

MAP SHOWING OUTCROPS OF PRE-QUATERNARY
ASH-FLOW TUFFS AND VOLCANICLASTIC ROCKS,
BASIN AND RANGE PROVINCE, NORTHERN CALIFORNIA

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INTRODUCTION

This map report is one of a series of geologic and hydrologic maps covering all or parts of States within the Basin and Range province of the western United States. The map reports contain information on subjects that characterize the geohydrology of the province, including the ground-water hydrology, ground-water quality, surface distribution of selected rock types, tectonic conditions, areal geophysics, Pleistocene lakes and marshes, and mineral and energy resources. This work is a part of the U.S. Geological Survey's program for geologic and hydrologic evaluation of the Basin and Range province to identify prospective regions for further study relative to isolation of high-level nuclear waste (Bedinger, Sargent, and Reed, 1984).

This map was prepared from published geologic maps and reports, utilizing the project guidelines defined in Sargent and Bedinger (1984). The map shows the known occurrences of pre-Quaternary ash-flow tuffs. Rocks associated with ash-flow tuffs, such as volcaniclastic rocks, tuff breccias, and agglomerates are also included on the map. The Description of Map Units includes the geologic and, if available, radiometric age, the lithology, thickness where available, and sources of data for the tuffs and volcaniclastic units in outlined and numbered areas in the counties of the study area. The nomenclature of the geologic units is from published reports and does not necessarily conform to U.S. Geological Survey usage. The listed radiometric ages do not necessarily represent the entire age range of a unit.

DESCRIPTION OF MAP UNITS

[To convert feet (ft) to meters multiply feet by 0.3048]

County- area number	Map symbol	Geologic unit	Geologic and radiometric age in millions of years (m.y.)	Lithology and comments	References for county area
LASSEN COUNTY (L)					
L-1	Tv	Bonta Formation of Durrell (1959)	Miocene	Rhyolitic and andesitic mudflow breccia, conglomerate, tuff and tuff breccia. May be correla- tive to rocks in Turner Creek Formation, see county area M-5.	California Department of Water Resources, 1963; Durrell, 1959; Gay and Aune, 1958; Lydon and others, 1960
L-2	Tt	Tuff	Pliocene	Coarse, pumiceous, lithic, tuff. May be correlative to part of Tuscan Formation.	Bean, 1980; T.L.T. Grose, Colorado School of Mines, unpublished field data, 1984; Lydon and others, 1960
L-3	Tv	Volcani- clastic rocks	Pliocene	Massive beds of mudflows and consolidated tuff. Thickness unknown.	California Department of Water Resources, 1963; T. L. T. Grose, Colorado School of Mines, unpublished field data, 1981; Lydon and others, 1960; Youngkin, 1980
L-4	Tv	Volcani- clastic rocks	Pliocene to Eocene	Reworked silicic to inter- mediate tuff and mudflow breccia, as much as 2,000 ft thick; thins northward.	California Department of Water Resources, 1963; T.L.T. Grose, Colorado School of Mines, unpublished field data, 1984; Lydon and others, 1960; Roberts, 1984

L-5	Tv	Volcani-clastic rocks	Pliocene	Similar to Tuscan Formation which includes basaltic and andesitic volcanic breccia, mudflow, tuff, tuff breccia, and thin interbedded sediments and basalt flows.	Lydon and others, 1960
L-6	Tv	Volcani-clastic rocks	Miocene to Eocene	Andesitic breccia, mudflow, and tuff.	California Department of Water Resources, 1963; Luedke and Smith, 1981; Lydon and others, 1960

MODOC COUNTY (M)

M-1	Tv	Volcani-clastic rocks	Tertiary	Andesitic mudflows and tuff breccia.	Gay and Aune, 1958; Jennings, 1977
M-2	Tv	Volcani-clastic rocks	Tertiary	Rhyolitic and andesitic tuff and tuff breccia and volcanic mudflow deposits.	Gay and Aune, 1958; Jennings, 1977
M-3	Tv	Cedarville series of Russell (1928)	Miocene and Oligocene	In descending order: Lava flows more than 1,600 ft thick. Air-fall pyroclastic debris, rhyolitic to andesitic, well bedded, poorly consolidated, locally stream reworked, thickness 100 to 400 ft. Lava flows 900 to 1,300 ft thick. Rhyolitic ash-flow tuff as much as 200 ft thick. Lava flows 400 to 1,200 ft thick. Rhyolitic welded ash-flow tuff locally with thin vitric zones, thickness 300 to 1,000 ft. Sedimentary rocks, unsorted mudflow debris, conglomerate, sandstone, and minor andesitic tuff.	California Department of Water Resources, 1963; Duffield and Weldin, 1976; Gay and Aune, 1958; MacDonald, 1966; Russell, 1928

M-4	Tt	Alturas Formation, Warm Springs Tuff Member	Tertiary 7.8 to 13.3±0.3 m.y.	Rhyolitic ash-flow tuff, locally welded; includes massive pumice lapilli tuff and ashy sandstone. Thickness 100 to 400 ft.	California Department of Water Resources, 1963; Gay and Aune, 1958; Luedke and Smith, 1981
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M-5	Tv	Turner Creek Formation	Miocene	Mudflows and tuff and some basalt flows and interbedded sandstone, conglomerate, and diatomite; about 4,000 ft thick.	California Department of Water Resources, 1963; Gay and Aune, 1958
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SIERRA COUNTY (SA)

SA-1	Tv	Volcanic-clastic rocks	Miocene to Eocene	Andesitic mudflows and rhyolitic tuffs.	Burnett and Jennings, 1962; California Department of Water Resources, 1963
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SISKIYOU COUNTY (SU)

SU-1	Tv	Cedarville Andesite of Powers (1932)	Tertiary	Andesitic lava flows and tuff breccia. Also called Tuff and Trap formation (Peacock, 1931).	Gay and Aune, 1958; Peacock, 1931; Powers, 1932
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REFERENCES CITED

- Bean, S. M., 1980, Volcanotectonics and geothermal potential in the Big Jack Lake area, Lassen County, California: Golden, Colorado School of Mines, M.S. thesis 2383, 103 p.
- Bedinger, M. S., Sargent, K. A., and Reed, J. E., 1984, Geologic and hydrologic characterization and evaluation of the Basin and Range province relative to the disposal of high-level of radioactive waste--Part I, Introduction and guidelines: U.S. Geological Survey Circular 904-A, 16 p.
- Burnett, J. L., and Jennings, C. W., compilers, 1962, Geologic map of California--Chico sheet: California Division of Mines and Geology, scale 1:250,000.
- California Department of Water Resources, 1963, Northeastern counties ground-water investigation: California Department of Water Resources Bulletin 98, v. 1, 224 p.; v. 2, plates.
- Duffield, W. A., and Weldin, R. D., 1976, Mineral resources of the South Warner Wilderness, Modoc County, California, with a section on Aeromagnetic data, by W. E. Davis: U.S. Geological Survey Bulletin 1385-D, 31 p.
- Durrell, Cordell, 1959, Tertiary stratigraphy of the Blairsdien Quadrangle, Plumas County, California: University of California Publications in Geological Science, v. 34, no. 3, p. 161-192.
- Gay, T. E., Jr., and Aune, Q. A., compilers, 1958, Geologic map of California--Alturas sheet: California Division of Mines and Geology, scale 1:250,000.
- Jennings, C. W., compiler, 1977, Geologic map of California: California Division of Mines and Geology, Geologic Data Map 2, scale 1:750,000.
- Luedke, R. G., and Smith, R. L., 1981, Map showing distribution, composition, and age of late Cenozoic volcanic centers in California and Nevada: U.S. Geological Survey Miscellaneous Investigations Map I-1091-C, scale 1:1,000,000, 2 sheets.
- Lydon, P. A., Gay, T. E., Jr., and Jennings, C. W., compilers, 1960, Geologic map of California--Westwood sheet: California Division of Mines and Geology, scale 1:250,000.
- MacDonald, G. A., 1966, Geology of the Cascade Range and Modoc Plateau, in Bailey, E. H., ed., Geology of northern California: California Division of Mines and Geology Bulletin 190, p. 65-96.
- Peacock, M. A., 1931, The Modoc lava field, northern California: New York, Geographical Review, v. 21, no. 2, p. 259-275.
- Powers, H. A., 1932, The lavas of the Modoc Lava-Bed Quadrangle, California: American Mineralogist, v. 17, no. 7, p. 253-294.
- Roberts, C. T., 1984, Cenozoic evolution of the northwestern Honey Lake basin, Lassen County, California: Golden, Colorado School of Mines, M.S. thesis 2856, 159 p.
- Russell, R. J., 1928, Basin Range structure and stratigraphy of the Warner Range, northeastern California: Los Angeles, University of California, Department of Geological Science Bulletin, v. 17, no. 11, p. 387-496.

- Sargent, K. A., and Bedinger, M. S., 1984, Geologic and hydrologic characterization and evaluation of the Basin and Range province relative to the disposal of high-level radioactive waste--Part II, Geologic and hydrologic characterization: U.S. Geological Survey Circular 904-B, [in press].
- Youngkin, M. T., 1980, Late Cenozoic volcanism and tectonism of the Eagle Lake area, Lassen County, California: Golden, Colorado School of Mines, M.S. thesis 2371, 106 p.