DEPARTMENT OF THE INTERIOR
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MAP SHOWING OUTCROPS OF PRE-QUATERNARY BASALTIC ROCKS, BASIN AND RANGE PROVINCE, OREGON

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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 basaltic rocks largely of Tertiary age. Locally, however, where basalts of Quaternary age were not differentiated on published maps from those of Tertiary age, the younger basalts are shown 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 basaltic units at numbered localities within counties of the study area. No lithologic information was available on the rock outcrops that are unnumbered. The radiometric ages do not necessarily represent the entire age range of a geologic unit.

DESCRIPTION OF MAP UNITS
[To convert feet (ft) to meters, multiply feet by 0.3048]

County-area or locality	Map symbol	Geologic unit	Geologic and radiometric age in millions of years (m.y.)	Lithology and comments	References for county area
			HARNEY COUNTY (H)		
H-1	Tob	Basaltic andesites of Rimrock Springs	Late Miocene	Six porphyritic flows, each 15 to 30 ft thick.	Brown, 1982
H-2	Tb	Basaltic andesites of Willow Creek Flats	Pliocene and late Miocene 8.6±0.3 m.y.	Multiple, scoriaceous to dense flows from cinder cones.	Brown, 1982
H-3	QTb		Quaternary and Tertiary 2.44±0.07 and 2.7±0.3 m.y.	Basalt.	Fiebelkorn and others, 1982
H-4	Tob		Miocene 7.1±1.12 m.y.	Olivine basalt.	Fiebelkorn and others, 1982
H-5	Tob		Miocene 11.1±1.3 m.y.	Basalt.	Fiebelkorn and others, 1982
H-6		Southern Harney Basin	Miocene 9.44±0.8 m.y.	Basalt.	Fiebelkorn and others, 1982
H-7			Miocene 8.07±0.69 m.y.	Basalt.	Fiebelkorn and others, 1982
H-8	Tob		Miocene 8.1±0.9 and 9.0±1.4 m.y.	Olivine basalt.	Laursen and Hammond, 1978; Parker, 1974; Parker and Armstrong, 1972; Walker, 1974; Walker and others, 1974
H-9	Tfs	Steens Basalt	Miocene 15.1 to 15.8 m.y.	Basalt is 3,000 ft thick and overlies 1,500 ft of andesite flows.	Fiebelkorn and others, 1982; Fuller, 1931
H-10		Alvord Creek Formation	Miocene 21.3 m.y.	Basalt.	Fiebelkorn and others, 1982

H-11	Tf	Includes Steens Basalt	Miocene	Basalt and andesite flows and flow breccias and minor interbeds of tuffaceous sedimentary rocks, tuff, scoria, and silicic volcanic rocks; thickness from cross section about 10,000 ft.	Harrold, 1973; Walker and Repenning, 1965
H-12	Tf		Late to middle(?) Miocene	Andesitic basalt flows, locally nearly one-half of unit composed of flow breccias, air-fall tuffs, and tuffaceous sediments; unit thickness greater than 980 ft. Overlies thin, porphyritic basalt flows and locally minor amounts of pyroclastics and flow breccia; thickness greater than 735 ft; probably correlates with Steens Basalt.	Brown and others, 1980; Carlton, 1969; Greene, 1976
			KLAMATH COUNTY (K)		
K-1	Tob		Tertiary 5 to 10 m.y.	Thick sequence of basaltic flows, breccias, agglomerates, and pyroclastic rocks. Some age discrepancies in area; a basalt has been dated at 1.9±0.5 m.y. and an andesitic tuff at 2.3±0.2 m.y., but Luedke and Smith (1982) believe basalts are 5 to 10 m.y. old.	Fiebelkorn and others, 1982; Luedke and Smith, 1982; Peterson and McIntyre, 1970
K-2	QTb		Quaternary and Tertiary 3.33±0.66 m.y.	Basalt.	Fiebelkorn and others, 1982
K-3	QTb		Quaternary and Tertiary 3.65±0.24 m.y.	Basalt.	Fiebelkorn and others, 1982
			LAKE COUNTY (L)		
L-1	Tob		Pliocene	Thin flows of olivine basalt; fault blocks to the north in Deschutes County have multiple thin flows totalling at least 100 ft thick.	Peterson and others, 1976; Walker and others, 1967
L-2	Tob	Hayes Butte Basalt	Late Pliocene	Basalt and minor andesitic basalt locally faulted; thickness generally less than 100 ft.	Hampton, 1964

L-3	Tob	Picture Rock Basalt	Early(?) Pliocene	Basalt flows and local interbeds of pyroclastic material; folded and cut by numerous faults. Flows generally are 10 to 50 ft thick and pyroclastic rocks are as much as 250 ft thick; unit may exceed 1,000 ft in thickness. Although area L-3 is adjacent to area L-2, the Picture Rock Basalt is separated from overlying Hayes Butte Basalt by unconformity, and in places by intervening thick unit of tuff, agglomerate, lava, and diatomite.	Hampton, 1964
L-4	Tob	Picture Rock Basalt	Early(?) Pliocene	Lithologically similar to area L-3.	Hampton, 1964
L-5	Tob	Hayes Butte Basalt	Late Pliocene	Lithologically similar to area L-2. Thickness exceeds 1,300 ft.	Hampton, 1964
L-6	Tob		Tertiary 5 to 10 m.y.	Undifferentiated basalts and basaltic andesites exposed in volcanic complex at Yamsay Mountain. Basalt flows in the northern part of Lake County, previously considered Quaternary and Tertiary in age (Luedke and Smith, 1982), are now called Quaternary (Macleod, 1983) and are not shown on this map.	Hering, 1981; Luedke and Smith, 1982; N.S. Macleod, U.S. Geological Survey, written commun., 1983
L-7	Tb		Miocene 6.9±0.9 m.y.	Basalt.	Fiebelkorn and others, 1982
L-8	Tob, Tb, Tf		Tertiary	Donath (1958) described as basalt and andesite flows, minor lenses of tuffaceous material; individual flows as much as 40 ft thick; unit 1,300 ft thick at north end of Diablo Mountain. Later differentiated into three units by Walker (1977).	Donath, 1958; Walker, 1977
L-9	Tfs		Late to middle(?) Miocene	Basalt flows and associated scoria and breccia; thickness greater than 1,800 ft. Partly correlative with Steens Basalt.	Walker and Swanson, 1968
L-10	Tb		Pliocene or Miocene	Andesite flows, flow breccia, agglomerate, and minor andesitic and basaltic tuff; many flows densely jointed.	Walker and Ridenour, 1982
L-11	Tf	Albert Rim flow	Miocene 15.1±0.8 m.y.	Basalt.	Fiebelkorn, and others, 1982

L-12	Tb		Early Pliocene or late Miocene	Thin basalt flows.	Walker and Swanson, 1968
L-13		Humble Oil and Refining Company well	Early Miocene or late Oligocene to early Oligocene or Eocene 29.7±1.8 m.y. and 30.3±1.4 m.y.	Dominantly flows, flow breccia, and agglomerate or volcanic conglomerate, composed of basalt and andesite, which are mostly porphyritic and exhibit pilotaxitic or trachytic texture. Most abundant varietal types are olivine, olivine-pyroxene, pyroxene, hornblende-pyroxene andesite and olivine-bearing basalt or basaltic andesite. Also present are tuffaceous sedimentary rocks, andesitic to dacitic agglomerate, and mudstone and siltstone. Isotopic dates on basalt from depth of 11,840 to 11,850 ft but dates may be anomalous due to alteration. Total depth of well, 12,093 ft.	Walker, 1980
L-14	Tb	Basalt of Coleman Rim	Late and middle Miocene 10.5±0.3 m.y.	Basalt and minor andesite flows and flow breccia; thickness about 230 ft. Unit thickens rapidly to the southeast where thin flows and interfingering basalt flow breccia are 985 to 1,310 ft thick.	Fiebelkorn and others, 1982; Walker, 1980
L-15	Tb	Basalt of Coleman Rim	Late and middle Miocene 8.5±1.3 m.y.	Basalt and minor, andesite flows and flow breccias; thickness 330 to 495 ft thick.	Fiebelkorn and others, 1982; Walker, 1980
L-16	Tb	Basalt of Coleman Rim	Late and middle Miocene	Basalt and minor andesite flows and flow breccias, thickness about 600 ft.	Peterson and McIntyre, 1970; Walker, 1980

L-17	Tob, Tb		Late or middle Miocene	Aphanitic basalt and olivine-basalt flows; individual flows average 10 ft thick, unit thickness as much as 200 ft. Upper basalt unit of Wells (1979), apparently equivalent to Tob and Tb units of Walker (1977).	Walker, 1977; Wells, 1979
	Tf	Flood basalt, basalt and andesite of Crook Peak, basaltic andesite of Twelvemile Peak, lower andesitic sequence	Miocene to Eocene 40.2±4 m.y.	In descending order: Flood basalt, commonly olivine basalt; individual flows generally less than 20 ft thick. Unit thickness as much as 1,970 ft; approximately correlative with Steens Basalt (see area H-8). Basalt and andesite of Crook Peak in flows as much as 2,360 ft thick. Basaltic andesite of Twelvemile Peak, flow breccias 10 to 40 ft thick continuing interbeds of massive lava, baked soil horizons, and basalt sills(?). Unit thickness about 3,280 ft. Lower andesitic sequence, andesite flows, flow breccia, mudflows, ash-flow tuff, fluvial tuff, conglomeratic sandstone, and minor basalt flows, thickness more than 2,130 ft; radiometric date from this unit.	

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