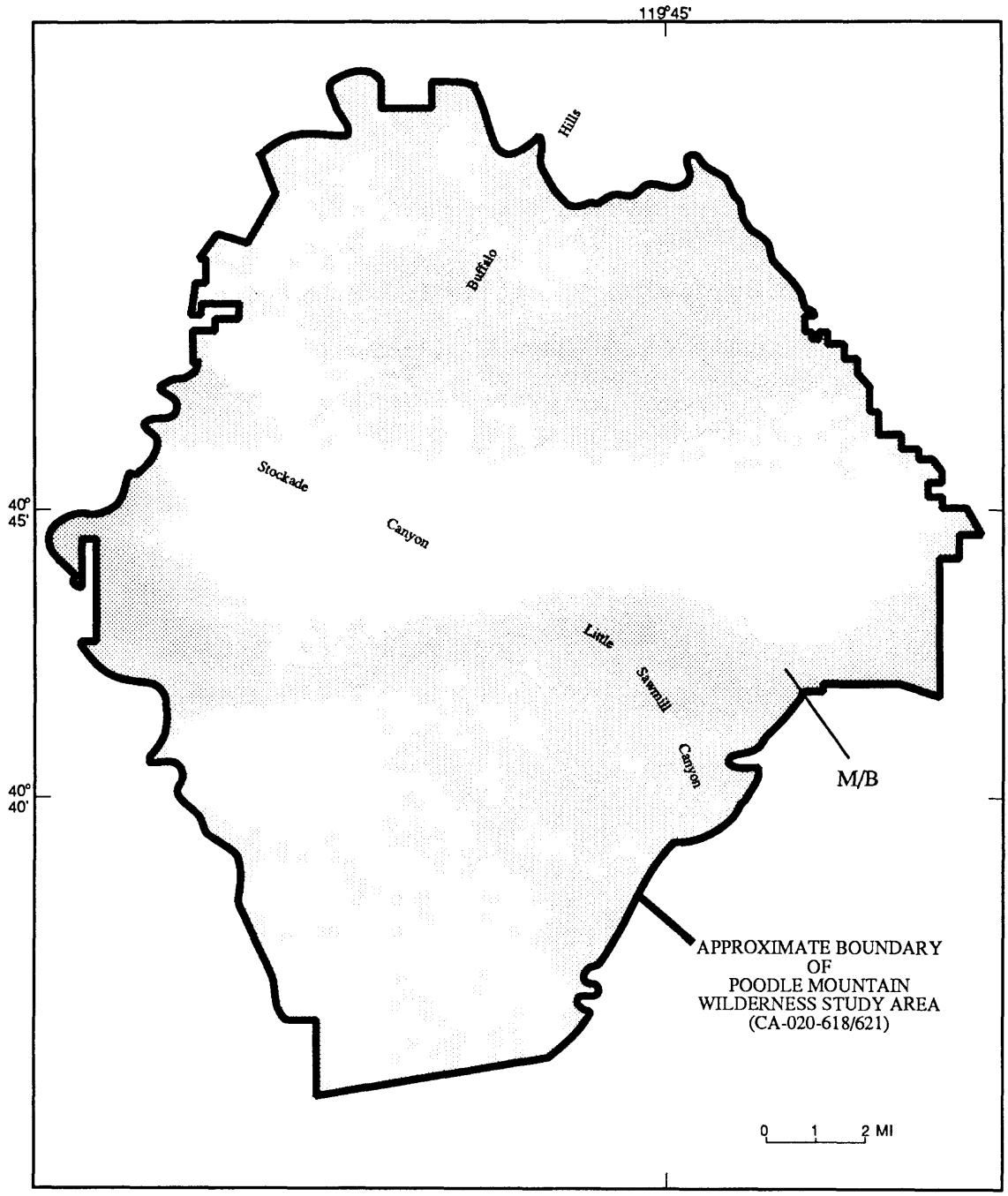
Beal, L.H., 1963, Investigation of titanium occurrences in Nevada: Nevada Bureau of Mines Report 3, p. 23-25.

Bonham, H.F., and Papke, K.G., 1969, Geology and mineral deposits of Washoe and Storey Counties, Nevada (with a section on industrial rock and mineral deposits): Nevada Bureau of Mines Bulletin 70, 140 p.

U.S. Bureau of Land Management, 1988, Geographic index (of) all claims.

U.S. Bureau of Mines, 1989, Mineral Industry Location System (MILS).

Vercoutere, T.L., Sorensen, M.L., Frisken, J.G., and Plouff, Donald, 1988, mineral resources of the Twin Peaks Wilderness Study Area, Washoe County, Nevada, and Lassen County, California; U.S. Geological Survey Bulletin 1706-A, 13 p.



EXPLANATION

M/B Geologic terrane having moderate mineral resource potential for gold, silver, copper, lead, zinc, titanium, iron, perlite, clay, zeolite, and pozzolan with certainty level B

Mineral resources of the Poodle Mountains Wilderness Study Area.

Name: Red Mountain
Area number: CA-050-132
Size (acres): 6,244

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): Approximately 30 to 40 million tons of laterite averaging 0.79 percent nickel, 0.06 percent cobalt and 1.42 percent chromium are present in the wilderness study area and adjacent private lands (unpub. minerals availability report, on file at U.S. Bureau of Mines, Western Field Operations Center, Spokane, Wash.)

Mineral resource potential (undiscovered): The central two-thirds of the study area have moderate and high potential for occurrence of nickel, cobalt, and chromite. Other parts have low potential for occurrence of these commodities. Area has low potential for uranium, thorium, oil and gas, and sand and gravel.

Mining activity: The area is not included in any mining district. Claims were originally staked for chromite in the wilderness study area in the early 1900's. Chromite production was reported at Red Mountain in 1928 but no figures are available. One chromite deposit in the vicinity was thought to have yielded approximately 100 tons around 1941. According to 1988 U.S. Bureau of Land Management records, there are 39 current lode and 41 placer claims in the wilderness study area.

Mineral setting: From west to east, this area is underlain by undivided Cretaceous marine sedimentary rocks, Upper Cretaceous marine sedimentary rocks, serpentinite and peridotite, and sandstone, conglomerate, etc. of the Franciscan Formation. Portions of faults many miles in length separate these units.

Recommendations: The wilderness study area should be studied as part of the comprehensive mineral study by the Bureau of Mines and Geological Survey. Further is needed to evaluate nickel, cobalt, and chromite resource potential.

References:

Bradley, W.W., 1929, Twenty-fifty report of the State Mineralogist: California State Mining Bureau, v. 25, 462 p.

Bradley, W.W., Huguenin, E.H., Logan C.A., Tucker, W.B., and Waring, C.A., 1918, Manganese and chromium in California: California State Mining Bureau Bulletin 76, pp. 151-154.

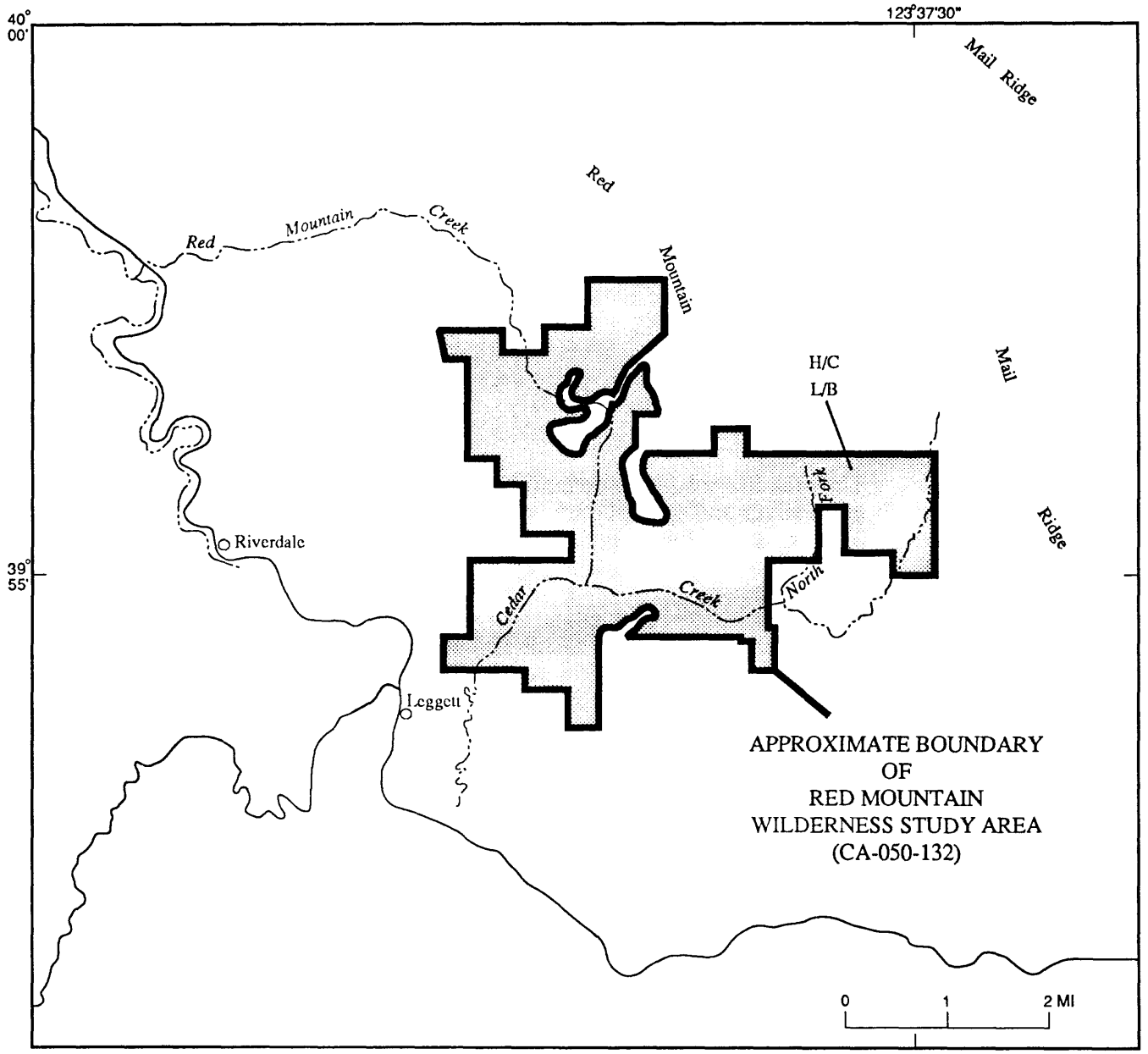
Dow, D.H., and Thayer, T.P., 1946, Geological investigations of chromite in California: California State Mining Bureau Bulletin 134, pp. 17-19.

Jennings, C.W., and Strand, R.G., compilers, 1960, Ukiah sheet: California Division of Mines and Geology Geologic Map of California, scale 1:250,000.

U.S. Bureau of Land Management, 1988, Geographic index (of) all claims.

_____1989, California state-wide wilderness study report: draft copy, part 3, v. 2.

U.S. Bureau of Mines, 1989, Mineral Industry Location System (MILS).



EXPLANATION

H/C Geologic terrane having high mineral resource potential for nickel, cobalt, and chromite with certainty level C as well as identified resources of nickel, cobalt, and chromite

L/B Geologic terrane having low mineral resource potential for uranium, thorium, oil and gas, and sand and gravel with certainty level B

Mineral resources of the Red Mountain Wilderness Study Area.

Name: Rocky Creek/Cache Creek
Area number: CA-050-317
Size (acres): 33,582

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): There are no identified resources in the wilderness study area. The wilderness study area is reported to contain deposits or occurrences of mercury, gold, asbestos, placer chromite, and sand and gravel (U.S. Bureau of Land Management, 1989). Further study is needed to appraise if these deposits or occurrences constitute resources. The McLaughlin gold mine is located two miles to the southeast. The Geysers Known Geothermal Resource Area (KGRA) encompasses approximately two-thirds of the wilderness study area and there are three geothermal lease applications inside the boundary. Several oil and gas lease applications and leases are located in the wilderness study area.

Mineral resource potential (undiscovered): The area has moderate potential for epithermal mineralization containing gold, silver and (or) mercury similar to that at the McLaughlin mine and low potential for chromium and manganese in deposits related to Franciscan ultramafic rocks. The area is near a region of relatively young volcanism and associated geothermal activity. The potential for geothermal resources is moderate with greater certainty within that part of the wilderness study area inside the Geysers Known Geothermal Resource Area (KGRA). There is low potential for oil and gas resources.

Mining activity: Sulphur Creek mercury-gold district is located northeast and within one mile of the wilderness study area boundary. District gold production from 1880 to 1890 was valued at $109,000. Formation of mineral deposits in the district is thought to be associated with hot spring action. Resource Exploration Mining has more than 300 current (October, 1988) claims and Homestake Mining Co. has more than 400 current claims in or adjacent to the wilderness study area. Ten mining claims for mercury have been patented within the wilderness study area and one Mining Plan of Operation submitted; no active mining was taking place as of January, 1988.

Mineral setting: The eastern part of the area is underlain by sedimentary rocks of the Great Valley Sequence. An assemblage of sedimentary and ultramafic rocks of the Franciscan Complex, partially covered by Quaternary and Tertiary sediments, underlies the western part of the area. Small areas of volcanic rock possibly correlative with the Clear Lake Volcanics occur west of the study area.

Recommendations: The wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines. A study is particularly important due to company interest in gold resources.

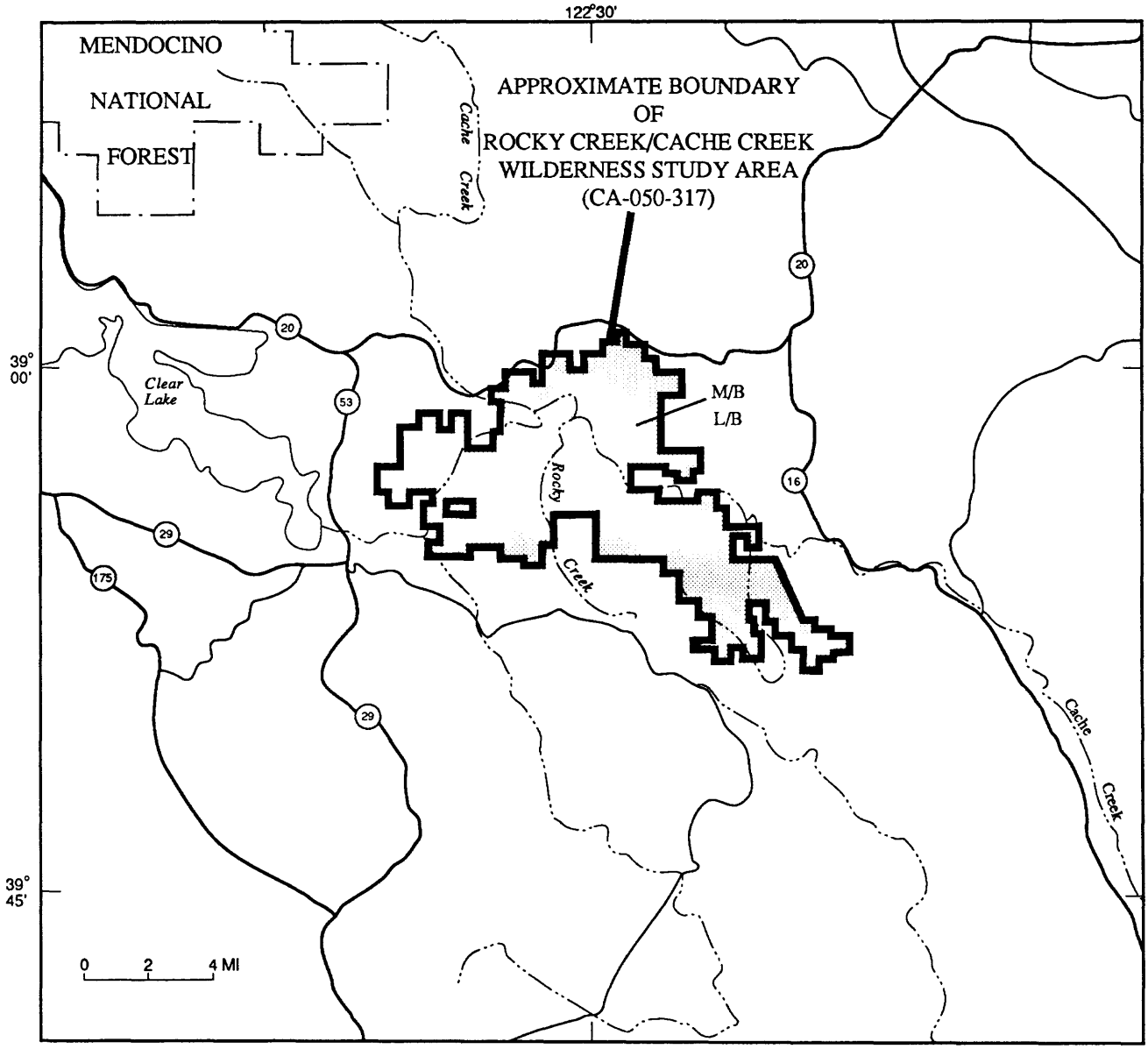
References:

Clark, W.R., 1970, Gold districts of California: California Division of Mines and Geology Bulletin 193, pp. 180-181.

U.S. Bureau of Land Management, 1989, California state-wide wilderness study report: draft copy, part 3, v. 2.

U.S. Bureau of Mines, 1989, Mineral Industry Location System (MILS).

Wagner, D.L., and Bortugno, E.J., compilers, 1982, Santa Rosa sheet: California Division of Mines and Geology Geologic Map of California, scale 1:250,000.



EXPLANATION

M/B Geologic terrane having moderate mineral resource potential for gold, silver, mercury and geothermal energy with certainty level B

L/B Geologic terrane having low mineral resource potential for chromium, manganese, and oil and gas with certainty level B

Mineral resources of the Rocky Creek/Cache Creek Wilderness Study Area.

Name: San Benito
Area number: CA-040-309
Size (acres): 1,500

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): There are no identified mineral resources within the wilderness study area. Mercury, chromite, gold, silver, clay, asbestos, and the gemstones (benitoite and jadeite) have been prospected or produced in and adjacent to the wilderness study area. Further study is needed to appraise if any resources remain in the mines.

Mineral resource potential (undiscovered): The San Benito area lies within the New Idria mining district. The area has high potential for undiscovered hot-springs type mercury-gold-silver deposits. The area has moderate potential for chromite, clay, gemstone, and asbestos deposits. The area has low potential for magnesite, talc

Mining activity: The wilderness study area is situated in the New Idria mining district. There are 44 current lode and placer claims in and adjacent to the wilderness study area according to 1988 U.S. Bureau of Land Management records. Small tonnages of mercury and chromite ore were produced inside the wilderness study area but no production records are available. In the areas near the Aurora and San Carlos mines, altered serpentine (silica-carbonate rock) is present in and adjacent to the wilderness study area. Besides containing mercury, similar altered rocks at the nearby Picacho mine are reported in the literature to carry significant gold and silver. Small discontinuous lens of chromite are present in the serpentine at the Aurora mine. The Dallas mine, two mi southeast of the wilderness study area, is the only known source of the rare sapphire colored gem stone benitoite. The wilderness study area's geologic setting is similar to the Dallas mine. Two mi west of the wilderness study area, jadeite is present in sheared serpentine.

Mineral setting: The San Benito area is located near the New Idria Thrust Fault, which juxtaposes ultramafic and marine metasedimentary rocks of the Franciscan Group with Cretaceous age marine sedimentary rocks.

Recommendations: The wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines. This is particularly important because of past mineral production and recent company interest in the area. There is very little specific resource data available concerning the study area. This area has not been mapped in sufficient detail to confidently evaluate the potential for undiscovered mineral and energy resources. Further detailed geologic mapping is recommended.

References:

Averill, C.V., 1947, Mines and mineral resources of San Benito County, California: California Journal of Mines and Geology Volume 43, p. 41-60.

Becker, G.F., 1888, Geology of the quicksilver deposits of the Pacific Slope: U.S. Geological Survey Monographs Volume 13,

Eckel, E.B., and Myers, W.B., 1946, Quicksilver deposits of the New Idria district, San Benito and Fresno Counties, California: California Division of Mines and Geology Forty-second Report of the State Mineralogist, p. 81-124.

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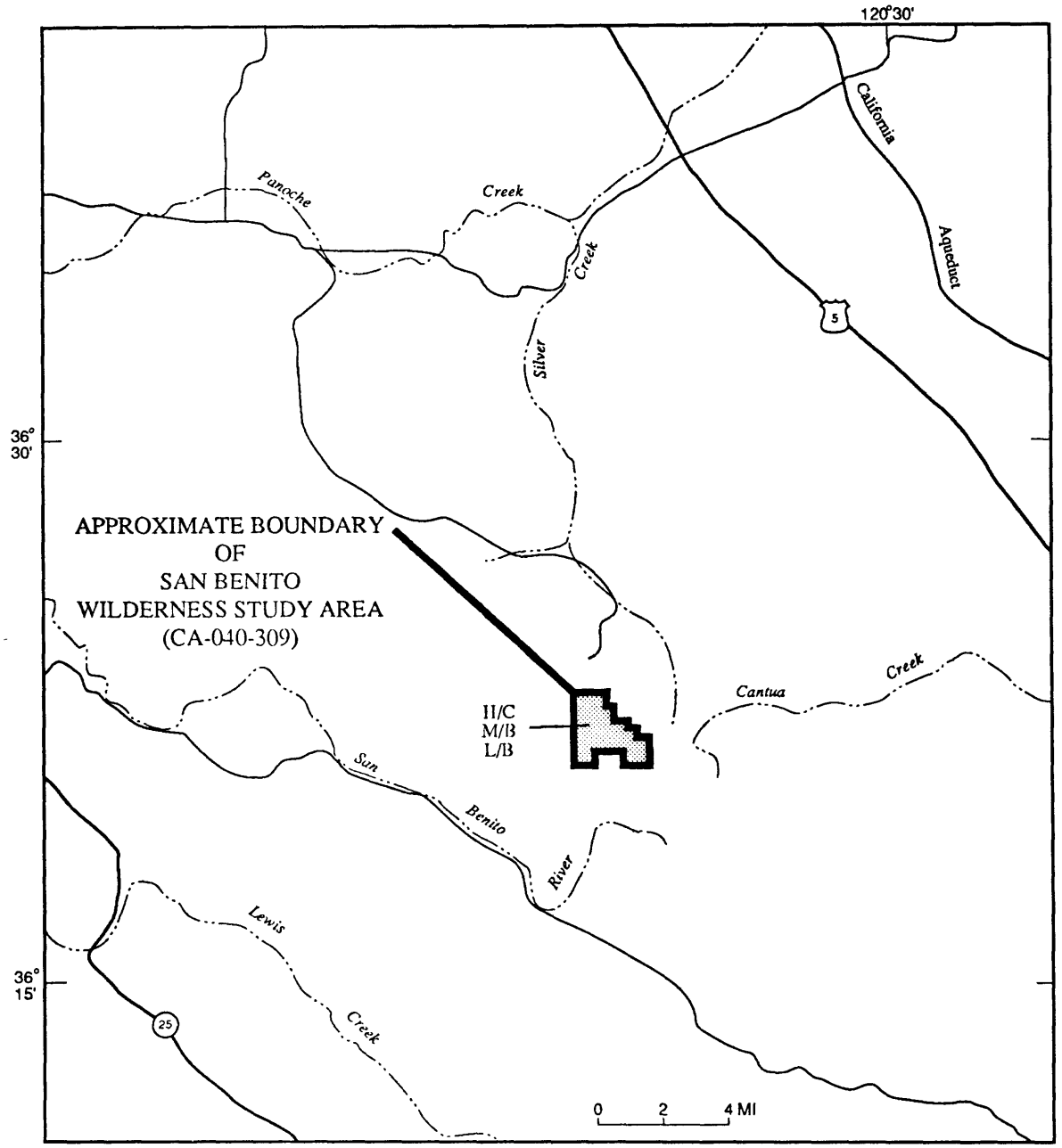

EXPLANATION

H/C Geologic terrane having high mineral resource potential for mercury, gold, and silver with certainty level C

M/B Geologic terrane having moderate mineral resource potential for chromite, clay, gemstone, and asbestos with certainty level B

L/B Geologic terrane having low mineral resource potential for magnesite and talc with certainty level B

Mineral resources of the San Benito Wilderness Study Area.

Name: San Felipe Hills
Area number: CA-060-023
Size (acres): 5,325

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): There are no identified mineral resources within the wilderness study area.

Mineral resource potential (undiscovered): The study area has moderate mineral resource potential for tungsten.

Mining activity: The wilderness study area is not in a mining district. California Division of Mines and Geology County Report 3 shows two groups of prospects in scheelite-bearing tactite in the wilderness study area and about 1,000 feet of underground development on a gold-bearing quartz vein nearby. There are no current claims in the wilderness study area according to January, 1989, U.S. Bureau of Land Management records.

Mineral setting: The area is underlain by Mesozoic metasediments and Cenozoic surficial deposits

Recommendations: By 1937, the nearby Montezuma mining district produced over $1 million of gold. Similar geology extends into the wilderness study area. Favorable geology for gold and tungsten suggests that the wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines.

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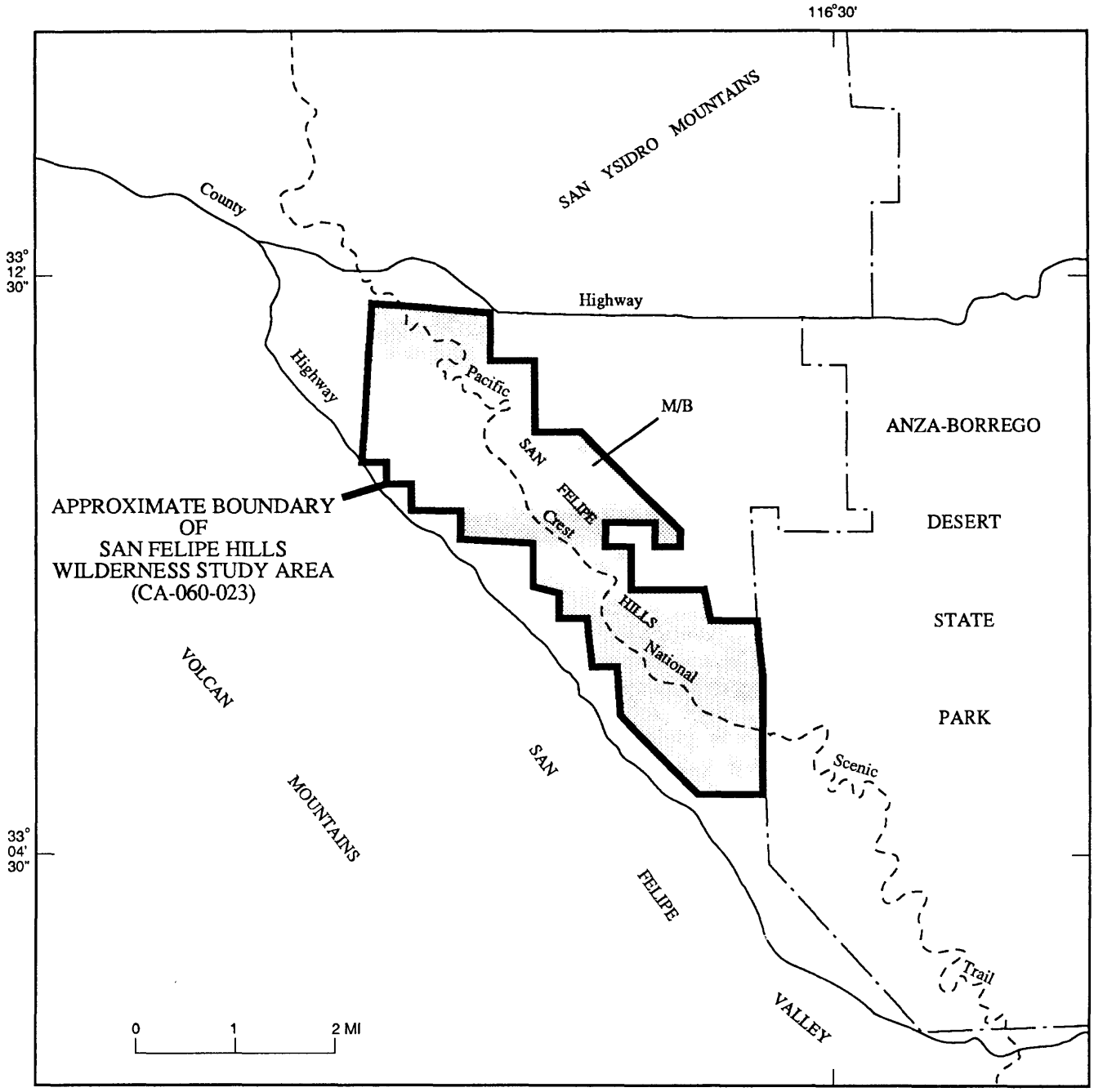

EXPLANATION

M/B Geologic terrane having moderate mineral resource potential for tungsten with certainty level B

Mineral resources of the San Felipe Hills Wilderness Study Area.

Name: San Ysidro Mountain
Area number: CA-060-022
Size (acres): 2,125

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): There are no identified mineral resources within the wilderness study area. California Division of Mines and Geology County Report 3 shows beryllium and gold in the wilderness study area. The San Diego County Environmental Development Agency study states that arsenopyrite, galena, gold, tungsten, limestone and gemstones are known to exist in and near the wilderness study area. Further study is needed to appraise if any of the commodities present constitute resources.

Mineral resource potential (undiscovered): The study area has moderate mineral resource potential for gold, tungsten, limestone, and geothermal energy as well as low mineral resource potential for lead, beryllium, and gemstones.

Mining activity: U.S. Bureau of Mines records show: a gold prospect, a limestone (building stone) prospect, and a past-producing tungsten mine in the wilderness study area; 5 gold prospects or claims blocks, one of which had production, and seven claims for marble, two of which produced near the wilderness study area. Twenty-one claims were recorded from 1977 to 1986. There were no current mining claims in the wilderness study area according to January, 1989, U.S. Bureau of Land Management records.

Mineral setting: The area is underlain by Mesozoic metasedimentary rocks which are intruded by Cretaceous granitic rocks and pegmatites.

Recommendations: The reports of precious metal, sulfides, gemstone and carbonates in several documents with no assessment of quality or quantity suggests that the wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines.

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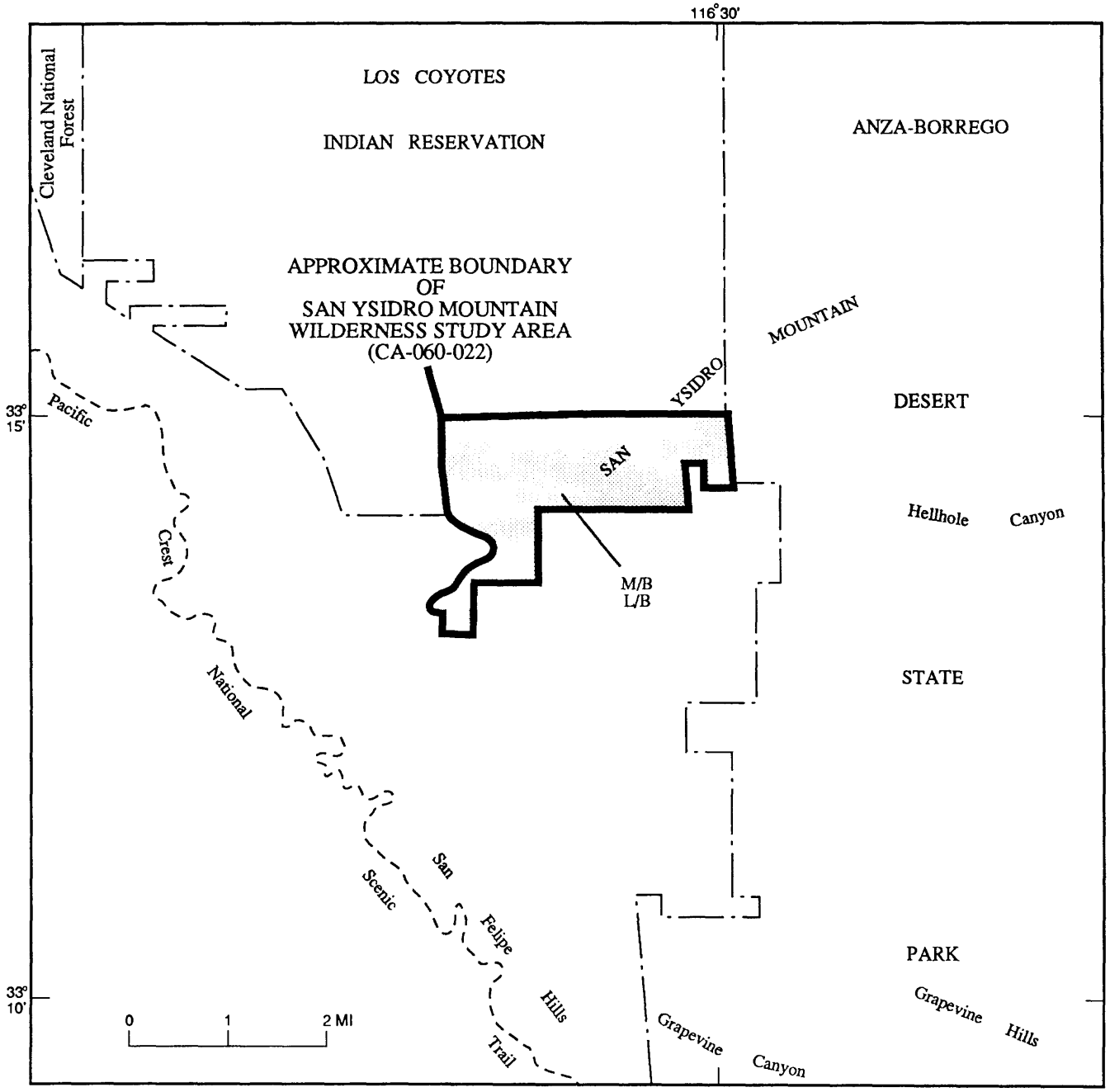

EXPLANATION

M/B Geologic terrane having moderate mineral resource potential for gold, tungsten, limestone, and geothermal energy with certainty level B

L/B Geologic terrane having low mineral resource potential for lead, beryllium, and gemstones with certainty level B

Mineral resources of the San Ysidro Mountain Wilderness Study Area.

Name: Sawtooth Mountain A
Area number: CA-060-024A
Size (acres): 3,883

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): No mineral resources are known within the wilderness study area, nor were any resources identified in the adjacent Sawtooth Mountains B Wilderness Study Area.

Mineral resource potential (undiscovered): The area has moderate mineral resource potential for gold and tungsten. There is moderate gemstone resource potential.

Mining activity: The wilderness study area is not in a mining district, nor has any mining activity, historical or current, been recorded. A 1988 U.S. Bureau of Land Management report states that one small mine is expected to be developed in the mid-1990's within the wilderness study area. The "mine" area is referred to as a "mineralized zone" but the commodity was not identified. There are no current mining claims in the wilderness study area according to January, 1989, U.S. Bureau of Land Management records.

Mineral setting: The area is composed of Cretaceous granitic rocks of the Peninsular Ranges batholith which intrudes Jurassic and Triassic metasedimentary rocks. Cenozoic surficial deposits also occur. Four episodes of deformation are evident in the area.

Recommendations: The wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines to increase the certainty that the mineralization within the adjacent Sawtooth Mountains B Wilderness Study Area extend into this wilderness study area. The area should be studied to evaluate, in particular, the reported mining interest and, in general, the entire area with regard to the Banner and Julian mining districts, within 20 mi of the wilderness study area, where similar rock types have yielded in excess of $4 million of gold. (Gold at $20.67 per ounce).

References:

Cather, E.E., 1984, Mineral resources of the Sawtooth Mountains B Wilderness Study Area (BLM No. 060-024B), San Diego County, California: U.S. Bureau of Mines Open-File Report MLA 30-84, 13 p.

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Todd, V.R., 1977, Geologic map of the Agua Caliente Springs quadrangle, San Diego County, California: U.S. Geological Survey Open-File Report 77-742.

_____1978, Geologic map of the Monument Peak quadrangle, San Diego County, California: U.S. Geological Survey Open-File Report 78-697.

_____1979, Geologic map of the Mount Laguna quadrangle, San Diego County, California: U.S. Geological Survey Open-File Report 79-862.

Todd, V.R., Kilburn, J.E., Detra, D.E., Griscom, Andrew, Knepper, D.H., Jr., Kruse, F.A., Cather, Eric, and Lipton, D.A., 1987, Mineral resources of the Sawtooth Mountains and Carrizo Gorge/Eastern McCain Valley Wilderness Study Areas, San Diego County, California: U.S. Geological Survey Bulletin 1711-B, 15 p.

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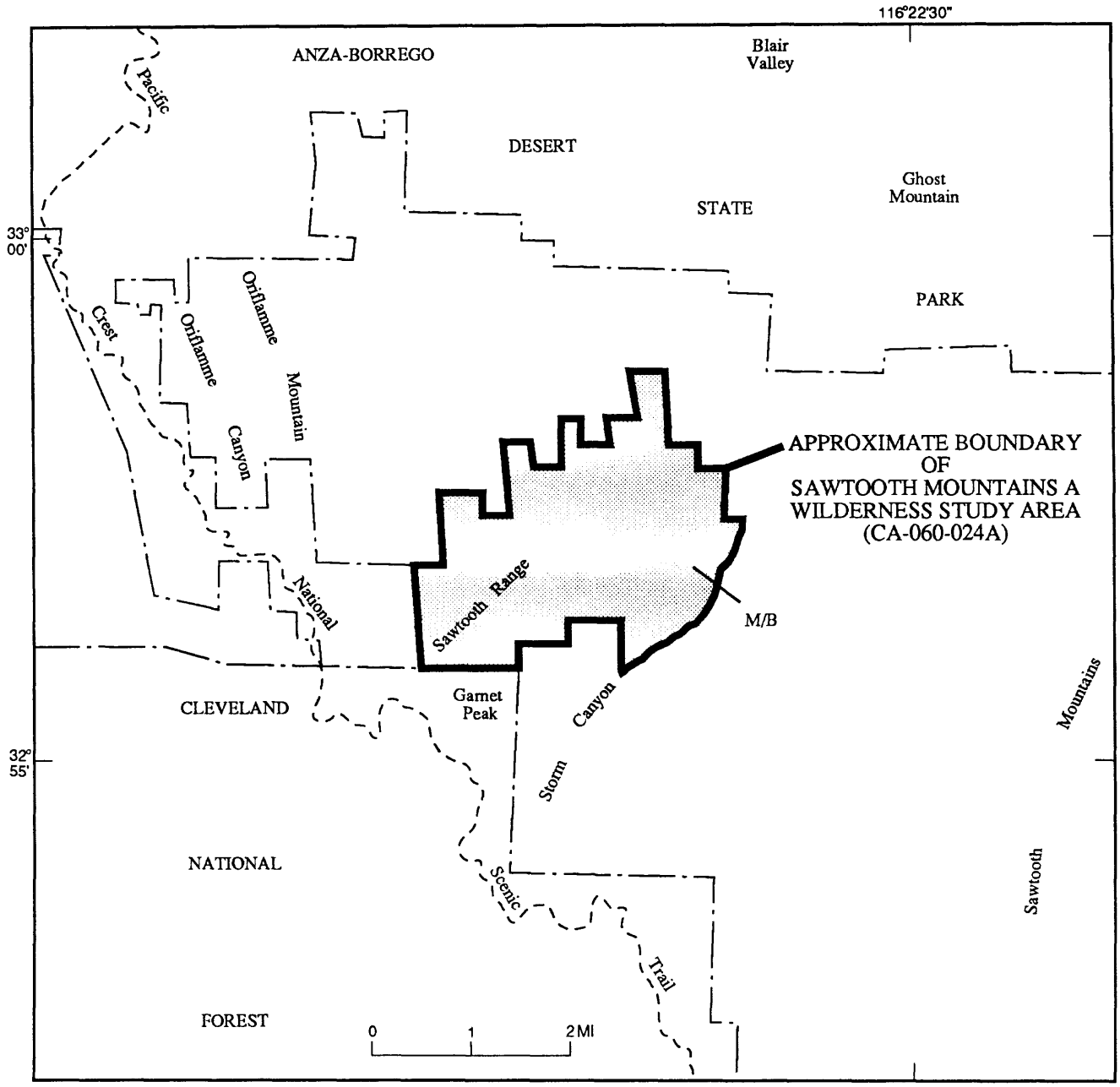

EXPLANATION

M/B Geologic terrane having moderate mineral resource potential for gold,tungsten, and gemstones with certainty level B

Mineral resources of the Sawtooth Mountain A Wilderness Study Area.

Name: Sawtooth Mountain C
Area number: CA-060-024C
Size (acres): 2,454

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): No mineral resources are known within the wilderness study area nor were any resources identified in the adjacent Sawtooth Mountains B Wilderness Study Area.

Mineral resource potential (undiscovered): The area has moderate mineral resource potential for tungsten and has low mineral resource potential for gemstones and gold.

Mining activity: The wilderness study area is not in a mining district, nor has any mining activity, historical or current, been recorded. A 1988 U.S. Bureau of Land Management report states that one small mine is expected to be developed in the mid-1990's within the wilderness study area. The "mine" area is referred to as a "mineralized zone" but the commodity was not identified. There are no current mining claims in the wilderness study area according to January, 1989, U.S. Bureau of Land Management records.

Mineral setting: The area is underlain by Cretaceous granitic rocks of the Peninsular Ranges batholith which intrude pre-batholithic metasedimentary rocks. Cenozoic surficial deposits also occur.

Recommendations: The wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines to increase the certainty that the mineralization within the adjacent Sawtooth Mountains B Wilderness Study Area extend into this wilderness study area. The area should be studied to evaluate, in particular, the reported mining interest in section 13 and, in general, the entire area with regard to the Banner and Julian mining districts, within 20 mi of the wilderness study area, where similar rock types have yielded in excess of $4 million of gold. (Gold at $20.67 per ounce).

References:

Cather, E.E., 1984, Mineral resources of the Sawtooth Mountains B Wilderness Study Area (BLM No. 060-024B), San Diego County, California: U.S. Bureau of Mines Open-File Report MLA 30-84, 13 p.

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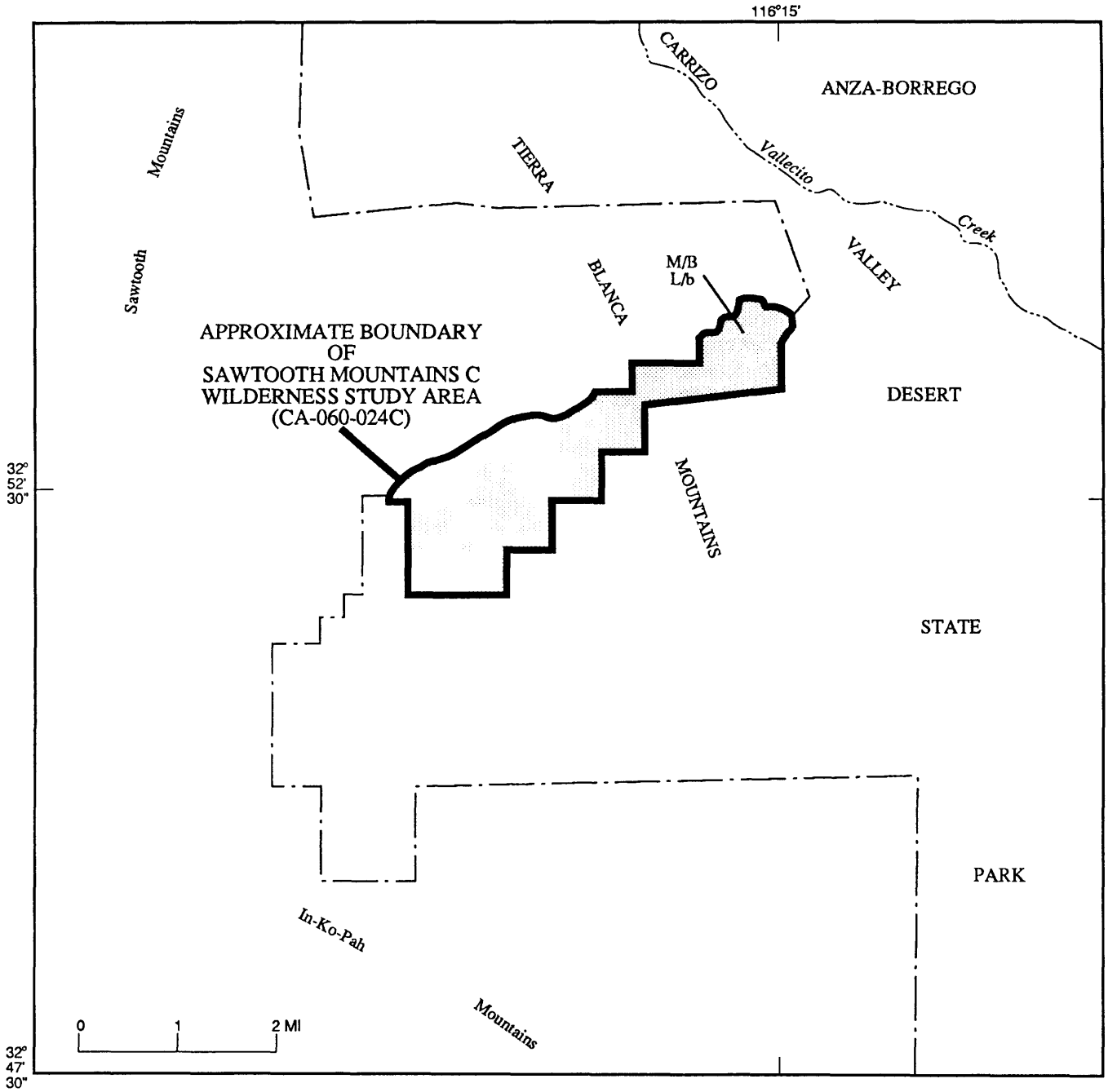

EXPLANATION

M/B Geologic terrane having moderate mineral resource potential for tungsten with certainty level B

L/B Geologic terrane having low mineral resource potential for gemstones and gold with certainty level B

Mineral resources of the Sawtooth Mountain C Wilderness Study Area.

Name: Sheep Ridge
Area number: CA-010-022
Size (acres): 5,102

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): There are no known mineral occurrences or deposits in the wilderness study area. Two occurrences of tungsten lie adjacent to the wilderness study area; one is a past producer.

Mineral resource potential (undiscovered): The area has moderate mineral resource potential for tungsten-molybdenum skarn mineralization in the metasedimentary rocks. These deposits would likely be small and local to calcareous portions of the metasedimentary rocks.

Mining activity: There is no known mineral production from the wilderness study area. No mines, prospects, or current claims are situated in the wilderness study area according to 1988 U.S. Bureau of Land Management records. No mining districts encompass the wilderness study area. About 450 tons of tungsten ore was mined from the Homer mine one mi west of the wilderness study area.

Mineral setting: The geology is predominantly Jurassic to Cretaceous plutonic rocks of the Sierra Nevada batholith. Older metamorphosed sedimentary rocks also occur in the area.

Recommendations: The wilderness study area should be studied as part of a comprehensive mineral survey by the Bureau of Mines and Geological Survey. A study is particularly important because of the favorable geologic environments for tungsten. Further study should include locating extent of metasedimentary host rocks favorable to base-metal mineralization.

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Matthews, R.A., and Burnett, J.L., compilers, 1965, Fresno sheet: California Division of Mines and Geology Geologic Map of California, scale 1:250,000.

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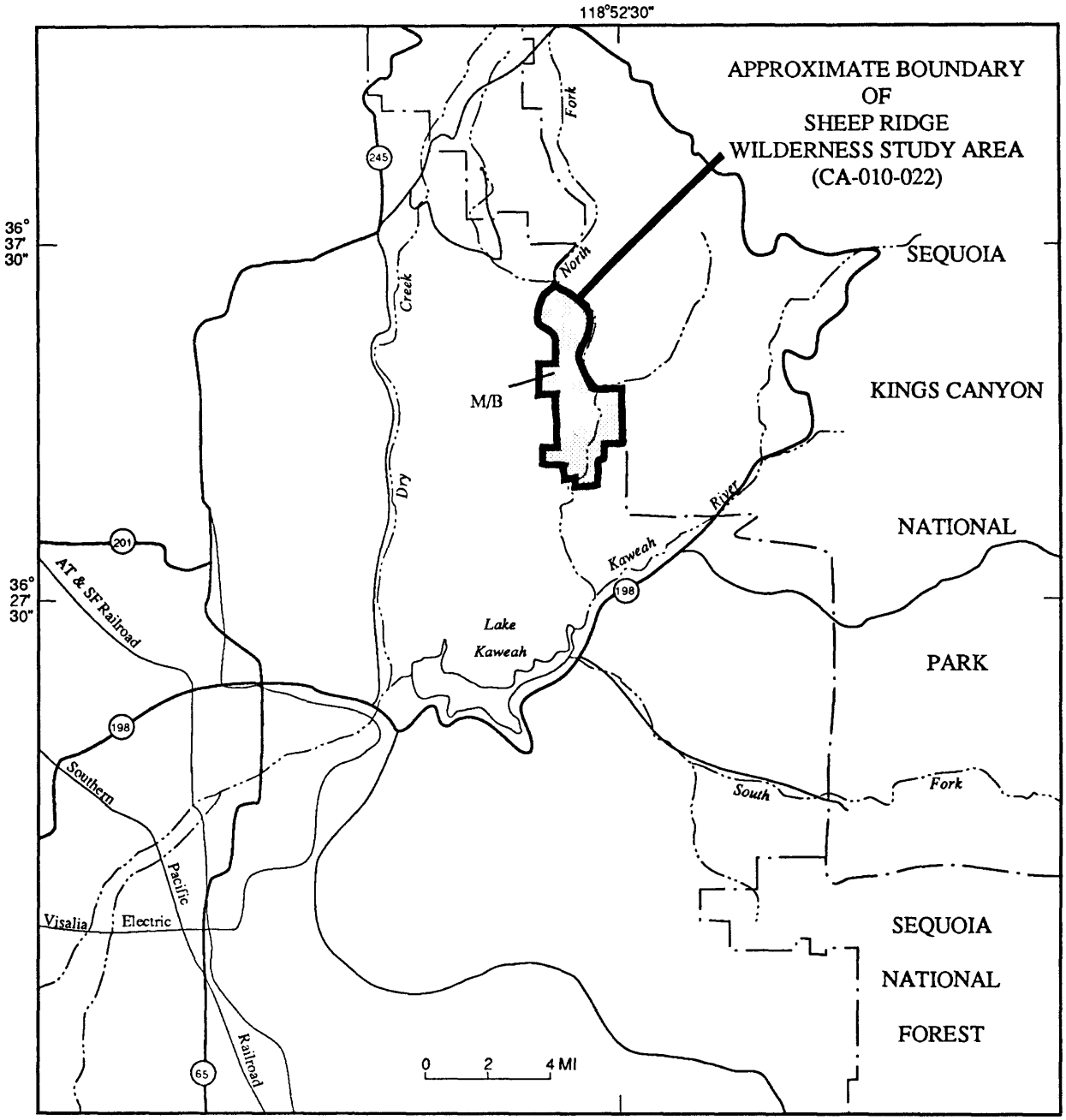

EXPLANATION

M/B Geologic terrane having moderate mineral resource potential for tungsten and molybdemum with certainty level B

Mineral resources of the Sheep Ridge Wilderness Study Area.

Name: Sheldon Contiguous
Area number: CA-020-1012
Size (acres): 24,130 of which 780 were studied at the request of the U.S. Bureau of Land Management.

Status of mineral surveys: Only part of this wilderness study area has been studied as part of a mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines (Bergquist and others, 1988).

Identified mineral resources (known): There are no identified mineral resources in the wilderness study area.

Mineral resource potential (undiscovered): The area has low potential for mercury, gold, silver and natural gas beneath the basalt.

Mining activity: There has been no known prospecting activity or mineral production from the wilderness study area. The wilderness study area is not part of any organized mining district; there are no current mining claims in the wilderness study area according to October, 1988, U.S. Bureau of Land Management records.

Mineral setting: The study area is in a transitional region between the Basin and Range and the Columbia Plateau physiographic provinces and is covered by Cenozoic volcanic rocks. The surrounding area is broken by sets of predominantly northwest-trending high-angle normal faults that have shaped the terrain into flat-topped, tilted fault blocks bounded by steep fault scarps.

Recommendations: As 23,350 acres (96 percent) were not requested for mineral surveys by the U.S. Bureau of Land Management, this unstudied part of the wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines.

References:

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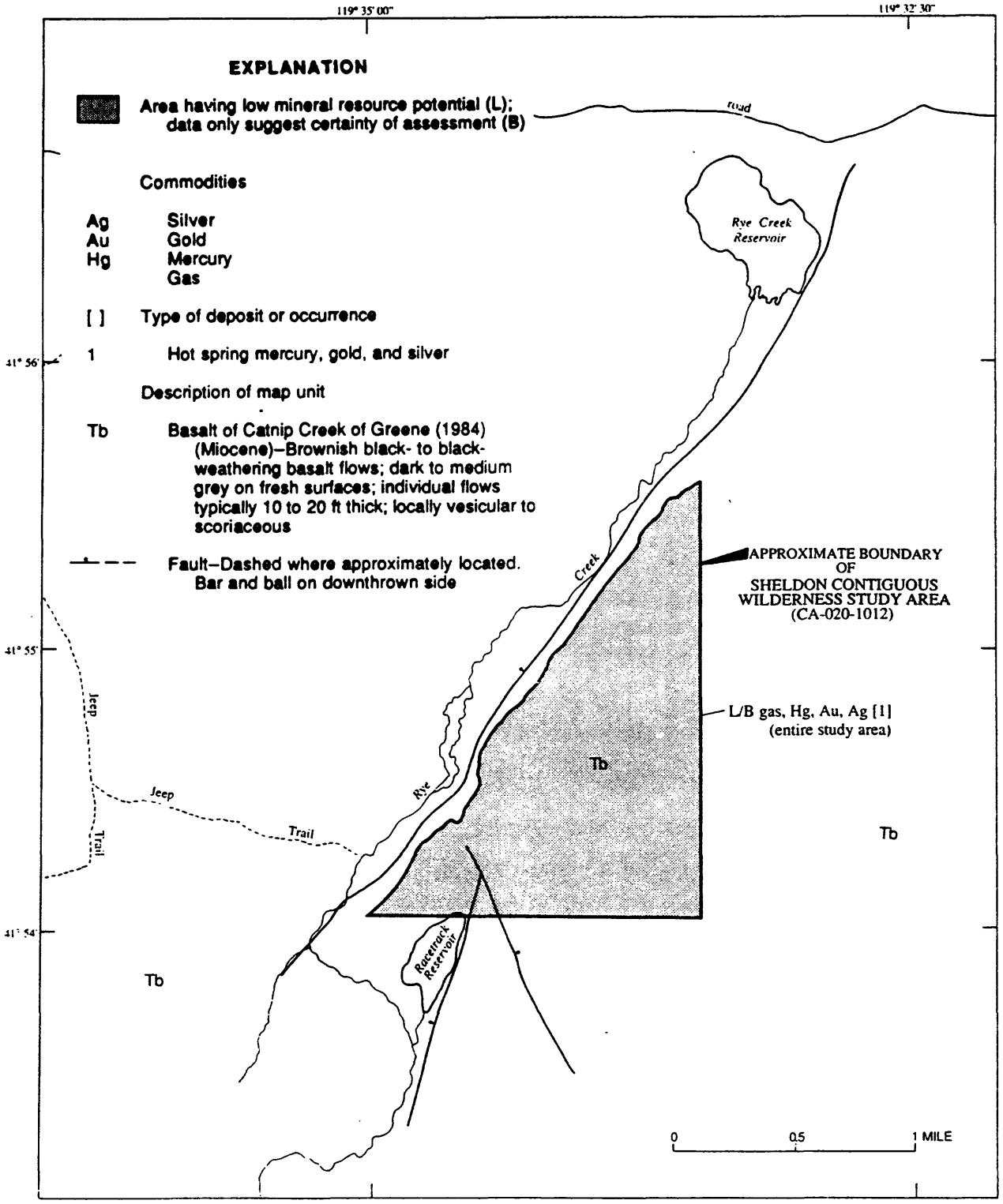

Mineral resources of the Sheldon Contiguous Wilderness Study Area.

Name: Skedaddle
Area number: CA-020-612
Size (acres): 60,960 of which 39,420 were studied at the request of the U.S. Bureau of Land Management.

Status of mineral surveys: Only part of this wilderness study area has been studied as part of a mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines (Diggles and others, 1988b).

Identified mineral resources (known): The identified resources in the Skedaddle Mountain Wilderness Study Area consist of 46,000 tons of measured subeconomic resources and about 138,000 tons of indicated subeconomic resources of perlite. Additional nonmetallic occurrences present in the study area consist of basalt, pozzolan, stone, and sand and gravel. There are no identified resources of these commodities and they are not currently of economic significance. There are no identified resources of metallic minerals in the study area, but metallic mineral occurrences present in and near the study area consist of small amounts of gold and mercury in vein-type deposits. The gold and mercury occurrences and the perlite resources are spatially related to a volcanic center in the Skedaddle Mountains.

Mineral resource potential (undiscovered): There are six areas of mineral and (or) geothermal energy resource potential in the Skedaddle Mountain Wilderness Study Area. Geologic and geochemical evidence suggests that the study area has potential for the occurrence of silver, gold, mercury, and antimony metallic deposits. The central part of Spencer Basin, upper Thousand Springs Canyon, and the south fork of Wendel Canyon have high mineral resource potential for gold, silver, mercury, and antimony while the area surrounding these locations has moderate mineral resource potential for the same metals. An area in Wendel Canyon has moderate mineral resource potential for perlite, and an adjacent area to the south has low mineral resource potential for the same commodity. The Skedaddle Mountain Wilderness Study Area includes part of the Wendel-Amedee Known Geothermal Resource Area. The southwest corner of the study area has moderate resource potential for geothermal energy and much of the west half of the study area has low potential for geothermal energy.

Mining activity: The wilderness study area is not in a mining district. There are no current mining claims in the wilderness study area according to October, 1988, U.S. Bureau of Land Management records. By 1906, 45 lode claims were recorded for gold including a few for mercury. None of the prospects or claims in or within 1 mi of the study area have recorded production. At least 276 recorded lode, 6 located but unrecorded lode, and 29 placer claim locations are present in and within about 1 mi of the study area. Approximately 191 of these are in the study area; four of these were actively held in 1985. None of the study area was being explored by private industry in 1985, but prospects in the Skedaddle Mountains may be targets for future exploration for both precious metals and perlite.

Mineral setting: The rocks in the study area consist mostly of Tertiary basalt, andesite, dacite, and lahar deposits; minor amounts of rhyolite are also present. Surficial deposits consist of colluvium, alluvium, talus, and lacustrine deposits. South of the study area are lakebed features including tufa deposits and strandlines from Pleistocene Lake Lahontan. Andesite flows, commonly including intercalated basalt, are exposed mostly at higher elevations in the study area. Olivine basalt flows, exposed in the eastern part of the area, are composed of fine-grained to glassy matrix and phenocrysts of olivine. Thick lahar deposits are exposed in the western and southern parts of the study area. Lahars are volcanic debris flows containing at least 80 weight percent solids. They consist of volcanic mud-flow breccia occurring as flows filling channels and as crusts on sides of channels. Two dacite flow-dome complexes crop out along and north of the crest of the Skedaddle Mountains. Dacite flows are also present in Thousand Spring Canyon.

The central part of Spencer Basin is underlain by volcanic rocks which probably were andesite, dacite, and lahar deposits, but which have been silicified, propylitized, and potassically altered to an extent that original lithologies were unrecognizable. Gold mineralization may have been extensive in these altered rocks.

Recommendations: As only 43 percent of the Skedaddle Mountain Wilderness Study Area has been studied as part of a mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines, further work is needed to assess the balance. The area also contains three areas which particularly warrant further study; all are in or along the boundary of the study area.

- Perlite is present in a group of rhyolite and rhyolitic units in Wendel Canyon. The perlite occurrence and surrounding area need to be investigated in greater detail in order to determine tonnage and grade with certainty and to look for extensions.

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

- A 2 mi-long area of siliceous-sinter outcrops is present near the head of Thousand Spring Canyon, and along the south edge of Spencer Basin. This area contains extensive sinter which has been bleached, contains limonite, and has locally anomalous trace-element concentrations. Additional work is needed to determine the significance, extent, and character of this occurrence as a possible indicator of disseminated gold and silver deposits. Detailed work should include geologic mapping, sampling, geophysical studies (IP, resistivity, EM16, and magnetometer) followed by drilling if appropriate.

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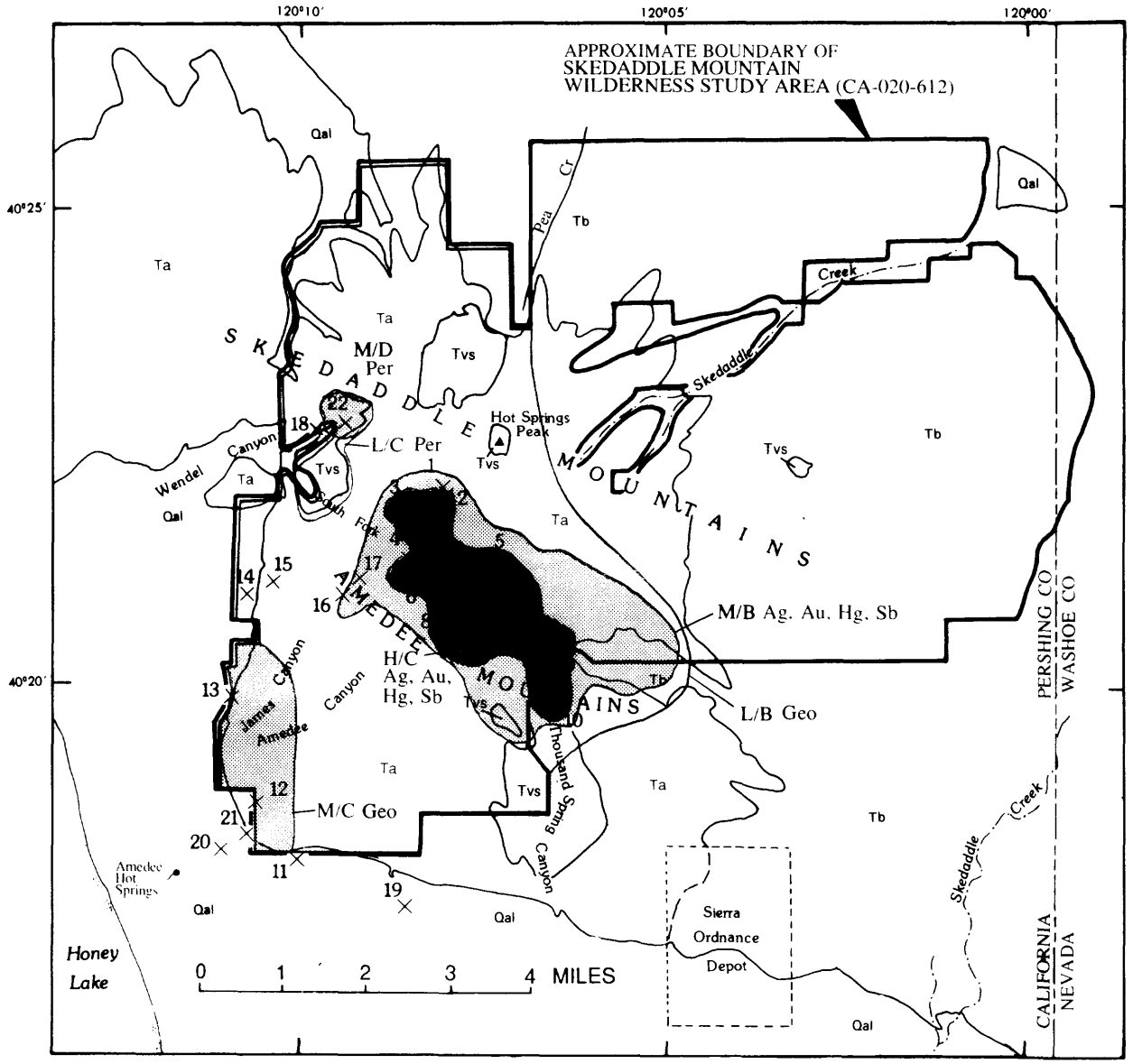
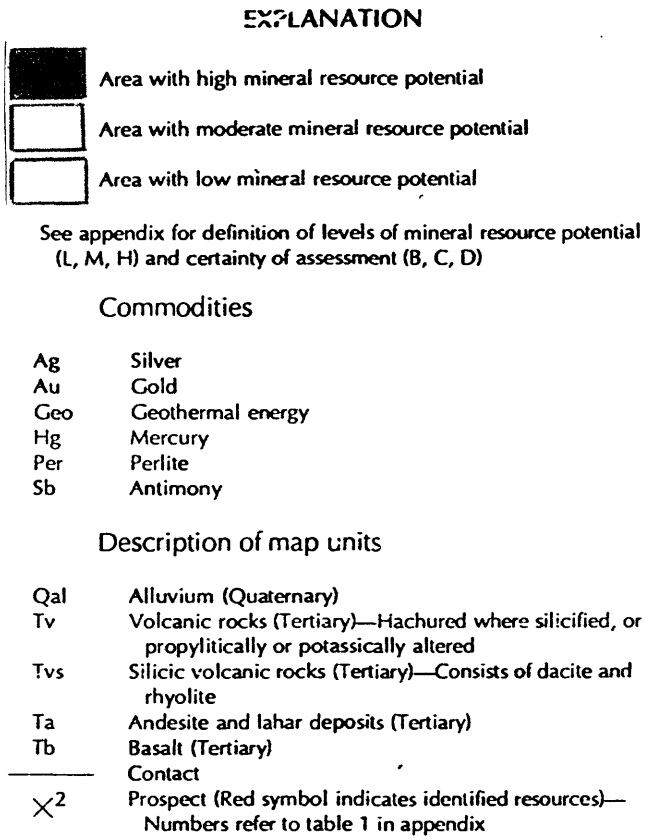


Mineral resources of the Skedaddle Wilderness Study Area.



Explanation, mineral resources of the Skedaddle Wilderness Study Area.

Name: Slinkard
Area number: CA-010-105/NV-030-531
Size (acres): 6,350

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): No known mineral occurrences or deposits are present within the wilderness study area.

Mineral resource potential (undiscovered): The study area has low resource potential for uranium in the basal gravels of the Relief Peak Formation. The area also has low geothermal resource potential for low temperature geothermal systems along the fault-bounded western edge.

Mining activity: There is no known mineral production from the wilderness study area. The wilderness study area is not in a mining district. As of July, 1988, there were 65 current mining claims in the wilderness study area and 66 nearby according to U.S. Bureau of Land Management records.

Mineral setting: The area is underlain by a layer of interbedded andesitic and basaltic lava flows and mudflows of the Tertiary-age Relief Peak Formation overlying a granitic pluton of Cretaceous age. The western edge of the area is fault bounded.

Recommendations: Since uranium is known to exist in the basal portion of the Relief Peak Formation, detailed mapping in the unit would indicate weather or not this part of the formation is present and thus clarify the uranium resource potential. Detailed mapping would also locate areas of hydrothermal alteration existing at the surface. This work should be supported by a geochemical study of the area as well. With consideration that three mining districts within 10 mi of the wilderness study area in similar rock types, a mapped intrusive into sedimentary rocks in the area, and the number of mining claims, the wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines.

References:

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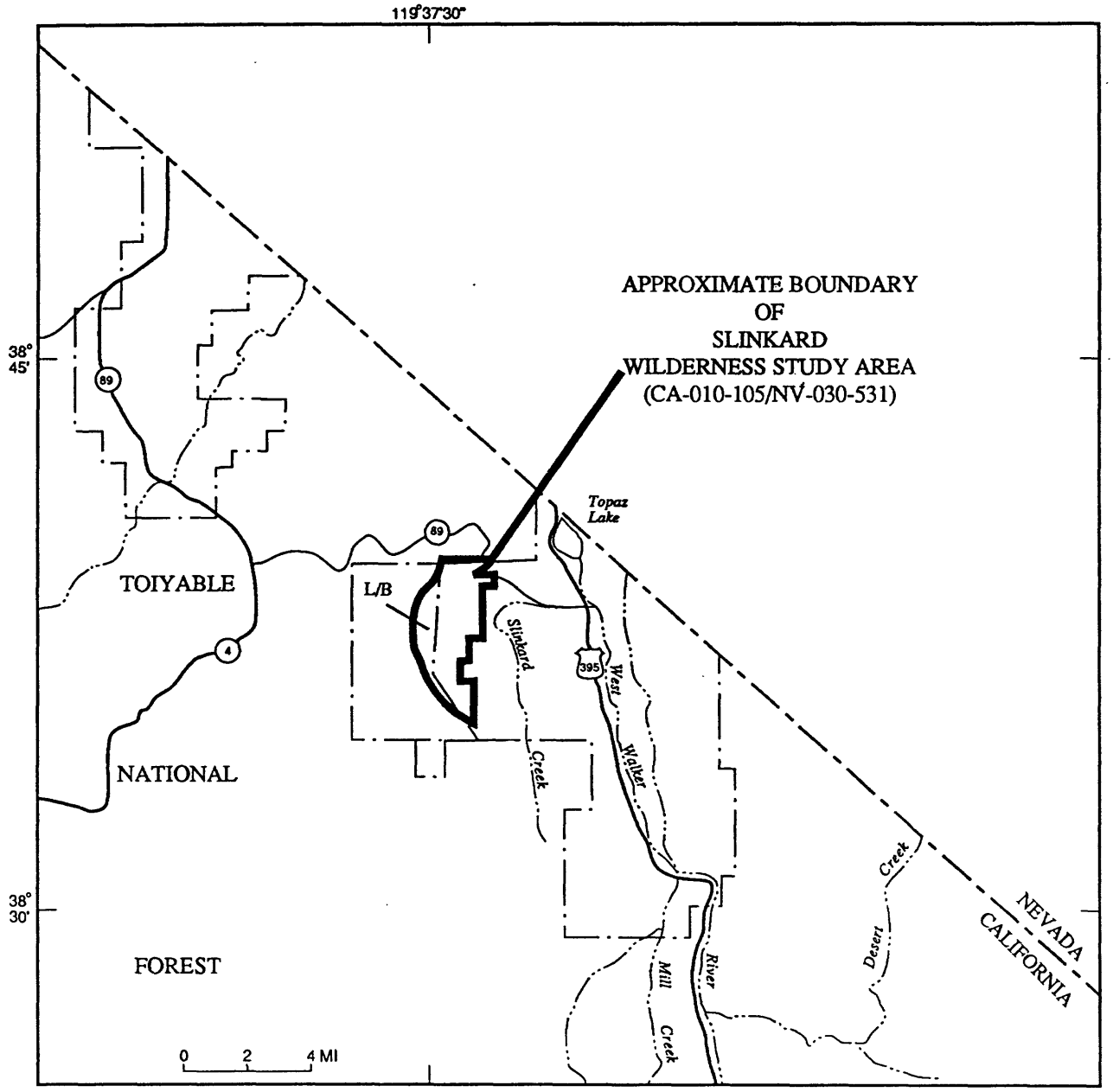
U.S. Bureau of Land Management, 1988, Geographic index (of) all claims.

_____1988, Wilderness recommendations, Benton-Owens Valley/ Bodie-Coleville study area: Environmental Impact Statement.

_____1989, California state-wide wilderness study report: draft copy, part 3, v. 1.

U.S. Bureau of Mines, 1989, Mineral Industry Location System (MILS).



EXPLANATION

L/B Geologic terrane having low mineral resource potential for uranium and geothermal energy with certainty level B

Mineral resources of the Slinkard Wilderness Study Area.

Name: South Warner Contiguous
Area number: CA-020-708
Size (acres): 4,330

Status of mineral surveys: This wilderness study area has been studied as part of a mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines (Sawlan and others, 1989).

Identified mineral resources (known): There are no identified mineral resources within the wilderness study area. The wilderness study area contains occurrences of low-grade uneconomic gold, antimony, arsenic, molybdenum, tungsten, mercury, perlite, and pozzolan.

Mineral resource potential (undiscovered): The entire study area has low potential for epithermal (low-temperature) gold and silver resources. Evidence of epithermal mineralization consists of rock and stream-sediment geochemical anomalies of gold or elements associated with gold in present-day mineralized hot springs and related epithermal gold deposits throughout the study area. The Barber and Van Riper parcels in the southern part of the study area have low potential for geothermal energy resources.

Mining activity: he wilderness study area is not in a mining district. About 35 mining claims were staked in the late 1800's and early 1900's. There are no current mining claims in the wilderness study area according to October, 1988, U.S. Bureau of Land Management records.

Mineral setting: The study area is underlain by Oligocene to middle Miocene volcanic rocks which form a west-dipping (20°-25°) homocline. These volcanic rocks include andesitic volcaniclastic rock, lava of basalt, andesite, and rhyolite, rhyolite ignimbrite, and andesite dikes. These volcanic rocks are cut by two major fault sets. Northeast-trending faults were active during post-middle Miocene time and these faults are cut by north-northwest-trending faults associated with Basin and Range faulting. Quaternary deltaic gravel deposits occur along the range front scarp along the east side of the study area parcels.

Recommendations: Intensive sampling of mineralized parts of the study area and the low anomalies of gold and associated elements in stream sediments indicate that gold resources are not exposed at the surface. In addition, the weakly mineralized rocks comprise only a small volume of rock confined to narrow quartz veins. Assuming that mineralization in the study area may represent the weakly mineralized margins of a regional mineralization event, future work in the study area should focus on a regional assessment of structures that control gold mineralization in areas surrounding the study area. Exploration drilling would be required to assess whether the weakly mineralized rocks in the study area represent the upper parts of larger mineralized body or a small zone of mineralization.

References:

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Morris, Edward, ed., 1945, Manual of industrial and war minerals of the counties of Alta (northern), California: Alta California, Inc., 136 p.

Russell, R.J., 1928, Basin Range structure and stratigraphy of the Warner Range, northeastern California: University of California Publications in Geological Sciences, v. 17, no. 11, p. 387-496.

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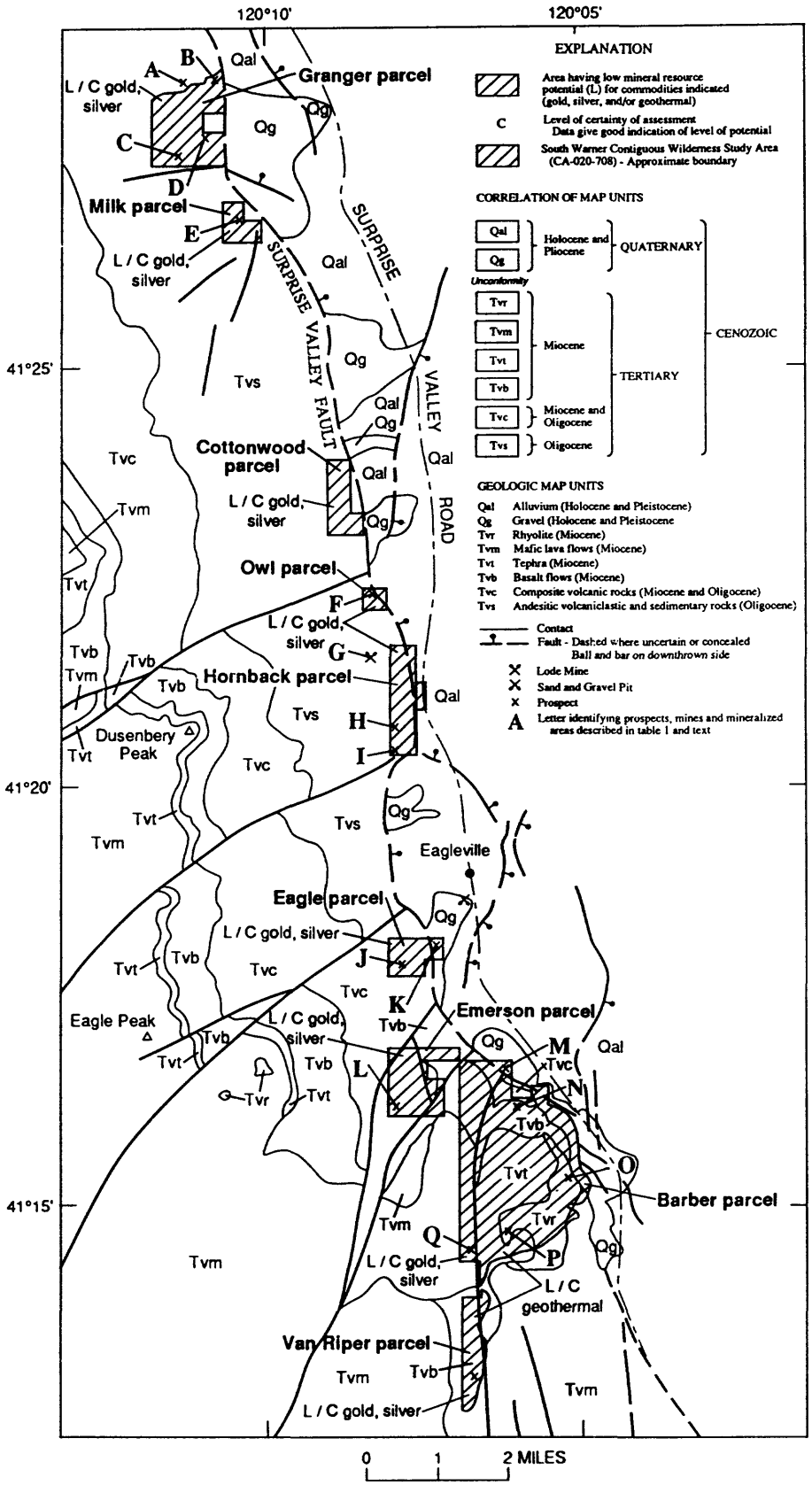

Mineral resources of the South Warner Contiguous Wilderness Study Area.

Names: Southern Otay Mountain and Western Otay Mountain

Area numbers: CA-060-029 and CA-060-028

Size (acres): 7,940 and 5,750

Status of mineral surveys: These wilderness study areas have been studied as part of a mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines (Todd and others, 1988).

Identified mineral resources (known): No mineral resources are identified in the Southern or Western Otay Mountain Wilderness Study Areas. None of the prospects in the wilderness study areas contain significant concentrations of gold, silver or other metals. However, small-scale recreational mining may occur in Mine Canyon.

Mineral resource potential (undiscovered): The areas probably lack significant mineralization and therefore have only low mineral resource potential for gold and lead.

Mining activity: The Dulzura (Oneida) mining district is adjacent to the east boundary of the Southern Otay Mountain wilderness study area. The earliest confirmed mining activity occurred in 1877 when gold was found in Mine Canyon. Only a minor amount of gold have been produced from Mine Canyon. Several claims, prospect pits and adits are situated along the northern border of the Southern Otay Mountain Wilderness Study Area and along the southern boundary of the Western Otay Mountain Wilderness Study Area. There are no current mining claims in either wilderness study area according to January, 1989, U.S. Bureau of Land Management records.

Mineral setting: These areas are underlain by the Santigo Peak volcanic rocks of Jurassic age. These rocks are intruded by Cretaceous granitic rocks and are overlain by Cenozoic surficial deposits.

Recommendations: As these areas have already been studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines, no further work is needed.

References:

Causey, J.D., and Schmauch, S.W., 1987, Mineral resources of the Southern Otay Mountain and Western Otay Mountain Wilderness Study Areas, San Diego County, California: U.S. Bureau of Mines Open-File Report MLA 31-87, 15 p.

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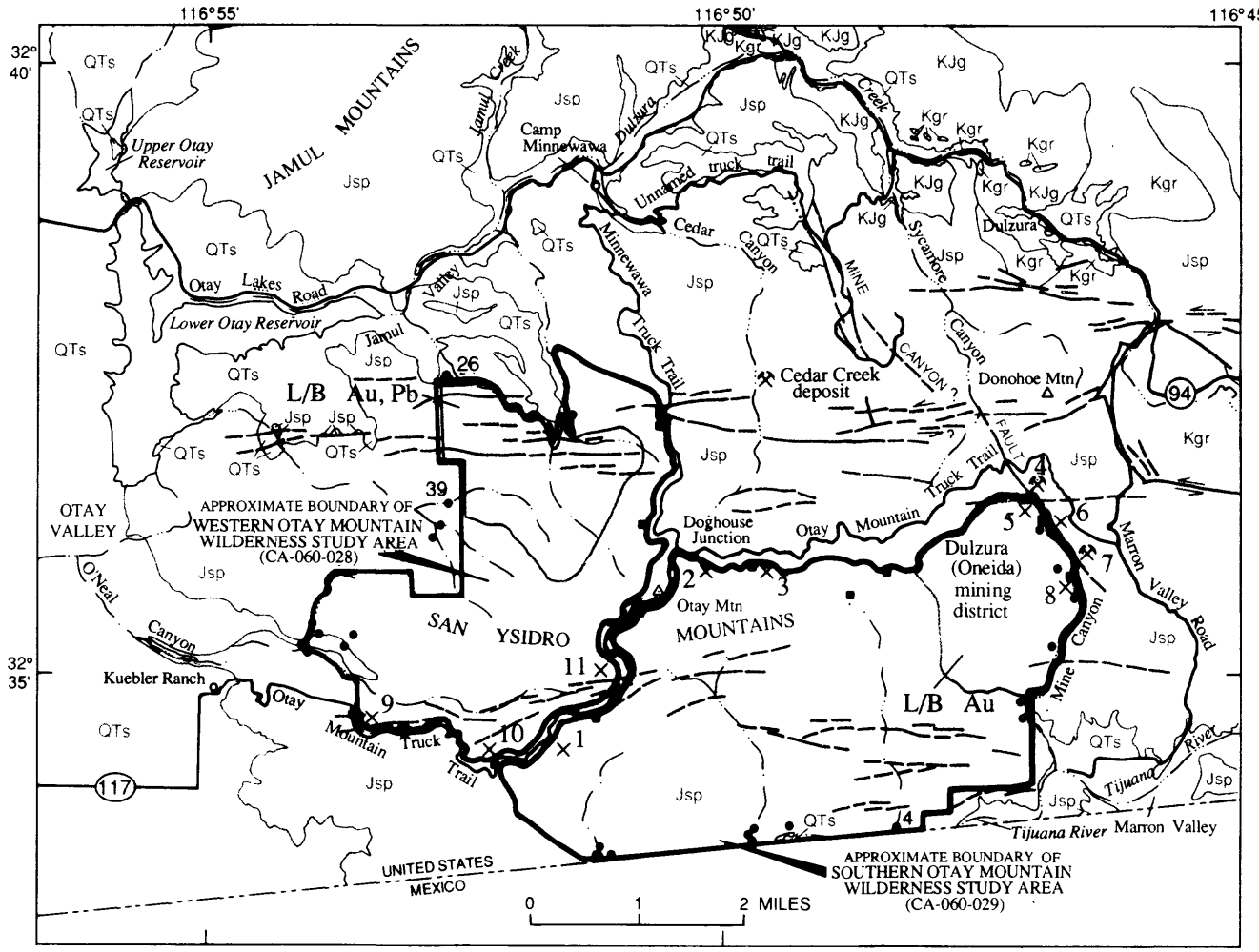

EXPLANATION

Area having low mineral resource potential (L) for commodities as shown; data only suggest certainty level (B)

Commodities

Au Gold
Pb Lead

Mines, claims, and prospects—See table 1 for description

1. Unnamed prospect
2. Silver Queen claim
3. Bonanza claim
4. Johnston mine
5. Doolittle group
6. Unnamed prospect
7. Donohoe mine
8. W & T claims
9. Border View Nos. 1-4 claims
10. Ocean View claims
11. Otay Mining Company claim

Description of map units

QTs Sedimentary deposits (Quaternary and Tertiary)—Includes unnamed fanglomerate deposits, Rosarito Beach Formation, Lindavista Formation, and surficial deposits

Kgr Undifferentiated granitic rocks (Cretaceous)—Part of Peninsular Ranges batholith

KJg Gabbro (Cretaceous and(or) Jurassic)—Hypabyssal pluton; may be part of Peninsular Ranges batholith

Jsp Santiago Peak Volcanics (Jurassic)

Contact—Dotted where concealed

High-angle fault—Dashed where approximately located or inferrred, dotted where concealed. Arrows indicate sense of lateral displacement, querried where uncertain

Stream

$\bullet^{26}$ Stream-sediment sample site—Panned-concentrate and(or) rock samples also taken at some sites. Numbered if noted in text

Rock sample site

Mine—See table 1 for description

$\times^{10}$ Prospect, claim—See table 1 for description

Mineral resources of the Southern Otay Mountain and Western Otay Mountain Wilderness Study Areas.

Name: Sweetwater
Area number: CA-010-103
Size (acres): 960

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): No mineral occurrences or deposits are present within the wilderness study area.

Mineral resource potential (undiscovered): The study area has moderate mineral resource potential for small deposits of gold and silver in quartz veins in both the volcanic rocks and in small windows of pre-Tertiary metamorphic and granitic rocks. There is low mineral resource potential for mercury in opalized and otherwise altered rhyolite. There is moderate resource potential for geothermal energy at the southern margin of the study area owing to the occurrence of hot springs nearby to the south.

Mining activity: There is no known mineral production from the wilderness study area; however, travertine has been mined nearby. The wilderness study area is not in a mining district. As of October, 1988, there were no current mining claims according to U.S. Bureau of Land Management records.

Mineral setting: Most of the study area consists of basaltic to rhyolitic volcanic extrusive rocks of Tertiary age, and varied sediments of both Quaternary and Tertiary ages. The other five percent is composed of metamorphosed volcanic and volcaniclastic rocks, intermediate and silicic in composition, and epiclastic sedimentary rocks, all of Jurassic and Triassic age. The study area is relatively free of major faulting but is flanked by areas cut by numerous northwest- to northeast-trending normal faults.

Recommendations: The area is mapped as Quaternary alluvium, glacial outwash, fan deposits, with small areas of fans and pediment sands and gravel. Further investigation of the potential for the occurrence of mineral resources should include a geochemical sampling program and a reconnaissance search for bleached areas, and for opalization of silicic volcanic rocks. The wilderness study area should be evaluated for sand and gravel and the possibility of hot springs deposits as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines.

References:

Brem, G.F., 1983, Geologic map of the Sweetwater Roadless Area, Mono County, California, and Lyon and Douglas Counties, Nevada: U.S. Geological Survey Miscellaneous Field Studies Map MF-1535-B, scale 1:62,500.

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Koenig, J.B., compiler, 1963, Walker Lake sheet: California Division of Mines and Geology Geologic Map of California, scale 1:250,000.

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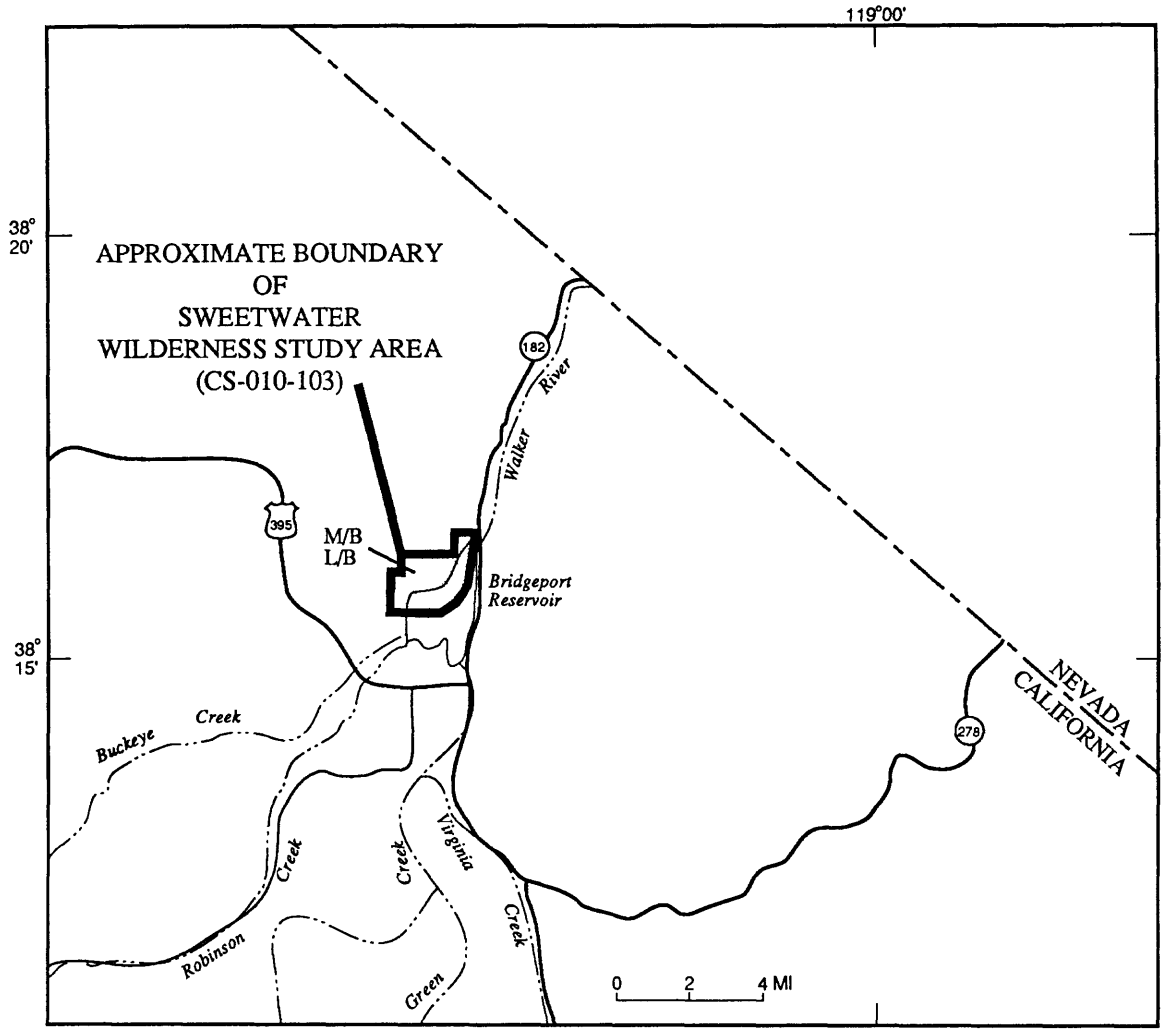
Stewart, J.H., Carlson, J.E., and Johanneson, D.C., 1982, Geologic map of the Walker Lake 1° by 2° quadrangle, California and Nevada: U.S. Geological Survey Miscellaneous Field Studies Map MF-1382-A, scale 1:250,000.

U.S. Bureau of Land Management, 1988, Geographic index (of) all claims.

_____1988, Wilderness recommendations, Benton-Owens Valley/Bodie-Coleville study areas: Environmental Impact Statement.

U.S. Bureau of Mines, 1989, Mineral Industry Location System (MILS).



EXPLANATION

M/B Geologic terrane having moderate mineral resource potential for gold, silver, and geothermal energy with certainty level B

L/B Geologic terrane having low mineral resource potential for mercury with certainty level B

Mineral resources of the Sweetwater Wilderness Study Area.

Name: Symmes Creek
Area number: CA-010-064
Size (acres): 7,700

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): No mineral occurrences or resources have been identified in the wilderness study area.

Mineral resource potential (undiscovered): The Symmes Creek Wilderness Study Area is situated between Symmes Creek and Shepherd Creek, east of Mt. Williamson. The study area has low mineral resource potential for silver, lead, and zinc that is associated with metavolcanic rocks. The metavolcanic rocks, if present, are buried beneath alluvial cover. The area has an abundance of poorly sorted sand and gravel; more well-sorted deposits are located outside the study area and closer to markets.

Mining activity: There is no known mineral production from the wilderness study area and no known mines or prospects. The wilderness study area is not in any known mining district. According to 1988 U.S. Bureau of Land Management records, there are no current mining claims in the wilderness study area.

Mineral setting: The bedrock in the study area consists Mesozoic or Paleozoic mafic and felsic metavolcanic rocks that have been intruded by plutonic rocks of Jurassic or Cretaceous age. The plutonic rocks consist of granodiorite with minor alaskite and mafic rocks, primarily diorite. The bedrock is covered in much of the area by alluvial fan deposits of poorly sorted sand, gravel, and boulders, some of which is derived from glacial till.

Recommendations: The wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines to increase the certainty that the mineralization within the adjacent U.S. Forest Service lands extend into this U.S. Bureau of Land Management land.

References:

Dellinger, D.A., Diggles, M.F., and du Bray, E.A., 1982, Maps and interpretation of geochemical anomalies in the John Muir Wilderness, California: U.S. Geological Survey Miscellaneous Field Studies Map MF-1185-B, scale 1:125,000, 3 sheets.

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Ross, D.C., 1965, Geology of the Independence quadrangle Inyo County, California: U.S. Geological Survey Bulletin 1181-O.

_____1966, Stratigraphy of some Paleozoic formations in the Independence quadrangle, Inyo County, California: U.S. Geological Survey Professional Paper 396.

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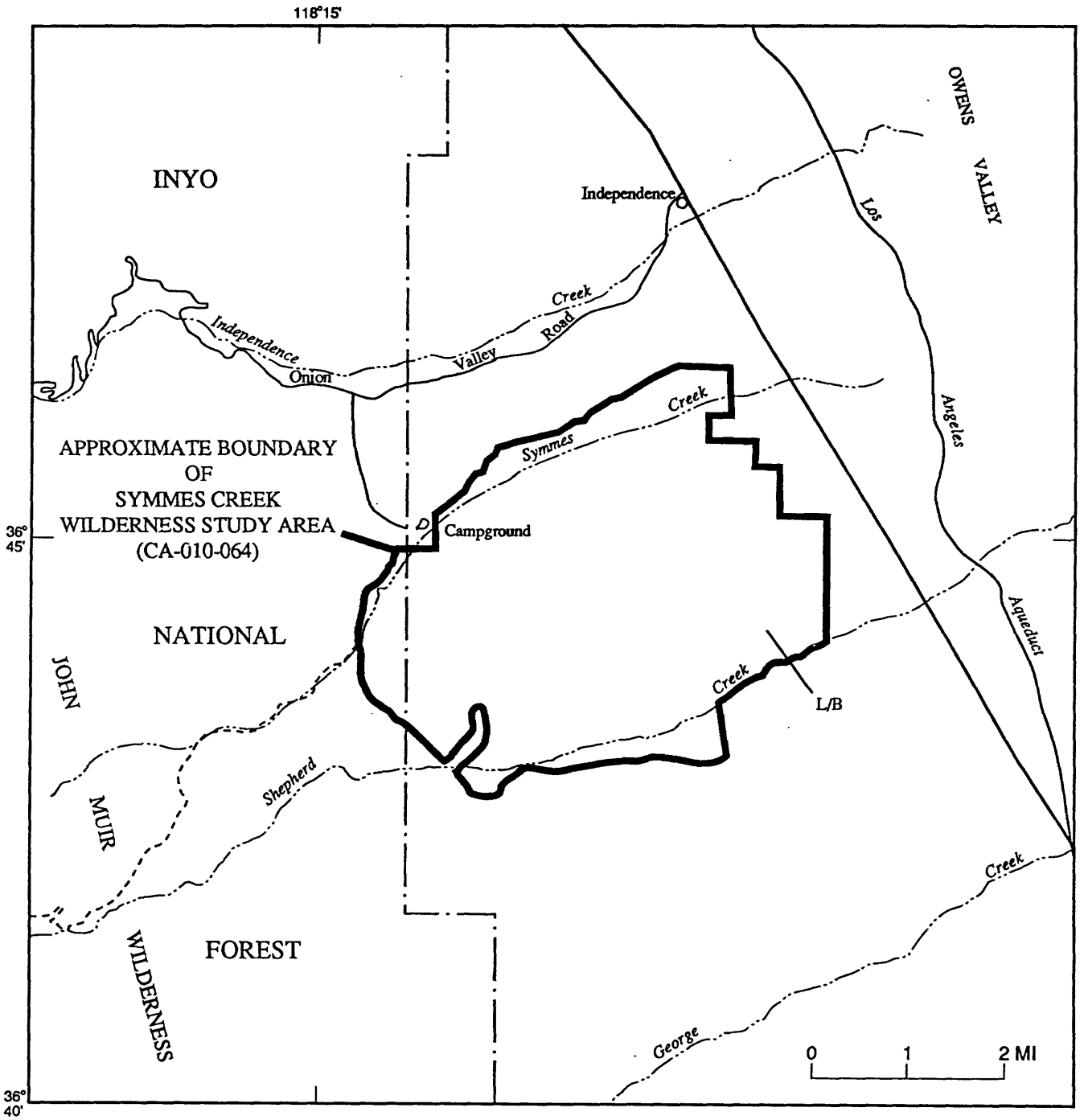

EXPLANATION

L/B Geologic terrane having low mineral resource potential for silver, lead, and zinc with certainty level B

Mineral resources of the Symmes Creek Wilderness Study Area.

Name: Table Mountain
Area number: CA-060-026
Size (acres): 1,018

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): There are no identified mineral resources within the wilderness study area. The wilderness study area is known to contain occurrences of manganese, nickel, tungsten, and feldspar. Further study is needed to appraise if these occurrences constitute resources.

Mineral resource potential (undiscovered): The area has moderate mineral resource potential for copper, manganese, nickel, tungsten, and feldspar.

Mining activity: Manganese was produced from a shear zone in 1928 and again in 1953. The grade was reported to be about 17 percent. There is a tungsten prospect and tungsten in tactite that has not been developed. Feldspar has been produced and a pegmatite containing 14 percent nickel has been reported. As of January, 1989, there were no current mining claims.

Mineral setting: The area is underlain by Cretaceous granitic rocks which intrude metasedimentary rocks. Cenozoic surficial deposits also occur.

Recommendations: Known commodities, production, favorable geologic structures for mineralization, and the paucity of data suggests the wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines.

References:

Rogers, T.H., compiler, 1965, Santa Ana sheet: California Division of Mines and Geology Geologic Map of California, scale 1:250,000.

Strand, R.G., compiler, 1962, San Diego-El Centro sheet: California Division of Mines and Geology Geologic Map of California, scale 1:250,000.

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_____1989, Geographic index (of) all claims.

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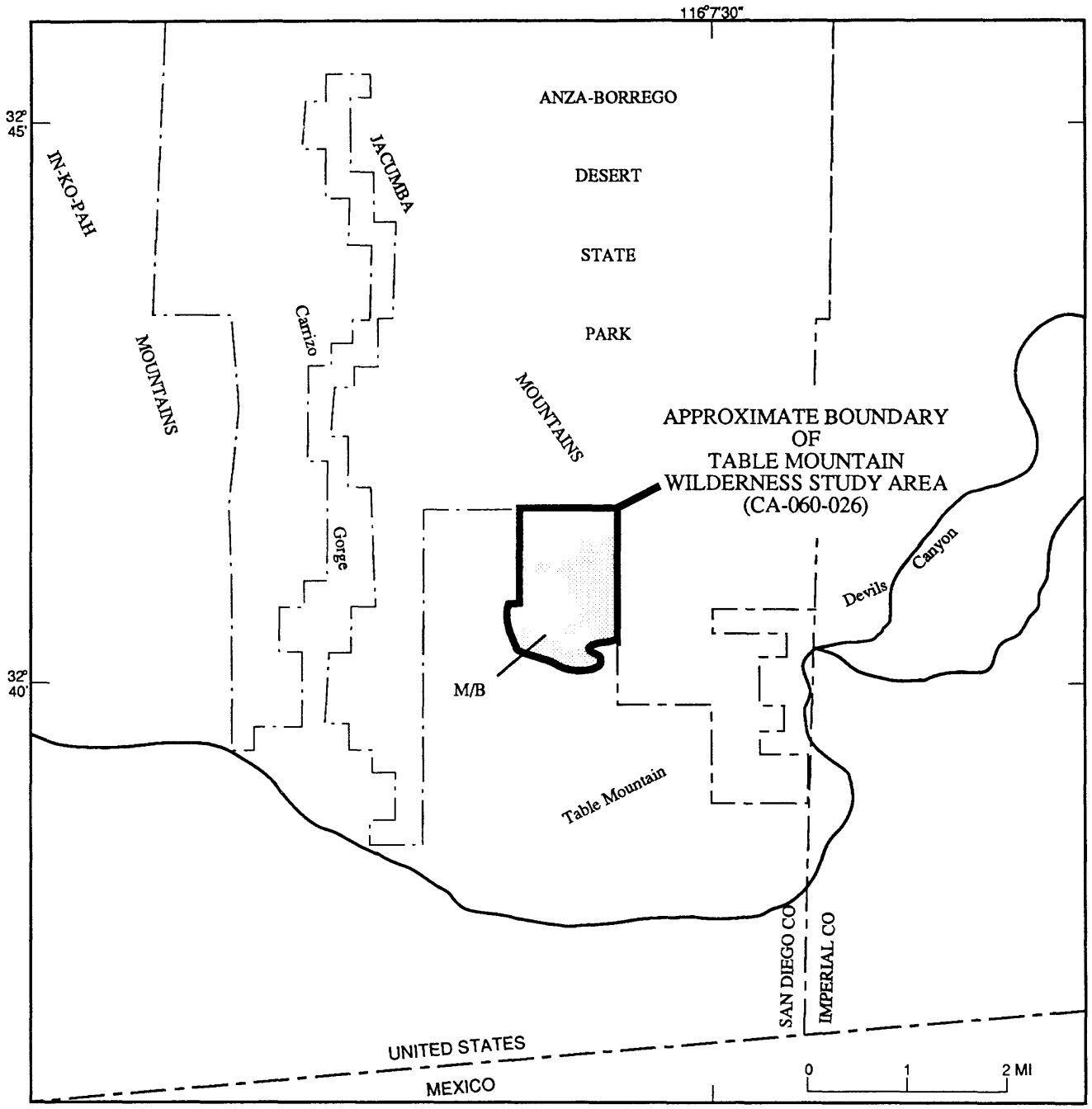


EXPLANATION

M/B Geologic terrane having moderate mineral resource potential for copper, manganese, nickel, tungsten, and feldspar with certainty level B

Mineral resources of the Table Mountain Wilderness Study Area.

Name: Thatcher Ridge
Area number: CA-050-212
Size (acres): 17,187

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): No mineral resources have been identified within the wilderness study area.

Mineral resource potential (undiscovered): The study area has low mineral resource potential for copper and manganese. Small parts have moderate resource potential for oil and gas, and for geothermal energy; elsewhere the potential for these commodities is low.

Mining activity: There is no known mineral production from the wilderness study area. No mines or prospects exist in the area and no mining districts are located in or near the area. No current claims are located in or adjacent to the wilderness study area, according to 1988 U.S. Bureau of Land Management records.

Mineral setting: This area is underlain principally by sedimentary rocks of the Franciscan Formation and metasedimentary rocks which may be Franciscan or older. Small areas are underlain by metavolcanic rocks and by serpentinite and peridotite. A fault parallel to the regional structure and several miles in length crosses the area.

Recommendations: The wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines. In particular, further investigation of oil and gas geothermal potentials is needed.

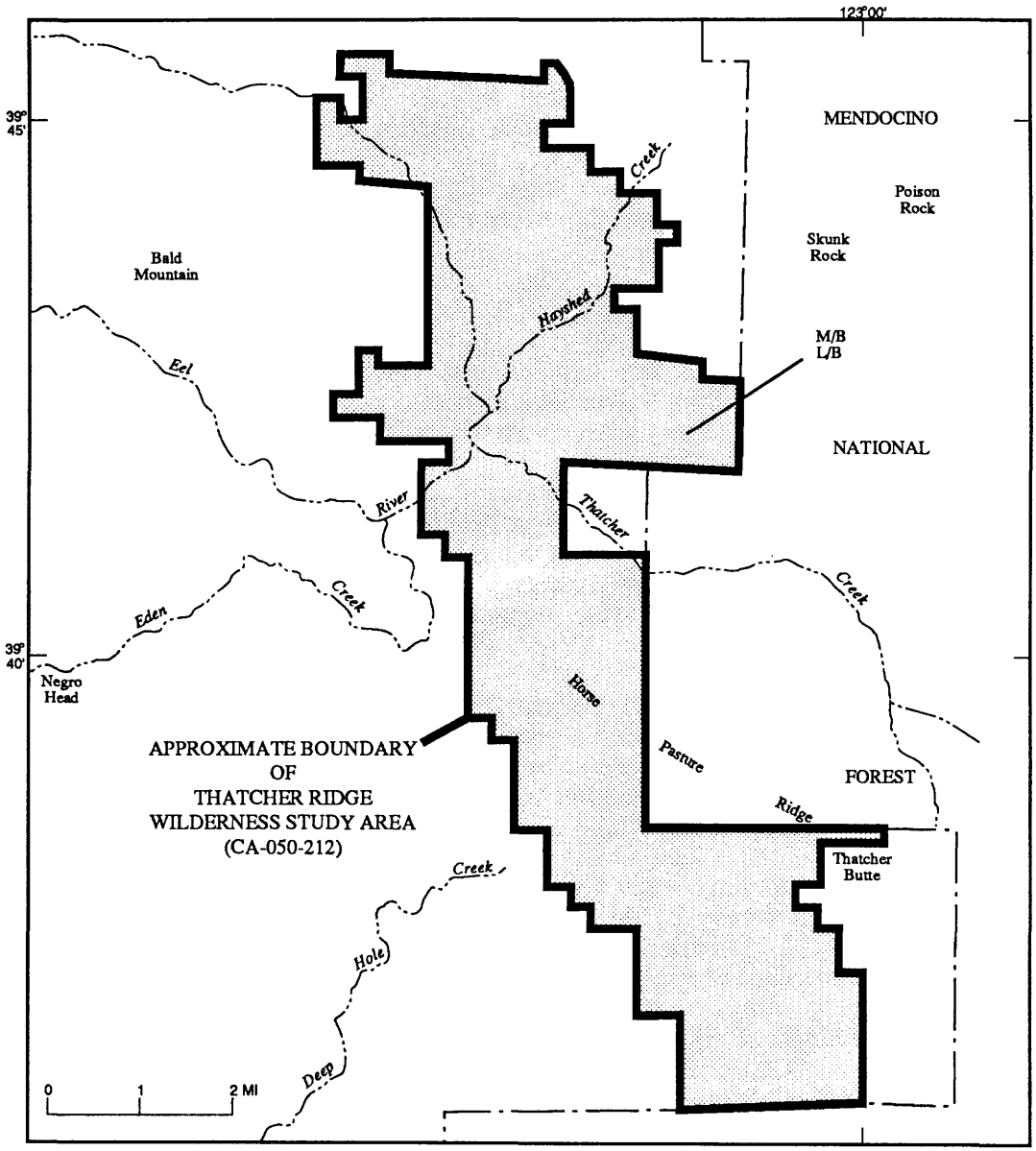
References:

Jennings, C.W., and Strand, R.G., compilers, 1960, Ukiah sheet: California Division of Mines and Geology Geologic Map of California, scale 1:250,000.

U.S. Bureau of Land Management, 1988, Geographic index (of) all claims.

_____1989, California state-wide wilderness study report: draft copy, part 3, v. 2.

U.S. Bureau of Mines, 1989, Mineral Industry Location System (MILS).



EXPLANATION

M/B Geologic terrane having moderate mineral resource potential for oil and gas and geothermal energy with certainty level B

L/B Geologic terrane having low mineral resource potential for copper and manganese with certainty level B

Mineral resources of the Thatcher Ridge Wilderness Study Area.

Name: Timbered Crater (Baker Cypress/Lava Rock)
Area number: CA-030-201
Size (acres): 18,095

Status of mineral surveys: This wilderness study area has been studied as part of a mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines (Peterson and others, 1981).

Identified mineral resources (known): The wilderness study area contains indicated and inferred resources of flat-lavas used in building construction. Two estimates are given for flat-lava resources in six localities. It is estimated that 94,000 tons of flat-lava are exposed on the surface and that an additional 7.75 million tons are found to depths ranging from 10 to 15 feet. The major use of the flat-lava that forms the surface veneer is for building facing and landscaping. Stone wholesalers indicate that because supplies of surficial flat-lava are dwindling, subsurface materials will probably become more economically attractive.

The entire wilderness study area is classified by the U.S. Geological Survey (1978) as "lands valuable prospectively for geothermal resources." Geothermal energy leases have been applied for by Earth Power Corporation and Thermal Power. These applications cover much of the wilderness study area north of Brushy Butte. Hot springs near Day, about 1.25 mi east of the wilderness study area are reported to have surface water temperatures of 127 °F. which are probably too low for power production but adequate for nonelectric uses.

Mineral resource potential (undiscovered): Metallic mineral resources are not indicated. Resources of lava rock suitable for construction are present in scattered localities throughout the study area and there is a moderate mineral resource potential for further deposits. The recent age of the basalt flows suggests a moderate potential for geothermal energy resources.

Mining activity: The wilderness study area is not within any mining district. Periodically, between the late 1940's and 1971, flat-lava decorative stone was removed from the area. Permits granted by the U.S. Bureau of Land Management from 1961 to 1971 indicate that at least 1,700 tons of flat-lava has been removed from within and around the wilderness study area. Judging from the amount of surface disturbance, at least twice this amount has probably been removed but not recorded. According to October, 1988, U.S. Bureau of Land Management records, there are no current mining claims in the wilderness study area.

Mineral setting: The area is underlain monthly by Holocene basalts of a small shield volcano centered on the area and by other Holocene basalts that flow into the area from the north. Part of a Pleistocene(?) volcanic cone projects into the west edge of the area and alluvium is present locally on the east side.

Recommendations: As this area has already been studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines, no further work is needed.

References:

California Department of Water Resources, 1963, Northeastern counties ground-water investigation: California Department of Water Resources Bulletin 98, 224 p.

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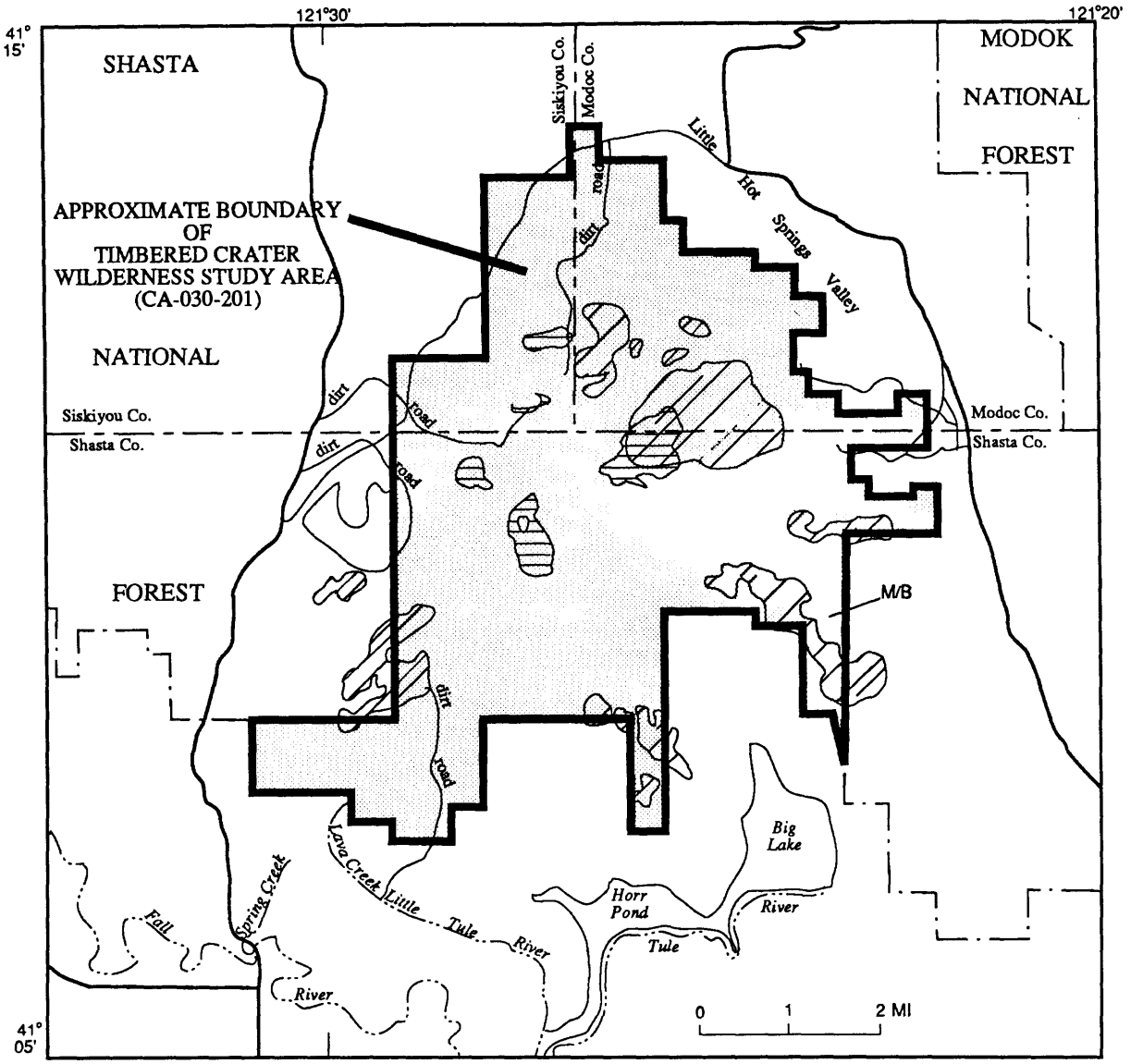
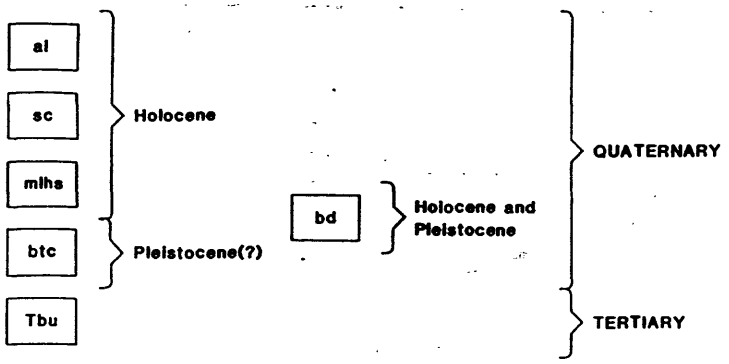


Mineral resources of the Timbered Crater Wilderness Study Area.

CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

al	ALLUVIUM
sc	SHIELD COMPLEX
mlhs	MODOC BASALT OF POWERS (1932)--In mapped area, consists of: Little Hot Spring Valley flow
btc	BASALTIC ROCKS OF TIMBERED CRATER
bd	BASIN DEPOSITS
Tbu	BASALT, undivided

Contact

Fault-dotted where concealed

\+ Vent

Cinder cone

Spatter cone

BLM Instant Study Area

RARE II boundary

Flat-lava decorative stone resources

Lava flows with large quantities of rubble

Geologic terrane having moderate mineral resource potential for geothermal energy with certainty level B

Explanation, mineral resources of the Timbered Crater Wilderness Study Area.

Name: Tule Mountain
Area number: CA-020-211
Size (acres): 17,860

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): There are no known mineral occurrences or deposits in the wilderness study area. Basaltic rock that weathers into slabs 1.5 to 4 inches thick is present near the top of Tule Mountain. The rock is apparently suitable for use as a decorative stone; however, local access to the site is poor, major markets are distant, and similar rock is available from other sites in the region.

Mineral resource potential (undiscovered): The resource potential for oil and gas resources is low. Speculative oil and gas leases are present in the area, but resources are not likely. Decorative stone is available but is a long distance from likely markets. Geothermal energy resources are also unlikely. The area is unlikely to have metallic mineral resources.

Mining activity: The wilderness study area is not in a mining district and has had no known mineral production. According to 1988 U.S. Bureau of Land Management records, no current claims or leases are present in the wilderness study area.

Mineral setting: The entire area is underlain by basaltic rocks, mostly of Pliocene age. Older Miocene basaltic rocks along the northeast edge of the area may locally project into the study area. Likewise, Pliocene sedimentary rocks to the northwest may project into the area along the northwest boundary.

Recommendations: The wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines.

References:

Gay, T.E., 1966, Economic mineral deposits of the Cascade Range, Modoc Plateau, and Great Basin region of northeastern California in Geology of northern California: California Division of Mines and Geology Bulletin 190, p. 104-107.

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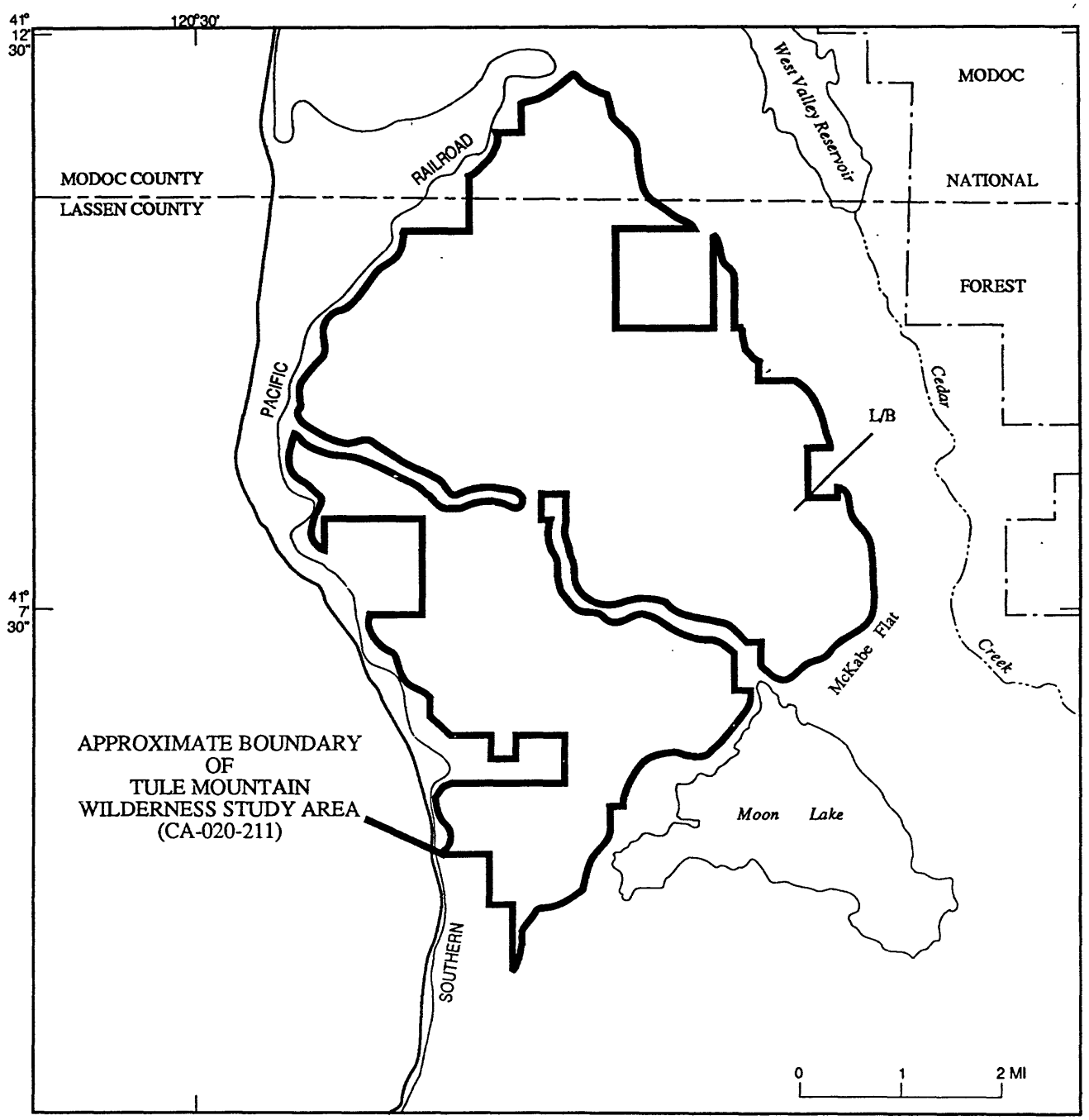

EXPLANATION

L/B Geologic terrane having low mineral resource potential for oil and gas with certainty level B

Mineral resources of the Tule Mountain Wilderness Study Area.

Name: Tunnel Ridge
Area number: CA-030-402
Size (acres): 4,623

Status of mineral surveys: This wilderness study area has been studied as part of a mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines (Kennedy and others, 1985).

Identified mineral resources (known): The Derby and Alexander placer claims located outside the study area along Canyon Creek, have resources of placer gold (Gaps, 1983). The deposit contains about 5,000 cubic yards of material averaging more than $1.00 per cubic yard. Although lode gold has been mined in areas that are only 1-2 mi north and 1-2 mi east of the wilderness study area, gold was not detected in any of the rock samples that were analyzed for this study. Placer gold in stream sediment in Gwin Gulch, Rarick Gulch, and Clear Gulch occurs in amounts too small to constitute a placer gold resource. The gold-bearing placers in Canyon Creek are all located west of the study area boundary. Platinum, locally present in the Trinity River placer gravels, is absent from the placers of the Canyon Creek drainage.

Mineral resource potential (undiscovered): Geochemical studies have identified slightly anomalous concentrations of copper in Gwin Gulch, silver in Pennsylvania Gulch, and silver, copper, and nonmagnetic iron in Clear Gulch. These anomalies are due to low level sulfide mineralization that occurred locally throughout the region; they are not indicative of potential resources. Stronger lead and silver geochemical anomalies were identified in two adjacent drainage basins below Little Bally. The anomalies also are attributed to sulfide mineralization, but the areas have only low mineral resource potential.

Mining activity: Mining in the general vicinity began in 1848 with the discovery of placer gold along the Trinity River (O'Brien, 1965). Within a few years, all the tributaries of the Trinity River had been explored and hydraulic mining was underway. Lode mining for gold began in the nearby Dedrick (Canyon City) mining district in 1889. Mining was the principle industry in the county until the start of World War II. Since the end of the war, a few small mines have operated intermittently. Small quantities of gold are currently being produced from some placer deposits along Canyon Creek. There are 4 current placer mining claims in the wilderness study area along Canyon Creek. A small area near the southwest corner of the study area is presently yielding crushed stone for use as road material. However, resources here are limited by the small extent of the incompetent schist being mined.

Mineral setting: The wilderness study area is situated in the central metamorphic belt of the Klamath Mountains geologic province. The belt underthrusts the eastern Klamath belt to the east, and in turn is underthrust by the western Paleozoic and Triassic belt (North Fork terrane) on the west. The central metamorphic belt consists of two formations, the Salmon Hornblende Schist and the Abrams Mica Schist. Structurally the Salmon lies below the Abrams, and is a 0.5- to 1-mi-thick mafic metavolcanic unit that underwent amphibolite-facies metamorphism during Devonian time. The Tunnel Ridge area is underlain only by the Salmon Hornblende Schist, which is well foliated and composed primarily of hornblende, oligoclase or albite, and clinozoisite. The Abrams Mica Schist is not exposed in the study area. Andesitic and dacitic dikes intrude the Salmon Hornblende Schist and granitic rocks throughout the region; dikes within the Salmon are often associated with gold-bearing quartz veins. Alteration of the dikes, mainly by propylitization and the addition of potassium and silica, is greatest within migmatitic zones.

Recommendations: As this area has already been studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines, no further work is needed.

References:

Albers, J.P., 1966, Economic deposits of the Klamath Mountains *in* Bailey, E.H., ed., Geology of Northern California: California Division of Mines and Geology, Bulletin 190, p. 51-62.

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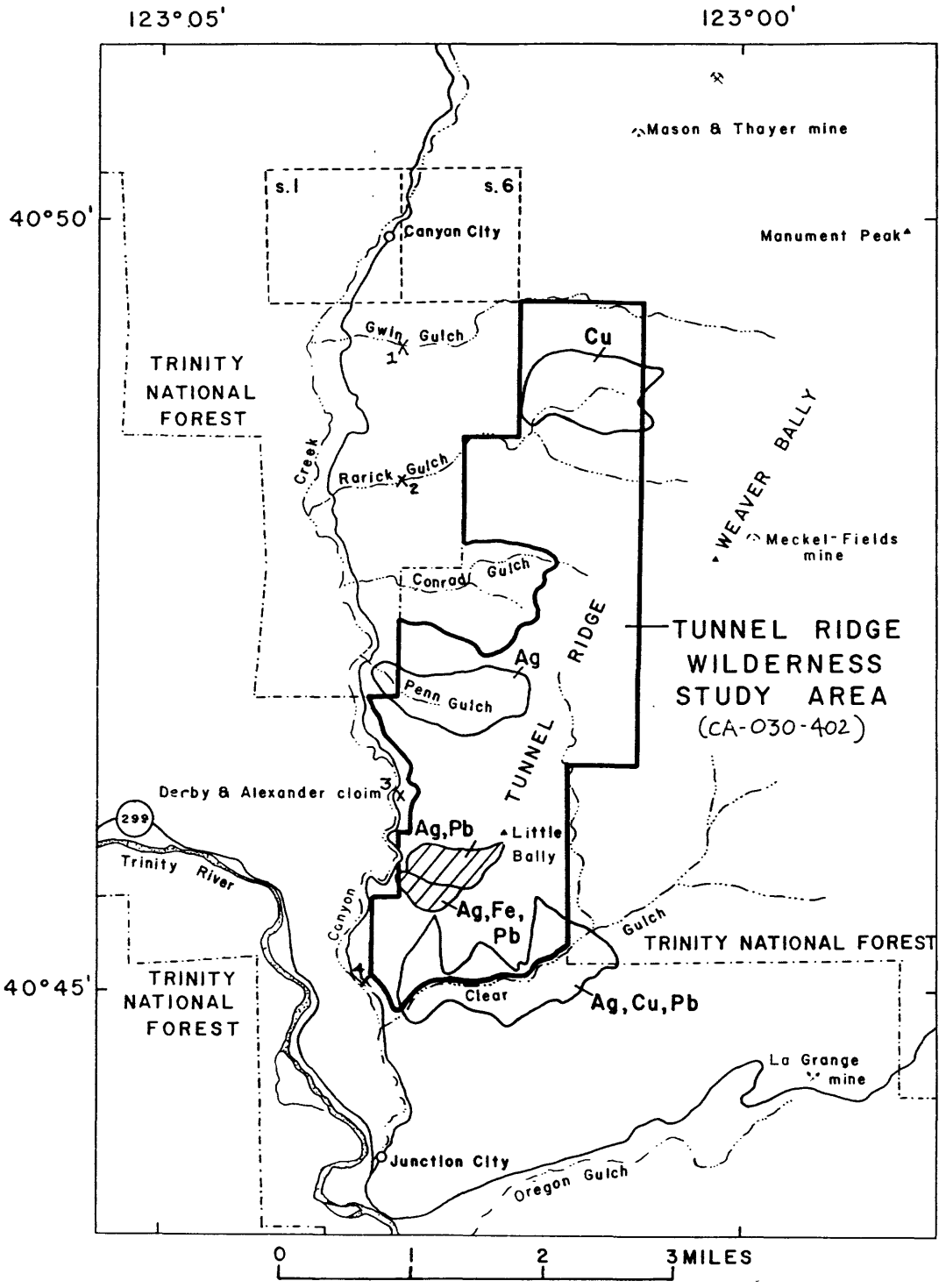

EXPLANATION

Mineral resources of the Tunnel Ridge Wilderness Study Area. Map shows geochemically anomalous drainage basins (outlined) and area of low mineral resource potential, certainty C (diagonally ruled area). Ag, silver; Cu, copper; Fe, nonmagnetic iron; Pb, lead; R, rock; X, location of local workings (number referred to in text).

Name: Tunnison Mountain
Area number: CA-020-311
Size (acres): 20,650 of which 8,445 were studied at the request of the U.S. Bureau of Land Management.

Status of mineral surveys: Only part of this wilderness study area has been studied as part of a mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines (Peterson and others, 1988).

Identified mineral resources (known): No mineral resources have been identified in the wilderness study area.

Mineral resource potential (undiscovered): The area has low resource potential for geothermal energy. There is no evidence that there is any potential for metallic commodities or oil and gas resources. Construction materials and sand and gravel are present but are too far from markets and too small a quantity to constitute resources.

Mining activity: The area is not in a mining district nor is there any known mining activity in the wilderness study area. There are no current mining claims in the wilderness study area according to October, 1988, U.S. Bureau of Land Management records.

Mineral setting: The area is underlain by Miocene to Holocene Cascade-related volcanic rocks. Intermediate composition pyroclastic rocks and basaltic andesite lava flows from the mountain and younger basalt and Quaternary alluvium and colluvium cover adjacent low lying areas.

Recommendations: as 12,205 acres were not requested for mineral surveys by the U.S. Bureau of Land Management, this unstudied part of the wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines.

References:

Lydon, P.A., Gay, T.E., Jr., and Jennings, C.W., compilers, 1960, Westwood (Susanville) sheet: California Division of Mines and Geology Geologic map of California, scale 1:250,000.

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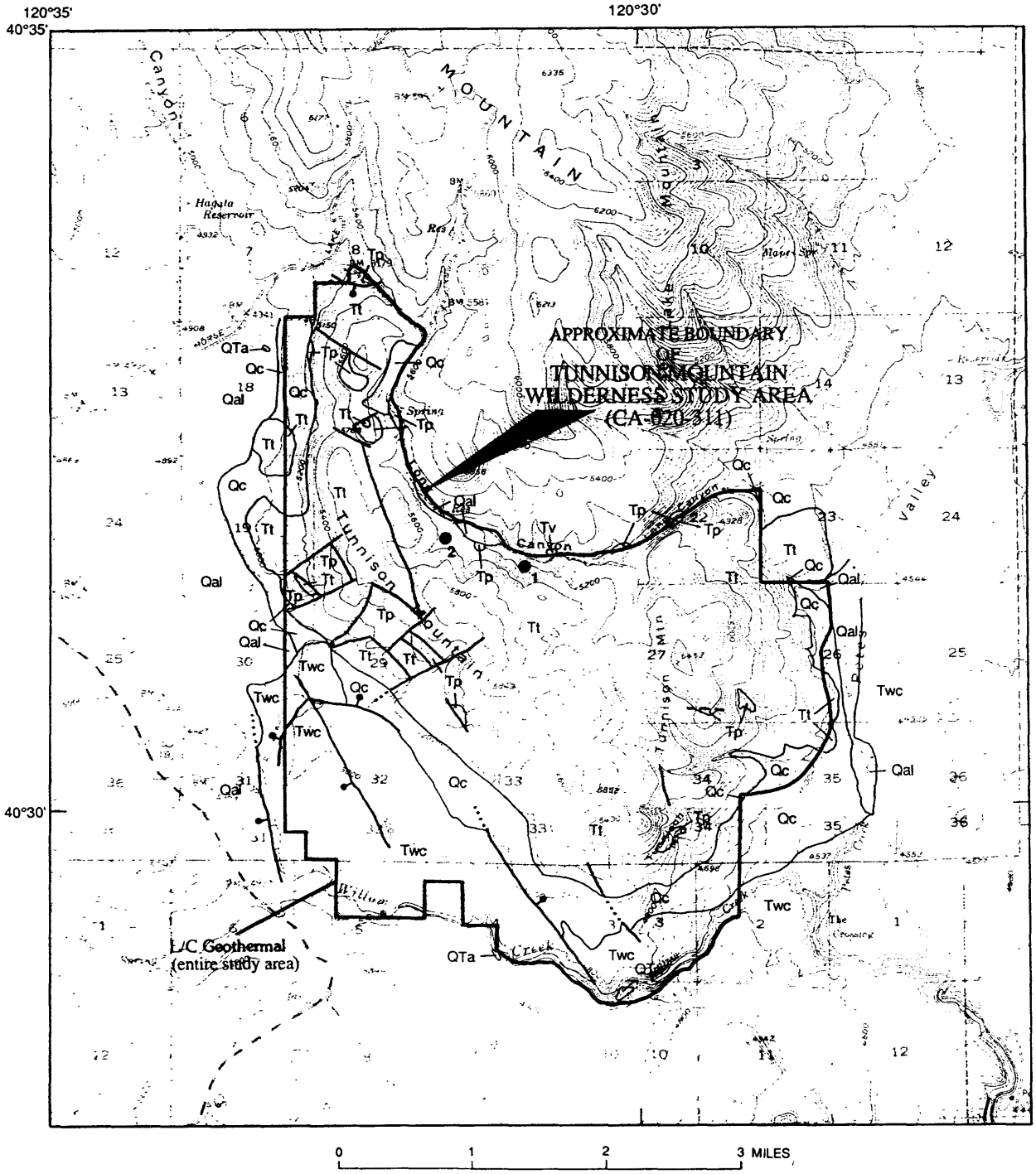

Mineral resources of the Tunnison Mountain Wilderness Study Area.

EXPLANATION

Area with low geothermal resource potential--Applies to entire study area. See appendix for defjnition of levels of mineral resource potential and certainty of assessment

Geologic map units

Qal	Alluvium (Quaternary)
Qc	Colluvium (Quaternary)
QTa	Ash-flow tuff (Quaternary or Tertiary)
Twc	Basalt of Willow Creek (Pliocene)
Tt	Basaltic andesite of Tunnison Mountain (Miocene)
Tv	Volcanic cinder deposits (Miocene)
Tp	Pyroclastic rocks (Miocene)
——	Contact
—T—	Fault--Dotted where concealed; bar and ball on downthrown side
$\bullet_2$	Geochemical sample-collection site

Explanation, mineral resources of the Tunnison Mountain Wilderness Study Area.

Name: Twin Peaks
Area number: CA-020-619A
Size (acres): 90,345 of which 54,970 were studied at the request of the U.S. Bureau of Land Management.

Status of mineral surveys: Only part of this wilderness study area has been studied as part of a mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines (Vercoutere and others, 1988).

Identified mineral resources (known): The wilderness study area contains at least 30 million tons of subeconomic pozzolan resources and low-grade occurrences of gold, silver, copper, lead, zinc, nickel, molybdenum, zeolites, and clay.

Mineral resource potential (undiscovered): The study area has a moderate mineral resource potential for gold in hydrothermally brecciated basalt that is situated south of Mixie Flat in the north-central part of the study area. The entire study area has low mineral resource potential for copper, tungsten, and zinc.

Mining activity: The wilderness study area is not in a mining district nor has any mining activity been recorded. Nearby, about 30 mining claims were staked in 1911 and 1930 for an unknown commodity and two claims for diatomaceous silica; evaporites have been mined on a small scale. There are no current mining claims in the wilderness study area according to October, 1988, U.S. Bureau of Land Management records.

Mineral setting: The study area lies in the southeastern part of the Modoc Plateau physiographic province. It is underlain by Tertiary and Quaternary rocks that are either directly or indirectly volcanic in origin. They consist predominantly of basaltic ans silicic flows, with mafic and intermediate dikes and plugs, and lenses of volcaniclastic sedimentary rocks intercalated within the basalt. Quaternary rocks are predominantly alluvial and lacustrine sedimentary deposits. An areally restricted stack of basalt of Pliocene to Pleistocene age is present in the western part of the study area.

Recommendations: A detailed study of structures and altered rock in areas showing low-grade metal occurrences is recommended.

References:

Bonham, H.F., and Papke, K.G., 1969, Geology and mineral deposits of Washoe and Storey Counties, Nevada: Nevada Bureau of Mines Bulletin 70, 136 p.

Gay, T.E., Jr., 1966, Economic mineral deposits of the Cascade Range, Modoc Plateau, and Great Basin region of northeastern California, *in* Bailey, E.H., ed., 1966, Geology of northern California: California Division of Mines and Geology Bulletin 190, p. 97-104.

Miller, M.S., 1987, Mineral resources of the Twin Peaks study area, Lassen County, California, and Washoe County, Nevada: U.S. Bureau of Mines Open-File Report MLA 15-87, 31 p.

Qualheim, B., 1979, Hydrogeochemical and stream sediment reconnaissance report for the Lovelock 1° x 2° NTMS quadrangle, Nevada: Lawrence Livermore Laboratory, University of California, Report UCRL 52677, U.S. Department of Energy contract number W-7405-ENG-48, GJBX-90-79, 16 p. with 37 p. of appendixes.

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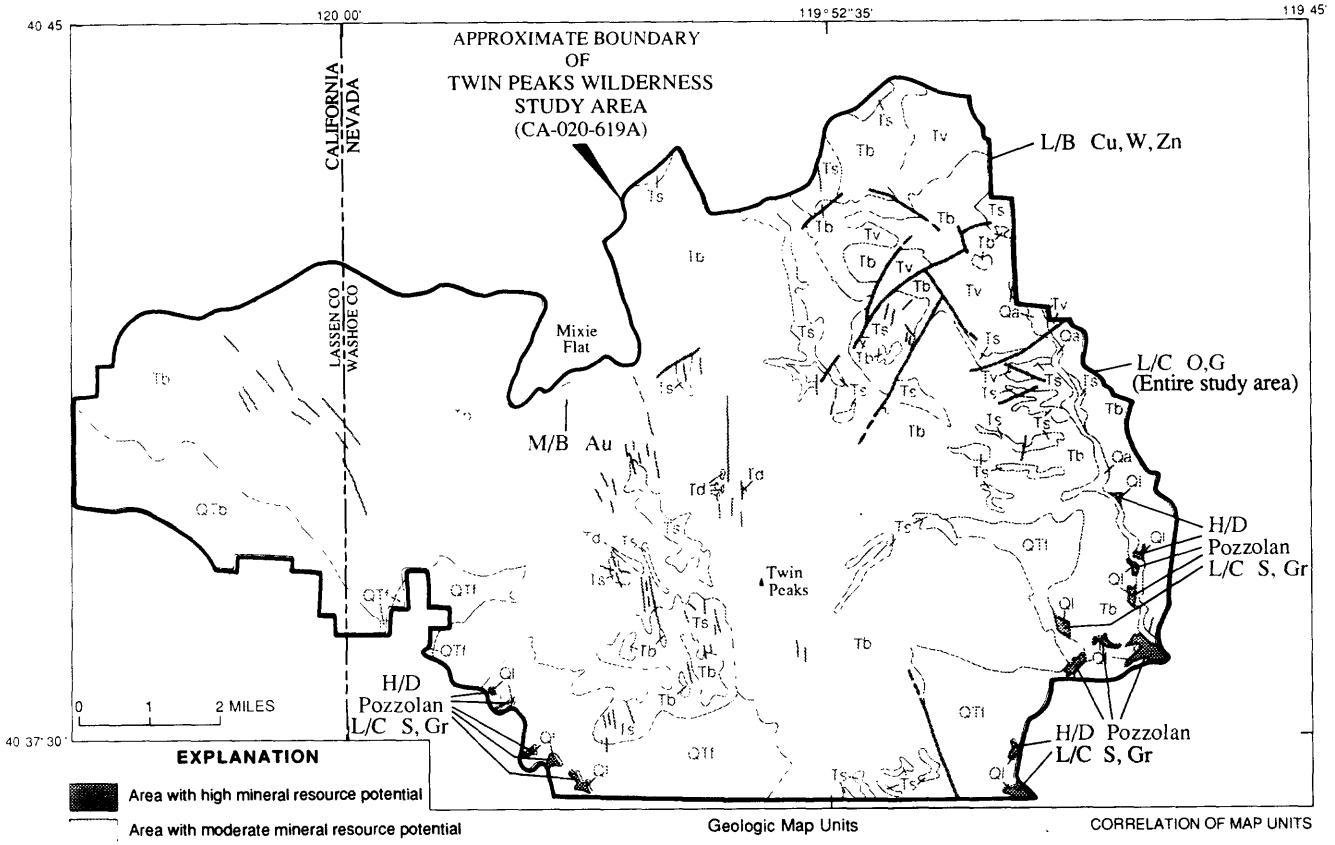
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119 45'
APPROXIMATE BOUNDARY
OF
TWIN PEAKS WILDERNESS
STUDY AREA
(CA-020-619A)
CALIFORNIA
NEVADA
LASSEN CO
WASHOE CO
Mixie
Flat
L/B Cu, W, Zn
L/C O,G
(Entire study area)
M/B Au
H/D
Pozzolan
L/C S, Gr
Twin
Peaks
H/D
Pozzolan
L/C S, Gr
H/D Pozzolan
L/C S, Gr
0 1 2 MILES
40 37'30'
EXPLANATION
Area with high mineral resource potential
Area with moderate mineral resource potential
Area with low mineral resource potential
Identified pozzolan resource
See appendixes for definition of levels of mineral resource potential (L, M, H) and certainty of assessment (B, C, D)
Commodities
Au Gold
Cu Copper
W Tungsten
Zn Zinc
Q, G Oil and gas
S Gr Sand and gravel
Pozzolan
Geologic Map Units
Qa Alluvium (Quaternary)
Ql Tuffaceous lake sediments (Quaternary)
QTf Fanglomerates (Pleistocene and (or) Pliocene)
QTb Basalt flows (Pleistocene and (or) Pliocene)
Td Mafic and intermediate dikes and plugs (Pliocene)
Tb Basalt and basaltic andesite flows (Pliocene and late Miocene)
Ts Volcaniclastic sedimentary rocks (Pliocene and late Miocene)
Tv Silicic and intermediate volcanic rocks, undivided (Pliocene and (or) Miocene)
Contact
Fault–Dashed where approximately located
Dike
CORRELATION OF MAP UNITS
Qa
Ql
QTf
QTb
Td
Tb
Ts
Tv

Name: Ventana Wilderness Contiguous
Area number: CA-040-308
Size (acres): 676

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): No mineral occurrences or resources are known in the wilderness study area.

Mineral resource potential (undiscovered): The study area has low potential for limestone, sand and gravel and geothermal resources. This region of the Salinian block is largely nonmineralized. Mineral resource evaluations of nearby and adjacent areas determined that no significant mineralization took place in rock units similar to those exposed in the study area. Oil and gas resources are unlikely within the study area.

Mining activity: There has been no known mineral production from the wilderness study area. No known prospecting or mining has been conducted in or adjacent to the wilderness study area. No known metal or industrial mineral production in the region has come from a similar geologic setting. The wilderness study area is not part of any mining district. There are no current mining claims in the wilderness study area according to 1988 U.S. Bureau of Land Management records.

Mineral setting: The area is underlain by Cretaceous and older granitic rocks that are part of a fault-bounded terrane known as the Salinian block. These granitic rocks are primarily gneissic quartz diorite to granodiorite in composition and form part of a pluton that has been uplifted and exposed by faulting and erosion during the Tertiary.

Recommendations: There is very little specific resource data available concerning the study area. The wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines.

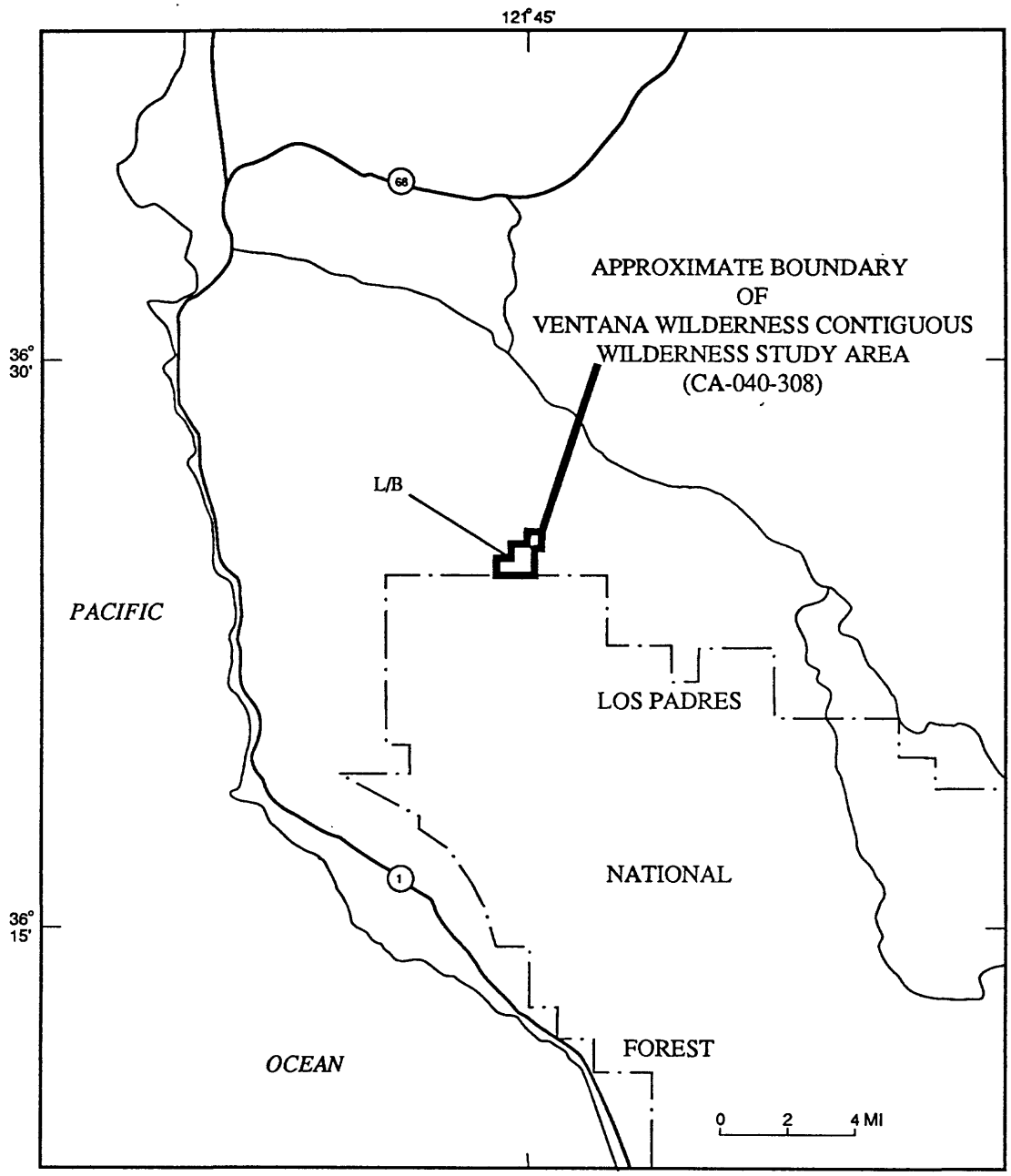
References:

Hart, E.W., 1966, Mines and mineral resources of Monterey County, California: California Division of Mines and Geology County Report Number 5, 142 p.

Jennings, C.W. and Strand, R.G., compilers, 1958, Santa Cruz sheet: California Division of Mines and Geology Geologic Map of California, scale 1:250,000.

Pearson, R.C., Hayes, P.T. and Fillo, P.V., 1970, Mineral Resources of the Ventana Primitive area, Monterey County, California; U.S. Geological Survey Bulletin 1261.

U.S. Bureau of Land Management, 1988, Geographic index (of) all claims.



EXPLANATION

L/B Geologic terrane having low mineral resource potential for limestone, sand and gravel and geothermal resources with certainty level B

Mineral resources of the Ventana Wilderness Contiguous Wilderness Study Area.

Name: Volcanic Tablelands
Area number: CA-010-081
Size (acres): 11,840

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): There are no known mineral resources in the wilderness study area; however, the wilderness study area is underlain by the Bishop Tuff, which has been mined in other localities for use as building stone. The Bishop Tuff as mapped by Bateman (1956) occurs as three varieties; one, a hard, consolidated tuff, is used for building stone, the second, a soft, pumiceous tuff, is mined in the Van Loon "fines" pit (sec. 18, T. 6 S., R. 33 E.), about one and a half miles southeast of the wilderness study area and used in making light-weight, concrete blocks. The third variety, a twenty-foot thick pumice horizon is suitable for light-weight aggregate, and acoustical plaster. The tuff occurring in the wilderness study area is the hard, consolidated variety, according to Bateman (1956), but the other types may underlie it, or occur as horizons or interbeds.

Mineral resource potential (undiscovered): The Bishop Tuff is a commonly used decorative building stone, and there is high resource potential for this commodity in the study area. There are extensive exposures of this material outside the study area, however. Active hot springs and recent volcanic activity in the vicinity suggest a moderate potential for geothermal resources in the study area. There is low potential for buried lode gold or silver deposits, and perhaps tungsten deposits in underlying Triassic and Paleozoic rocks could be assessed with greater certainty through geophysical investigations. The wilderness study area was assigned very low potential for uranium and thorium (U.S. Bureau of Land Management, 1988).

Mining activity: There has been no known production or other mineral activity within the wilderness study area. An unknown amount of stone has been removed from a number of pits excavated in the Bishop Tuff about 0.25 mi southeast of the wilderness study area. There are no current mining claims located in the wilderness study area according to October, 1988, U.S. Bureau of Land Management records.

The Chidago mining district is located about 8 miles north of the wilderness study area, and includes a number of mines which produced base- and precious-metals. it is possible that the same terranes underlie the Bishop Tuff in the wilderness study area at depth, but there is little possibility that a deposit could be discovered or developed.

Mineral setting: The Volcanic Tableland study area is underlain by rhyolitic ash flows of the Bishop Tuff, derived from eruptions in Long Valley 700,000 years ago. This eruption formed a broad tableland sloping to the southeast that remains largely noneroded today.

Recommendations: The wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines. This is particularly important because of building stone potential. Further studies are also necessary to assess the potential for geothermal resources in the study area.

References:

Bateman, P.C., 1956, Economic geology of the Bishop tungsten district, California: California Department of Natural Resources Division of Mines Special Report 47, 87 p.

Eric, J.H., 1948, Tabulation of copper deposits of California, in Copper in California: California Department of Natural Resources Division of Mines Bulletin 144, p. 199-357.

Rinehart, D.C., and Ross, D.C., 1956, Economic geology of the Casa Diablo Mountain quadrangle, California: California Department of Natural Resource Division of Mines Special Report 48, 17 p.

U.S. Bureau of Land Management, 1983a, Benton Range G-E-M resource area (GRA No. CA-05) technical report (WSA CA 010-077): Great Basin GEM Joint Venture, Reno, NV, under contract YA-554-RFP2-1054, 33 p.

_____1983b, Casa Diablo G-E-M resources area (GRA No. CA-06) technical report (WSA CA 010-082): Great Basin GEM Joint Venture, Reno, NV, under contract YA-553-RFP2-1054, 29 p.

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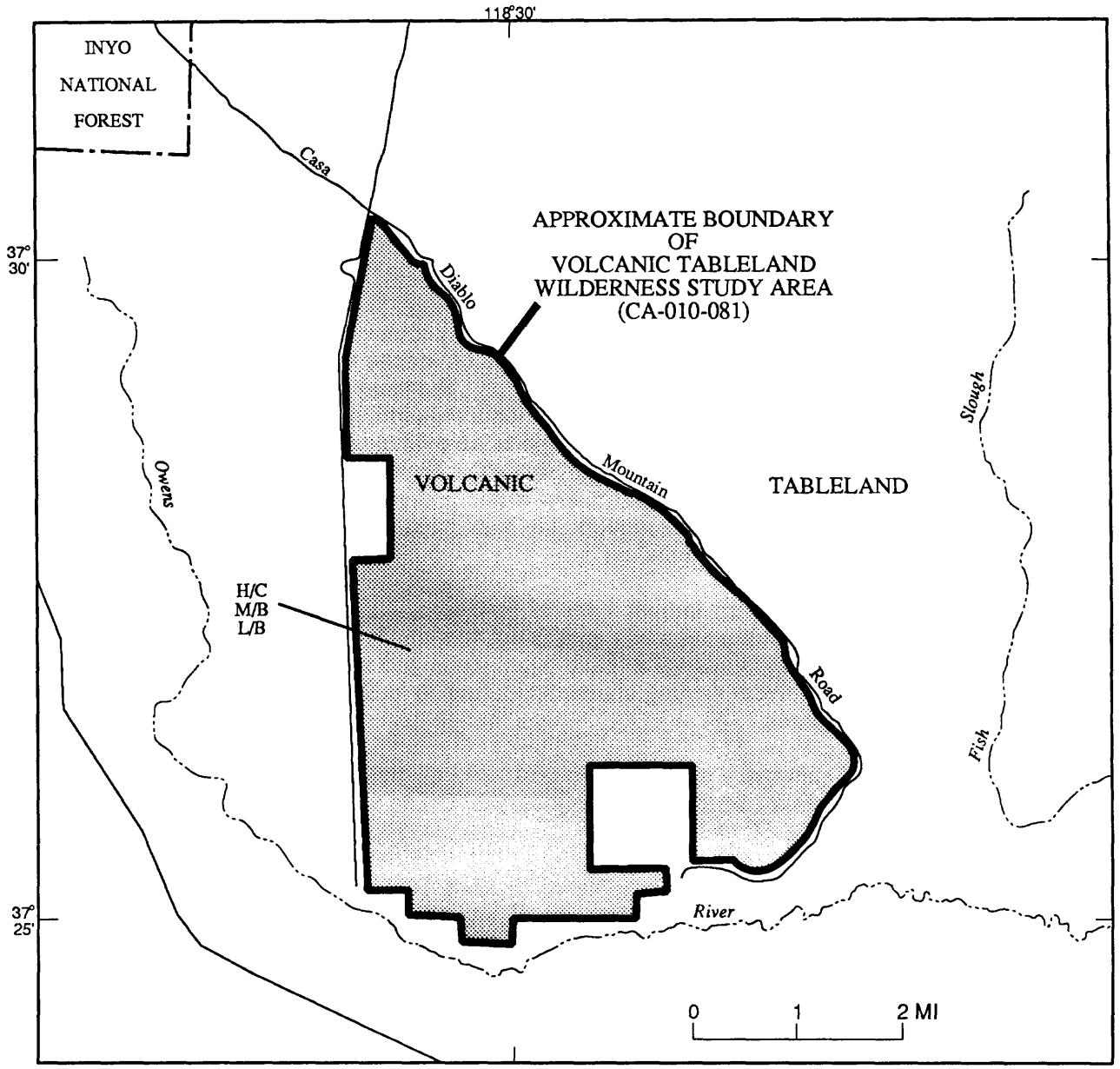

EXPLANATION

H/C Geologic terrane having high mineral resource potential for building stone with certainty level C

M/B Geologic terrane having moderate mineral resource potential for geothermal energy with certainty level B

L/B Geologic terrane having low mineral resource potential for gold, silver, tungsten, uranium, and thorium with certainty level B

Mineral resources of the Volcanic Tablelands Wilderness Study Area.

Name: Walford Springs
Area number: CA-010-092
Size (acres): 13,200

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): No known mineral occurrences or deposits are present within the wilderness study area.

Mineral resource potential (undiscovered): There is high resource potential for geothermal energy, on the basis of the proximity of late Pleistocene and Holocene volcanism in the Long Valley, Mammoth, and Mono Lake areas. The sand and gravel in the area have no qualities that make them unique form similar materials present throughout the Mono Lake basin. There is no evidence that there is metallic mineral resource potential at the surface. Field-based studies, were they to be made, might suggest a low mineral resource potential for metals; in the absence of such studies, the area cannot be ranked for metallic mineral resource potential.

Mining activity: There is no known mineral production from the wilderness study area. The wilderness study area is not in a mining district. No historical mining activity is known to have taken place and as of October, 1988, there were no current mining claims according to U.S. Bureau of Land Management records.

Mineral setting: Quaternary lake deposits and sand dunes mantle the entire area. These surficial deposits probably bury Miocene volcanic rocks to depths ranging from 100 to 1000 ft.

Recommendations: The entire area is mapped as Quaternary lake beds and playa deposits. The area should be evaluated for alkali salts, boron, and other evaporite minerals. The presence of hot springs in and around the wilderness study area together with evidence of recent volcanic activity and faulting supports the possibility of epithermal mineral deposits. Sulphur Springs is nearby. This combination of geologic events, surficial environment, and geographic name suggests that the wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines.

References:

Great Basin GEM Joint Venture, 1983, Bodie geology-energy-minerals resources area (GRA No. CA-02) technical report: Bureau of Land Management, Denver, Colorado, 43 p.

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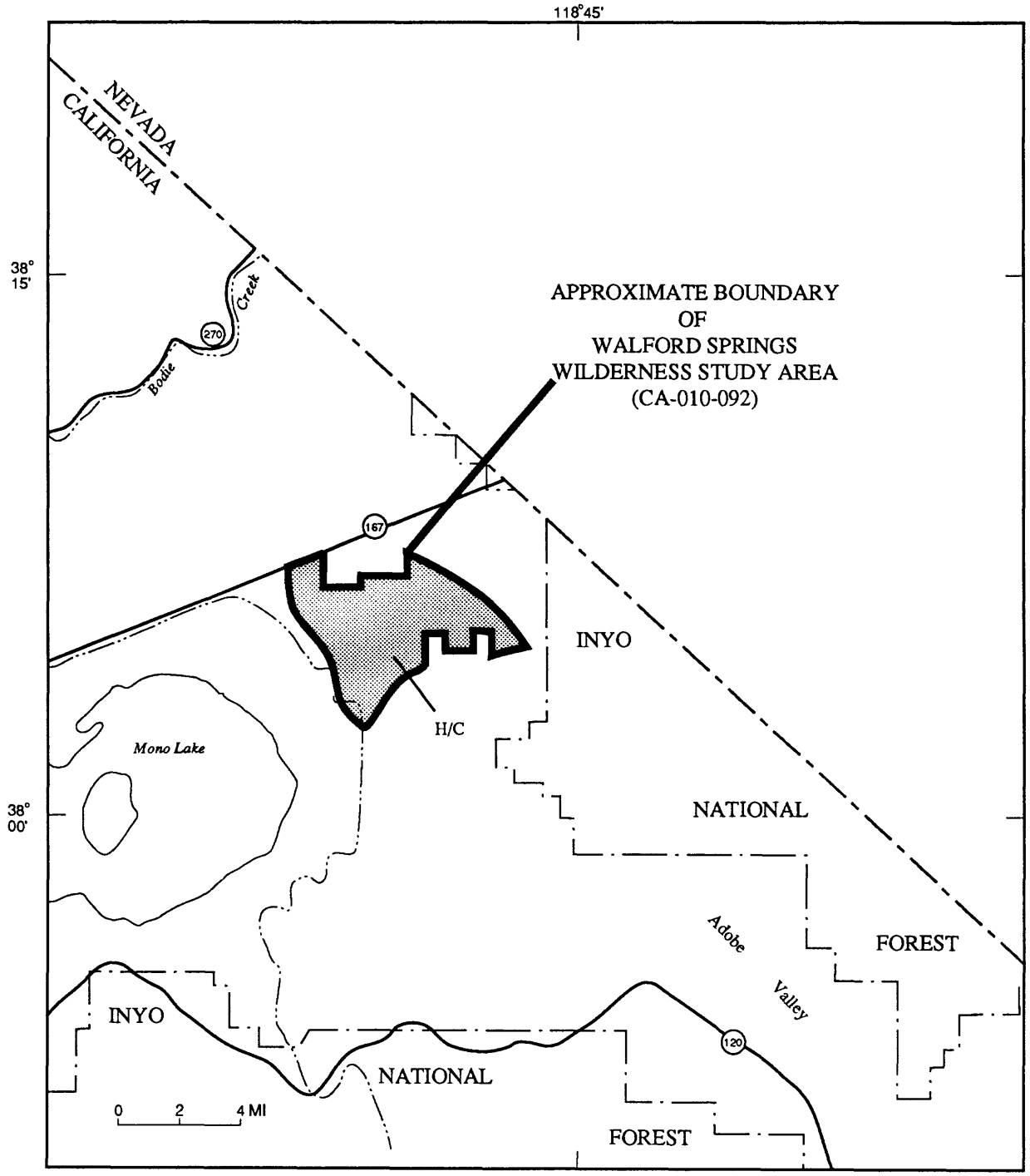

EXPLANATION

H/C Geologic terrane having high mineral resource potential for geothermal energy with certainty level C

Mineral resources of the Walford Springs Wilderness Study Area.

Name: Wall Canyon
Area number: CA-020-805
Size (acres): 45,790

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): There are no known mineral deposits in the wilderness study area.

Mineral resource potential (undiscovered): The study area has moderate mineral resource potential for gold, silver, and mercury associated with faults and felsic intensive rocks; moderate mineral resource potential for zeolites and moderate mineral resource potential for uranium, and lithium associated with the rhyolitic flows and ash-flow tuffs. Volcanic-derived sediments and lake deposits have moderate mineral resource potential for clay, zeolites, and pozzolan.

Mining activity: The wilderness study area is not in a mining district, and has had no known mineral production. However, U.S. Bureau of Land Management records, October 25, 1988, indicate that an area straddling the northwestern border of the wilderness study area contains at least 41 current claims, some of which are wholly or partially within the wilderness study area. The claims include the MC group (18 claims) in T. 39 N., R. 18 E., secs. 1 and T. 39 N., R. 19 E., sec. 6 owned by Tenneco; the West Aspen group (14 claims) in T. 39 N., R. 19 E., sec. 9 owned by W. Wright Parks III (Geologist, Reno, NV). Horizon Gold Shares apparently has consolidated most or all of the claims and has leased them to U.S. Borax Chemical Co., which is exploring the area for a hot springs-type gold deposit similar to the Hog Ranch mine, about 25 miles east. The Hog Ranch mine, which began production in 1986, is the first major gold mine in Washoe County, and its discovery has led to intense exploration by numerous individuals and companies in the region including the wilderness study area for similar deposits. There are no geothermal resources or sand and gravel nor are there any oil or gas leases in the wilderness study area.

Mineral setting: Bedrock geology in the study area is dominantly volcanic, consisting of extensive basalt, andesite, and dacite flows, breccias, and intrusive phases, and rhyolitic flows and ash-flow tuffs. Minor volcanic derived sediments and lake deposits also occur in the area. Many north and northwest trending faults cut the south and west portion of the study area. Sediments are known to contain abundant vertebrate and plant fossils of Barstovian age.

Recommendations: The wilderness study area may host all or portions of one or more deposits of gold and other metals of high value. The wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines. Future work in the study area, in the form of geologic mapping, detailed geochemical sampling and radiometric measurements is necessary to accurately assess the potential for hot springs-type gold, silver, and mercury mineralization associated with rhyolitic rocks, and potential for clay, zeolite, and pozzolan resources.

References:

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Turrin, B.D. Bergquist, J.R., Turner, R.L., and Plouff, Donald, 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 Land Management, 1988, Geographic index (of) all claims.

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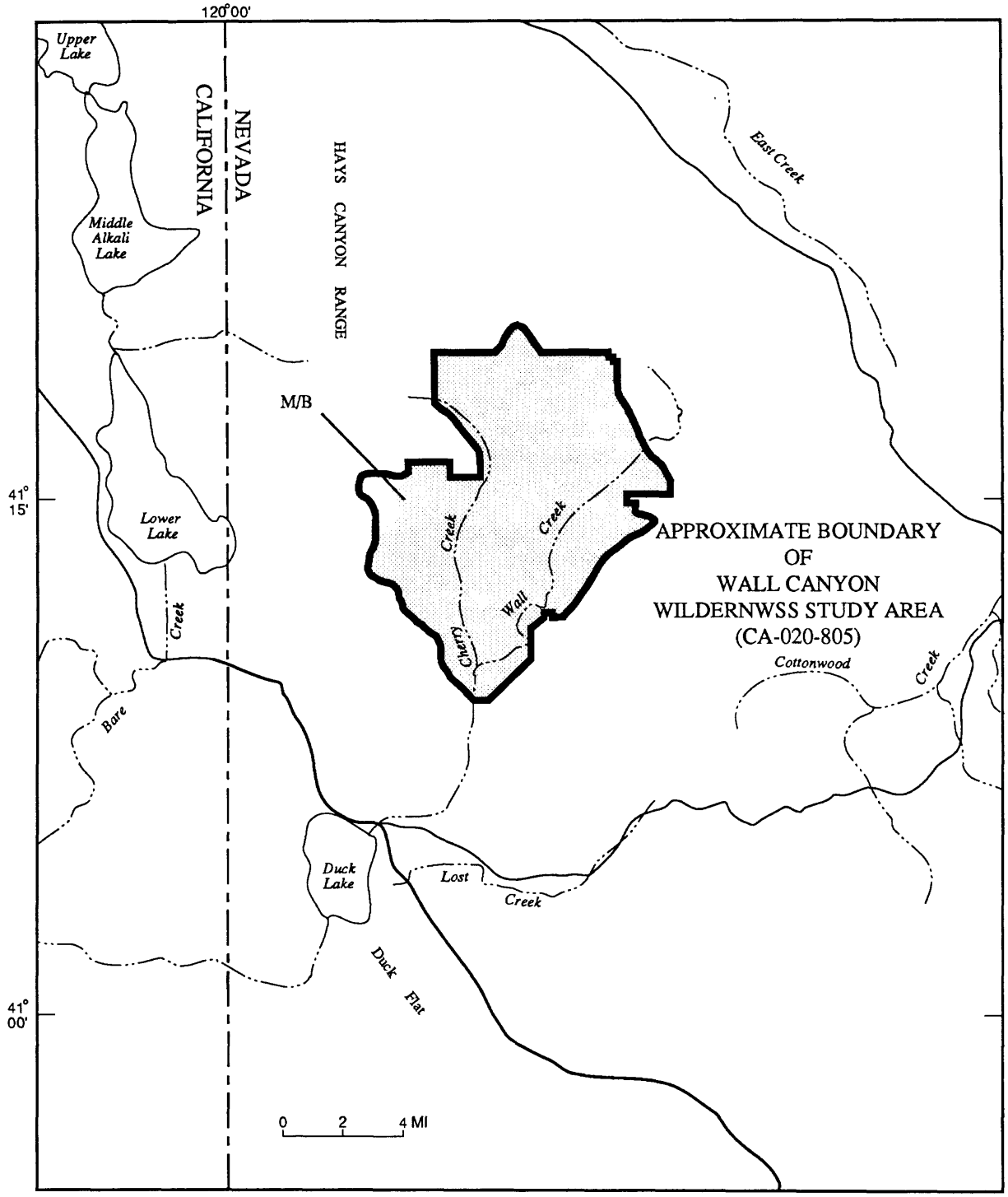

EXPLANATION

M/B Geologic terrane having moderate mineral resource potential for gold, silver, mercury, zeolites uranium, lithium clay, zeolites, and pozzolan with certainty level B

Mineral resources of the Wall Canyon Wilderness Study Area.

Name: Wheeler Ridge
Area number: CA-010-068
Size (acres): 3,197

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): No mineral resources are known to occur in the wilderness study area.

Mineral resource potential (undiscovered): The Wheeler Ridge study area is adjacent to the previously studied Wheeler Ridge Roadless Area, and geochemical studies included this area (Cosca and others, 1982). The area has low mineral resource potential for tungsten, molybdenum, and copper. Recent volcanic activity in the vicinity and the presence of faults that could serve as channels for hydrothermal fluids suggest a moderate potential for geothermal resources.

Mining activity: There is no known mining activity within the wilderness study area. The Pine Creek tungsten mine, the largest tungsten producer in the country, is about five mi southwest of the wilderness study area. From 1918 to 1953, the Pine Creek mine produced 1,000,000 short ton units (1 short ton unit is 20 pounds) of WO_3. Total production from the mine from 1916 to 1986 was approximately 15 million metric tons of ore containing approximately 0.45 percent WO_3, 0.08 percent copper and 0.04 percent molybdenum. The Adamson mine is located two mi northwest of the Pine Creek mine and is operated in conjunction with it. There are no current mining claims in the wilderness study area according to January, 1989, U.S. Bureau of Land Management records.

Mineral setting: The Wheeler Ridge study area lies along the eastern border of the previously studied Wheeler Ridge (U.S. Forest Service) Roadless Area (Langenheim and others, 1982; Cosca and others, 1983). The Wheeler Ridge study area is located on the eastern Sierra Nevada rangefront. A small area (0.25 mi2) along the western border of the study area is underlain by Triassic age granitic rocks of the Sierra Nevada batholith. The remainder of the area is covered by sedimentary outwash from the Sierra Nevada and is comprised mainly of alluvial fan material and Pleistocene age glacial moraine deposits. North-trending rangefront faults, related to the uplift of the Sierra Nevada, cut the area.

Recommendations: Due to the proximity of large tungsten mines and favorable geology, the wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines to increase the certainty that the mineralization within the adjacent U.S. Forest Service lands extend into this U.S. Bureau of Land Management land. The wilderness study area is almost entirely underlain by alluvium, therefore exploration would necessitate geophysics, soil sampling, and similar techniques.

References:

Bateman, P.C., 1965, Geology and tungsten mineralization of the Bishop district,California: U.S. Geological Survey Professional Paper 470, 208 p.

Capstick, D.O., 1982, Mineral investigation of the Wheeler Ridge RARE II Area (No. 5040), Inyo and Mono Counties, California: U.S. Bureau of Mines Open-File Report MLA 3-83, 9 p.

Cosca, M.A., Chaffee, M.A., Diggles, M.F., Fey, D.L., Hill, R.H., and Sutley, S.J., 1983, Geochemical analyses of rock, stream-sediment, and nonmagnetic heavy-mineral concentrate samples, Laurel-McGee and Wheeler Ridge Roadless Areas, Inyo and Mono Counties, California: U.S. Geological Survey Open-File Report 83-3, 107 p.

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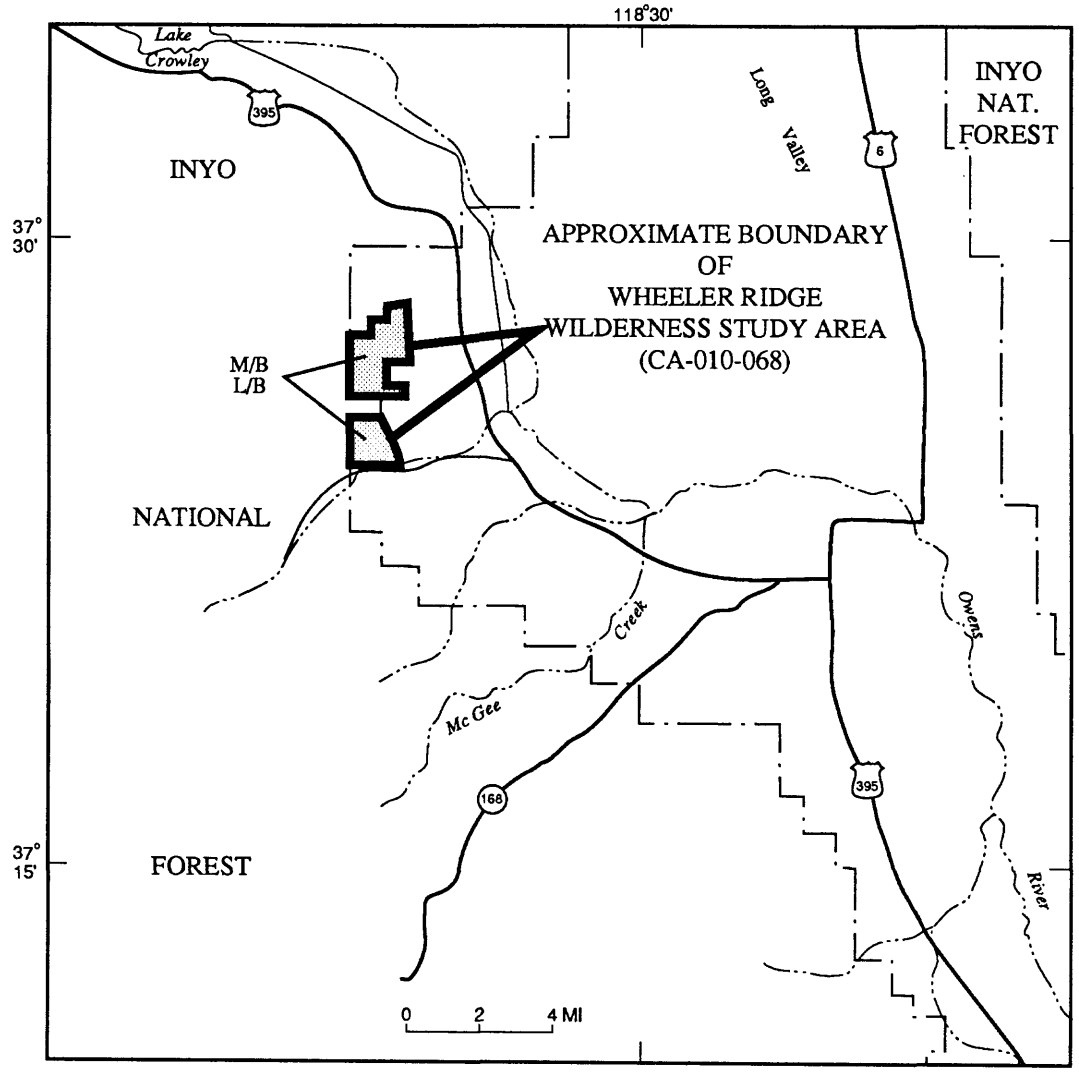
Metzger, O.H., 1941, Preliminary report on Wheeler Ridge tungsten prospect, Mono and Inyo Counties, California: U.S. Bureau of Mines, 4 p.



EXPLANATION

M/B Geologic terrane having moderate mineral resource potential for geothermal energy with certainty level B

L/B Geologic terrane having low mineral resource potential for tungsten, molybdenum, and copper with certainty level B

Mineral resources of the Wheeler Ridge Wilderness Study Area.

Name: White Mountain
Area number: CA-010-075
Size (acres): 1,260

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): No mineral resources are identified in the wilderness study area. This wilderness study area consists of nine small areas adjoining the west side of the White Mountains Roadless Area, the known deposits of which are described by Schmauch and others (1983) and Schmauch (1987). Commodities mentioned in these reports as significant are gold, silver, lead, zinc, copper, uranium, barite, andalusite, rutile, sericite, and pumice. Mines or prospects with identified resources or resource potential within one mi of this wilderness study area are:

- Silver Tiger - silver, lead
- Black Warrior - silver, lead
- Russel nos. 1-17 - silver, copper, zinc
- Unknown (sec. 23, T1S, R32E - silver, copper
- Neptune, Phenix, & Creekside - silver, copper
- Silver Pinon - silver, copper
- Stairway Copper nos. 1-16 - copper
- Pacific mine - sericite
- Copper Queen - copper, silver
- Little Blue Group - copper, silver
- Copper King - silver, copper
- Mono Copper - copper
- White Mountain Copper - copper
- Mohawk - gold, copper
- G.B. & S. Mining - gold, silver, copper
- Sacramento Canyon - pumice
- Sacramento mine - gold, copper, silver
- Comstock (Piute) - pumice
- Moon Group - gold, silver, copper, lead
- Saratoga, Lexington, & Ranger - gold, silver, copper
- Southern Belle - gold, silver, copper
- Bullion - gold, silver, copper

Mineral resource potential (undiscovered): This part of the White Mountains has been cut by numerous small diorite dikes that have moderate potential for hosting silver, zinc, and copper mineral resources . Areas that are overlain by pumice have high potential for further buried pumice resources. Small secondary veins of barite are present in upper Silver Canyon. The study area has low mineral resource potential for barite.

Mining activity: Mining began in the area around 1861 at the southern end of the White Mountains. Several mines produced gold, silver, copper and lead. Mining continued intermittently until the 1940's. Interest in nonmetallic minerals began around 1920. Andalusite, sericite, barite, pumice, and limestone have been shipped from various parts, primarily the west flank, of the White Mountains.

Mining activity in the White Mountains area is described in more detail in Schmauch and others (1983) and Schmauch (1987). Metallic mineral production from the White Mountains totals approximately 2,500 ounces of gold, 103,000 ounces of silver, 18,000 pounds of copper, 130,000 pounds of lead and 23,000 pounds of zinc. The value of nonmetallic mineral production until 1983 was about $1.7 million. There are 40 current mining claims in and adjacent to the wilderness study area according to January, 1989, U.S. Bureau of Land Management records.

Mineral setting: Rocks in the wilderness study area consist mostly of Upper Proterozoic through Cambrian strata consisting of a sequence of carbonate, sandstone, and shale deposited in a shallow-marine continental-shelf environment. The range front is overlain in numerous places by small pumice deposits. Quaternary stream and alluvial fan deposits cover much of the bedrock.

Recommendations: The mineral resources potential of the White Mountains Roadless Area has been described by Diggles and others (1983) and the known deposits by Schmauch and others (1983) and Schmauch (1987) but only cursory examination was given areas outside the boundaries of the study area. Because of the proximity of properties with identified resources or potential, the wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines. This would increase the certainty that the mineralization within the adjacent U.S. Forest Service lands extend into this U.S. Bureau of Land Management land. Surface mapping and sampling should be done to discover and define any undeveloped resources associated with previous mining activity. Geophysical and geochemical studies covering the entire area should be done to identify undiscovered resources.

References:

Bateman, P.C., 1965, Geology and tungsten mineralization of the Bishop district,California: U.S. Geological Survey Professional Paper 470, 208 p.

Chesterman, C.W., 1956, Pumice, pumicite, and volcanic cinders in California: California Division of Mines Bulletin 174, p. 1-98.

Diggles, M.F., 1983, Geologic and mineral-resource evaluation of the White Mountains, California and Nevada: San Jose, Calif., San Jose State University, M.S. thesis, 120 p., 4 plates.

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Diggles, M.F., Blakely, R.J., Rains, R.L., and Schmauch, S.W., 1983, Mineral resource potential of the Blanco Mountain and Black Canyon Roadless Areas, Inyo and Mono Counties, California: U.S. Geological Survey Miscellaneous Field Studies Map MF-1361-C, scale 1:62,500.

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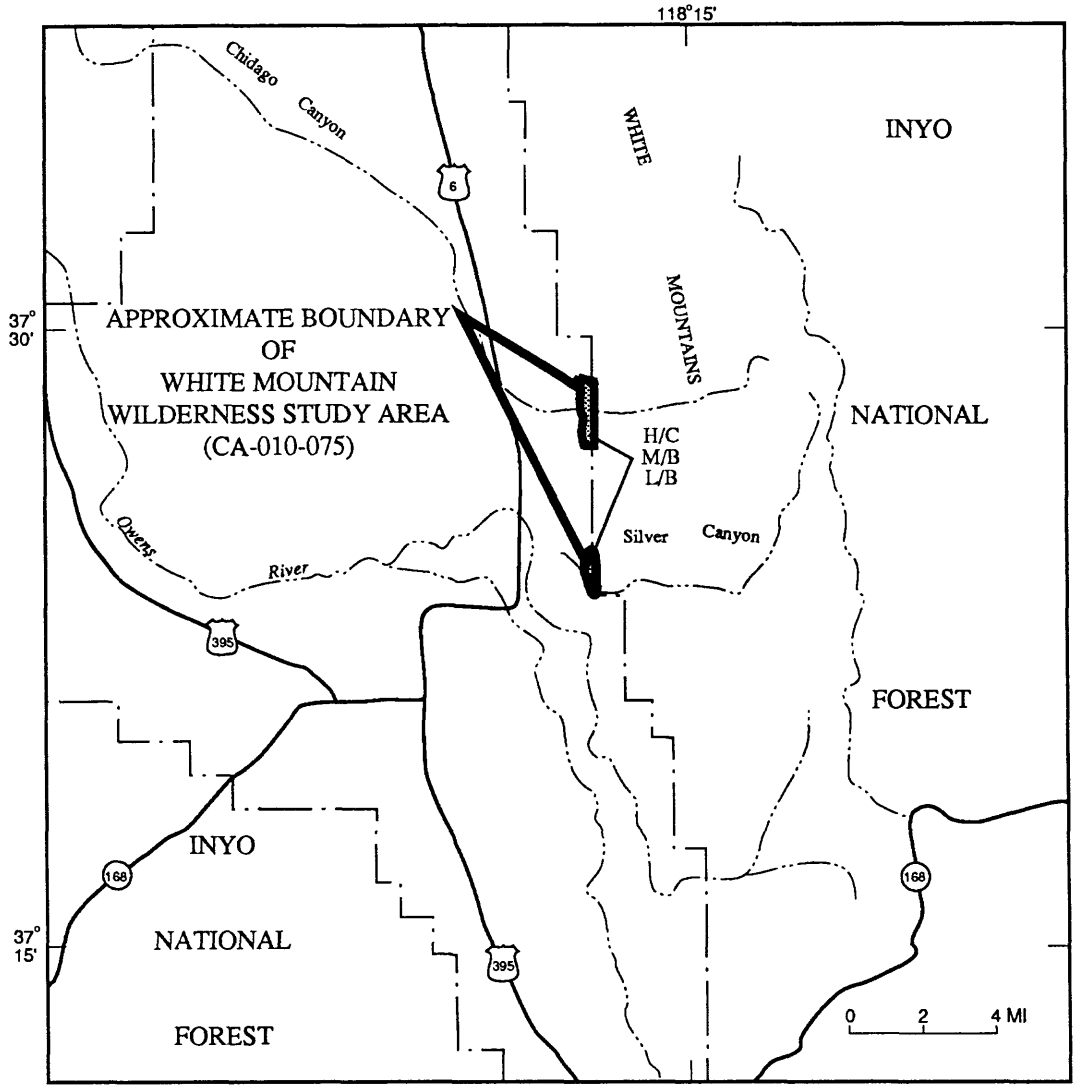

EXPLANATION

H/C Geologic terrane having high mineral resource potential for pumice with certainty level C

M/B Geologic terrane having moderate mineral resource potential for silver, zinc, and copper with certainty level B

L/B Geologic terrane having low mineral resource potential for barite with certainty level B

Mineral resources of the White Mountain Wilderness Study Area.

Name: Yellow Rock Canyon
Area number: CA-020-913A
Size (acres): 13,050

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): There are no known mineral deposits in the wilderness study area.

Mineral resource potential (undiscovered): The study area has moderate potential for gold, silver, and mercury. The same rock units to the east contain identified occurrences of gold, silver, and mercury, associated with rhyolitic tuff. There is a moderate potential for uranium and lithium for the eastern half of the study area. The entire study area has moderate potential for zeolite resources.

Mining activity: The wilderness study area is not in a mining district, and has had no known mineral production. However, exploration for mercury, including drilling and trenching, was conducted in the 1970's in T. 40 N., R. 22 E., sec. 8, an area that straddles the extreme northwest corner of the wilderness study area. The claims for mercury were abandoned in the 1970's, but since then, the explored area has been claimed, abandoned, and reclaimed for gold. U.S. Bureau of Land Management claim records, October 25, 1988, indicate that sec. 8 contains 14 current claims (the Amalgam claim group), a few of which may be wholly or partially within the wilderness study area. The claim group is leased to American Copper and Nickel Co., Inc., Sparks, NV, which has since staked additional claims around the Amalgam claim group; some of the new claims are also apparently in the wilderness study area (Mel Lahr, Regional Manager, American Copper and Nickel Co., Inc., oral commun., February 2, 1989). The target is a hot springs-type gold deposit similar to the Hog Ranch mine, about 13 miles southeast. The Hog Ranch mine, which began production in 1986, is the first major gold mine in Washoe County. The great value of the Hog Ranch deposit has led to intense exploration by dozens of companies in the region including the wilderness study area for similar deposits. There are no geothermal resources or sand and gravel nor are there any oil or gas leases in the wilderness study area.

Mineral setting: The study area consists of an extensive area of rhyolitic flows, domes, and Ash-flow tuff, locally interfingered with volcanic derived shale, mudstone, and ash-fall tuff.

Recommendations: Future work in the study area, in the form of geologic mapping, detailed geochemical sampling, and radiometric surveying, is necessary to accurately assesses the potential for hot springs-type gold, silver, and mercury mineralization, uranium and lithium, and zeolite resources. The wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines.

References:

Bonham, H.F., and Papke, K.G., 1969, Geology and mineral deposits of Washoe and Storey Counties, Nevada (with a section on industrial rock and mineral deposits): Nevada Bureau of Mines Bulletin 70, 140 p.

Nevada Mining Association Bulletin, 1986, Western goldfield principals visit Hog Ranch project: v. 10, No. 6, 5 p.

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

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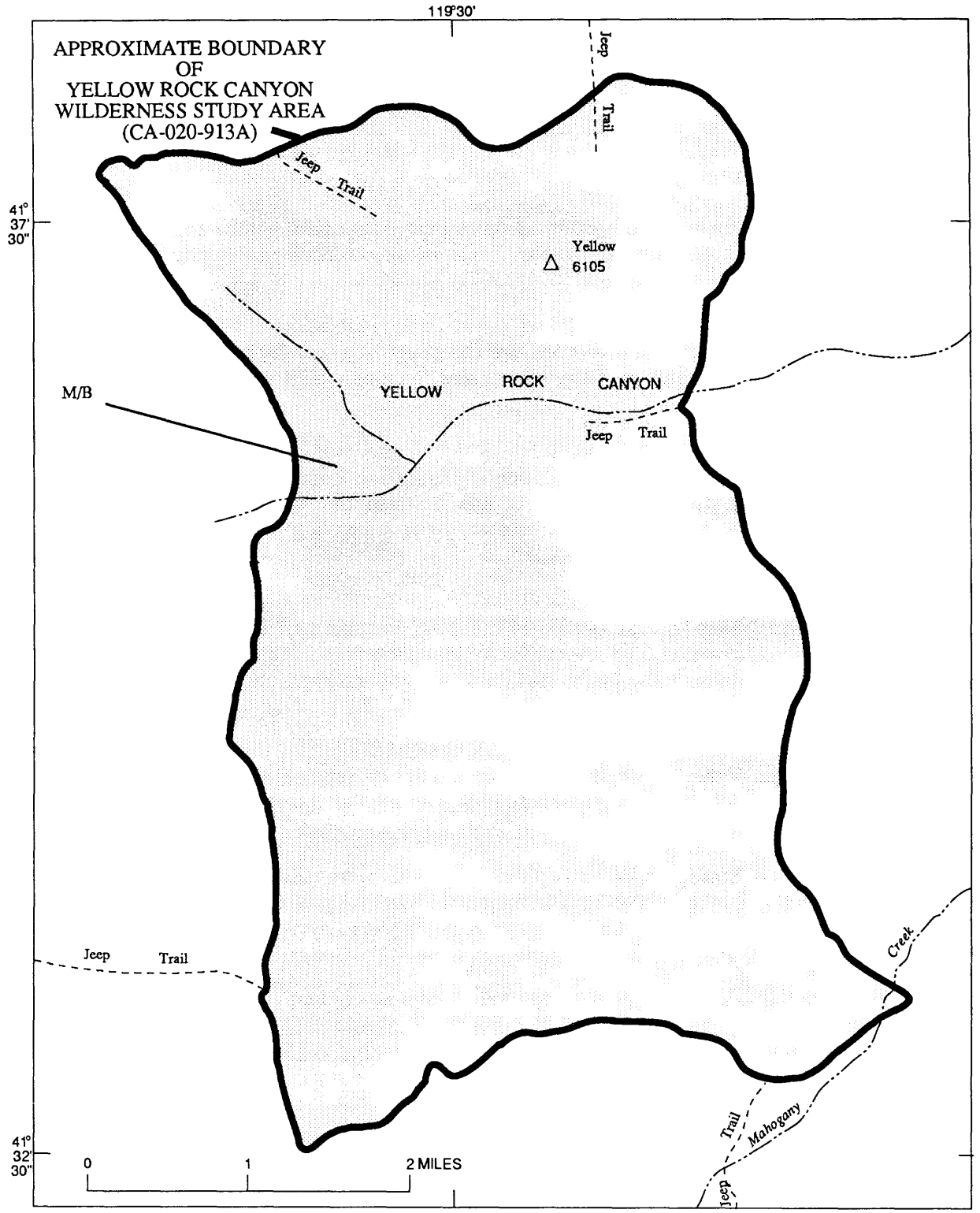

EXPLANATION

M/B Geologic terrane having moderate mineral resource potential for gold, silver, mercury, uranium, lithium, and zeolites with certainty level B

Mineral resources of the Yellow Rock Canyon Wilderness Study Area.

Name: Yolla Bolly Contiguous
Area number: CA-030-501
Size (acres): 646

Status of mineral surveys: This area was not studied by the U.S. Geological Survey or the U.S. Bureau of Mines.

Identified mineral resources (known): No mineral resources have been identified within the wilderness study area. A study of the Yolla Bolly - Middle Eel wilderness to the west indicated no significant mineral trends.

Mineral resource potential (undiscovered): There is no evidence that the study area has any mineral resource potential for deposits of significant size.

Mining activity: There is no known mineral production from the wilderness study area. No known mines or prospects exist in the wilderness study area and no mining districts are situated in or adjacent to the area. No current claims are located in or adjacent to the wilderness study area, according to 1988 U.S. Bureau of Land Management records.

Mineral setting: This area is located in the southernmost part of the Klamath Mountains block and is underlain by pre-Cretaceous metasedimentary rocks which area in the same belt as those underlying South Fork Mountain. Two faults, apparently strike slip, and many tens of miles in length, pass through or near the area.

Recommendations: The wilderness study area should be studied as part of a comprehensive mineral survey by the U.S. Geological Survey and the U.S. Bureau of Mines.

References:

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Blake, M.C., Jr., Jayko, A.S., Leszcykowski, A.M., Longwell, W.D., and Gobla, Michael, 1983, Mineral resource potential of the Yolla Bolly-Middle Eel Wilderness and adjacent Roadless Areas, northern California: U.S. Geological Survey Miscellaneous Field Studies Map MF-1595-B, scale 1:62,500.

Leszcykowski, A.M., and Gobla, Michael, 1982, Mineral investigation of the Yolla Bolly - Middle Eel wilderness (F.S.), Tehama and Trinity Counties, California: U.S. Bureau of Mines Open-File MLA Report 103-82, 9 p.

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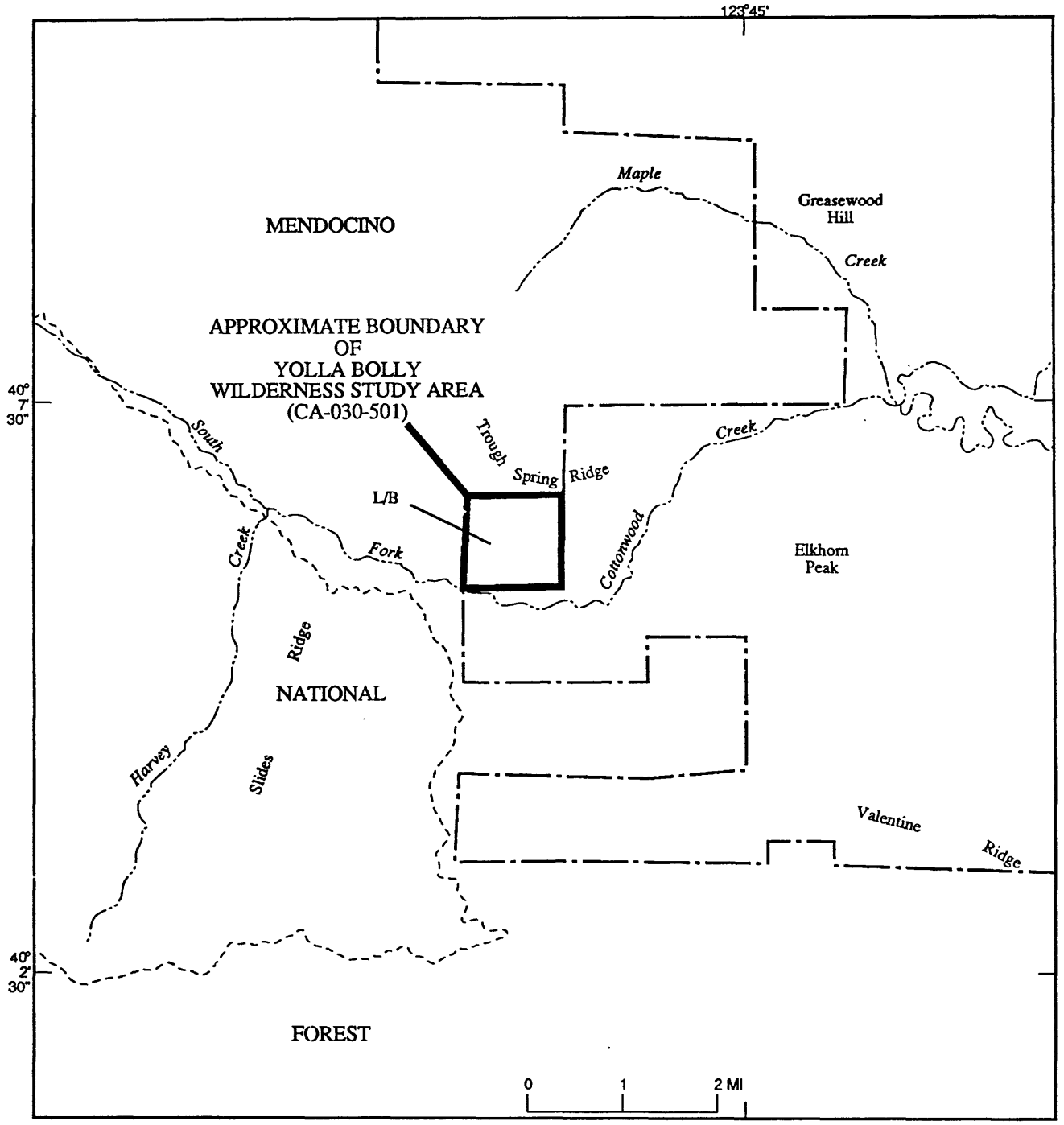

EXPLANATION

L/B Geologic terrane having low mineral resource potential for manganese with certainty level B

Mineral resources of the Yolla Bolly Contiguous Wilderness Study Area.

GEOLOGIC TIME CHART

Terms and boundary ages used by the U.S. Geological Survey in this report

EON	ERA	PERIOD		EPOCH	AGE ESTIMATES OF BOUNDARIES IN MILLION YEARS (Ma)
Phanerozoic	Cenozoic	Quaternary		Holocene	0.010
				Pleistocene	1.7
		Tertiary	Neogene Subperiod	Pliocene	5
				Miocene	24
			Paleogene Subperiod	Oligocene	38
				Eocene	55
				Paleocene	66
	Mesozoic	Cretaceous		Late	
				Early	96
					138
		Jurassic		Late Middle Early	205
		Triassic		Late Middle Early	~240
	Paleozoic	Permian		Late Early	290
		Carboniferous Periods	Pennsylvanian	Late Middle Early	~330
			Mississippian	Late Early	360
		Devonian		Late Middle Early	410
		Silurian		Late Middle Early	435
		Ordovician		Late Middle Early	500
		Cambrian		Late Middle Early	[1]~570
Proterozoic	Late Proterozoic				900
	Middle Proterozoic				1600
	Early Proterozoic				2500
Archean	Late Archean				3000
	Middle Archean				3400
	Early Archean				
pre-Archean[2]		(3800?)			4550

[1]Rocks older than 570 Ma also called Precambrian, a time term without specific rank.
[2]Informal time term without specific rank.