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MAP SHOWING OUTCROPS OF GRANITIC ROCKS AND PRE-QUATERNARY ASH-FLOW TUFFS, 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 potentially suitable regions for further study relative to storage of high-level nuclear waste (Bedinger, Sargent, and Reed, 1984).

This map on the granitic rocks and pre-Quaternary ash-flow tuffs of Oregon was prepared from published geologic maps and reports, utilizing the project guidelines defined in Sargent and Bedinger (1984). For this study, granitic rocks include granite, granodiorite, quartz monzonite, quartz diorite, aplite, syenodiorite, adamellite, and locally some metaquartz diorite and gneiss. The ash-flow tuffs are generally less than a few hundred feet thick in this part of Oregon; locally, however, they may be as much as 2,000 feet thick in or near volcanic calderas. In the Description of Map Units the granitic rocks and ash-flow tuffs are described separately. The geologic age, lithologic character, thickness, and sources of data for the outcrops of each rock type are discussed within outlined and numbered areas in the counties of the study area. The radiometric ages of the rock units are only those which are available and do not necessarily represent the entire age range of the units. A brief description of the pre-Quaternary calderas in the area is also included, in which the age and size of each caldera and the character of the associated ash-flow tuffs are discussed.

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DESCRIPTION OF MAP UNITS

[To convert feet (ft) to meters, multiply feet by 0.3048; to convert miles (mi) to kilometers, multiply miles by 1.069; to convert square miles (mi^2) to square kilometers, multiply square miles by 2.590; to convert cubic miles (mi^3) to cubic kilometers, multiply cubic miles by 4.1682]

Part A.--GRANITIC ROCKS

County-area number	Map symbol	Pluton or formation name	Geologic and radiometric age in millions of years (m.y.)	Lithology and comments	References for county area
			HARNEY COUNTY (H)		
H-1	Kg	Pueblo Mountains intrusives	Cretaceous 93.7±1.3 m.y.	Stock of quartz monzonite, granodiorite, and quartz diorite; in part gneissic.	Harrold, 1973; Walker and Repenning, 1965
H-2	TKd	Pueblo Mountains intrusives	Tertiary and Cretaceous 61.0±1.2 and 102±2.0 m. y.	Small outcrop of metaquartz diorite and aplite.	Harrold, 1973; Walker and Repenning, 1965
H-3	Kg	Trout Creek Mountains intrusives	Cretaceous	Stock of granodiorite and quartz monzonite, partly gneissic.	Walker and Repenning, 1965
			LAKE COUNTY (L)		
L-1	Tg	Paisley Mountains plutonic complex	Oligocene 33 to 34 m.y.	Small stocks, dikes, and irregular bodies. Plutonic complex is zoned--strongly jointed granodiorite and quartz monzonites stocks at center and old mafic rocks at periphery. Younger graphic syenodiorite as dikes and small, irregular bodies also in center. All rocks show chloritic alteration. Dated rock was hornblende-biotite adamellite.	Appling, 1950; Hammitt, 1976; Muntzert, 1969

Part B.--PRE-QUATERNARY ASH-FLOW TUFFS

County-area number	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-4	Twt	Idaho Canyon Tuff	Miocene >15.1 m.y.	Densely welded devitrified tuff. Thickness 197 to 394 ft in Catnip Canyon, Nevada (T. 42 S., R. 28 E.).	Cathrall and others, 1978
H-5	Twt	Unnamed welded ash-flow tuffs	Miocene and Oligocene(?) 13 to 15 m.y.	Ash-flow tuffs about 100 ft thick occur in tuffaceous sedimentary unit of middle to late Miocene age. Older ash-flow tuffs, 15 to 20 ft thick, occur in Pike Creek Formation of late Oligocene(?) to early Miocene age.	Harrold, 1973; Walker, 1977
H-6	Twt	Tuff of Whitehorse Creek, tuff of Oregon Canyon, and unnamed ash-flow tuffs	Miocene Tuff of Whitehorse Creek 15.0±0.3 m.y. Tuff of Oregon Canyon 16.6±0.2 m.y.	Unwelded to densely welded, peralkaline, rhyolitic and comenditic ash-flow tuffs which contain interstratified air-fall and lithic tuffs. Combined thickness is 805 ft or more in Ts. 39 and 40 S., Rs. 36 and 37 E.	Carlton, 1969; Rytuba and others, references 4, 6, 7, 9, 10, and 11
H-7	Twt	Dinner Creek Welded Tuff, tuff of Whitehorse Creek, tuff of Long Ridge, tuff of Trout Creek Mountains, tuff of Oregon Canyon, and other unnamed tuffs	Miocene Dinner Creek Welded Tuff Creek, 13 to 15 m.y., tuff of Whitehorse Creek 15.0±0.3 m.y., tuff of Long Ridge, 15.8±0.6 m.y., tuff of Trout Creek Mountains, 15.9±0.3 m.y., tuff of Oregon Canyon, 16.1±0.2 m.y.	Tuffs range from unwelded to densely welded, and some contain interstratified air-fall tuffs. Total thickness in McDermitt caldera, measured from cross section, is about 2,000 ft.	Greene, 1972, 1973, 1976; Rytuba and others, references 1, 2, 3, 5, 6, 7, 8, and 9; Walker, 1977; Walker and Repenning, 1965, 1966; Wallace and Roper, 1981
	Trr	Alkali rhyolite of Reiser Creek	Miocene	Alkali-rhyolite welded tuff more than 700 ft thick.	

H-8	Tat	Rattlesnake Ash-flow Tuff, Devine Canyon Ash-flow Tuff	Miocene 8.5 to 9.7 m.y.	Rattlesnake Ash-flow Tuff (see H-11 for description); overlies Devine Canyon Ash-flow Tuff in western part of area. Devine Canyon Ash-flow Tuff, welded, multiple-flow, simple cooling unit. At reference section (north of study area in NW1/4 sec. 32 T. 21 S., R. 31 E.) tuff is 104 ft thick; near Folly-farm in northeast part of area it is 80 to 104 ft thick; unit extends south of 43°N, but has not been mapped in detail.	Fiebelkorn and others, 1982; Greene, 1973; Greene and others, 1972; Walker, 1977, 1979
H-9	Tat	Ash-flow tuff near Buchanan	Pliocene or Miocene 5 to 10 m.y.	Slightly welded, vitric to devitrified tuff, containing abundant pumice; about 20 ft thick.	Greene and others, 1972; Luedke and Smith, 1982; Walker, 1977
H-10	Tat	Prater Creek Ash-flow Tuff	Miocene 8.4 to 9.1 m.y.	Commonly 20 to 40 ft thick. West of Devine Canyon (T. 21 S., R. 31 E., northwest of area) the tuff consists of upper dense zone, a lithophysal middle zone, and a lower dense zone. East of Devine Canyon, middle zone is absent, and tuff is finely porous.	Greene and others, 1972; Walker, 1977, 1979

H-11	Tat	Rattlesnake Ash-flow Tuff (also called welded tuff of Double O Ranch), Prater Creek Ash-flow Tuff, and Devine Canyon Ash-flow Tuff	Miocene 6.8 to 7.0 m.y.	Rattlesnake Ash-flow Tuff: Pumiceous, welded ash-flow tuff, extensively exposed in Harney basin, where it comprises most of Tat unit south of latitude 43°N. At the reference section (SW1/4 23, T. 27 S., R. 28 E.) the tuff is 210 ft thick and consists of an upper dense zone 8 ft thick; a lithophysal zone 190 ft thick; a lower, dense, devitrified zone 8 ft thick; and a basal vitric zone 4 ft thick. Thickness of tuff ranges from 50 to maximum of 265 ft south of Harney Lake and west of valley of Donner and Blitzen River. Possible vent source on Buzzard Creek (T. 28 S., R. 28 E.). Prater Creek Ash-flow Tuff underlies Rattlesnake Ash-flow Tuff in vicinity of Burns caldera (see H-10 for description). Devine Canyon Ash-flow Tuff underlies Rattlesnake Ash-Flow Tuff south and east of Harney Lake (see H-8 for description).	Brown, 1982; Fiebelkorn and others, 1982; Greene and others, 1972; Walker, 1977
			KLAMATH COUNTY (K)		
K-1	Twt	Welded tuffs	Pliocene or Miocene	Moderately extensive ash-flow tuff of rhyolitic or dacitic composition.	Luedke and Smith, 1982; Peterson and McIntyre, 1970

LAKE COUNTY (L)

L-1	Ttst	Tuffs and tuffaceous sedimentary rocks	Early Pliocene to late Oligocene	Well-indurated, slightly altered, rhyolitic, dacitic, and andesitic tuffs, tuffaceous sedimentary rocks, and minor flows and breccias. Parts of tuff sequence described in detail in following areas:	Walker, 1977
L-1a		Ash-flow tuffs and sedimentary rocks	Early Pliocene to middle(?) Miocene	Between Drews Reservoir and Barnes Valley Creek the section contains massive beds of pumice-bearing ash-flow tuff and minor tuffaceous sediments, underlain by a thick section of interbedded porphyritic basalt and tuffaceous sediments. Below are massive ash-flow tuffs containing abundant exotic rock fragments.	Peterson and McIntyre, 1970; Walker, 1977
L-1b		Palagonitic tuff and tuffaceous sediments	Early Pliocene(?) to late Oligocene	These rocks are 1,500 to 2,000 ft thick. Upper part of sequence mostly bedded tuff and tuffaceous sediments and some palagonitic tuff; contains late Miocene (Barstovian) fossils. Lower part mostly ash-flow tuffs and interbedded lahars and altered andesites and basalts. Sedimentary strata contain sparse fossils of late Oligocene and middle Miocene age. Compaction and degree of welding vary within the section and along strike. An age as young as early Pliocene postulated by Peterson and McIntyre (1970).	Peterson and McIntyre, 1970; Walker, 1980

L-1c		Peyerl Tuff (of local distribution), "Lower tuff" (west of Drake Peak)	Early Pliocene to early Miocene and late Oligocene	Peyerl Tuff (see L-3 for description). "Lower tuff": Interbedded ash-flow tuffs, tuffaceous sediments, and basalt. In Crooked Creek Canyon (not shown on map), upper part at least 21 ft thick contains unwelded tuffs; lower part, more than 980 ft thick, has welded tuffs. Unit thins to 98 ft east of Crooked Creek. Probably correlates with John Day Formation of central Oregon.	Fiebelkorn and others, 1982; Wells, 1980
L-2	Tas	Silver Creek welded tuff of Hering (1981)	Pliocene or Miocence	Crystal-lithic tuff, uniformly welded, poorly exposed, approximately 45 ft thick (base and top rarely exposed). Probably vented from small, buried Yamsay Mountain volcanic center which is 4.5 to 6.5 m.y. old.	Hering, 1981
L-3	Tpt	Peyerl Tuff	Early Pliocene 4.59±0.89 m.y.	Many ash-flow tuffs, having aggregate thickness at about 325 ft. Source is Wart Peak caldera.	Fiebelkorn and others, 1982; MacLeod, Norman S., U.S. Geological Survey, written commun., 1983
L-4	Tat	"Wagontire" silicic ash-flow tuff	Miocene 5 to 10 m.y.	Welded ash-flow tuff and pumiceous air-fall tuff.	Greene, 1973; Greene and others, 1972; Walker, 1977; Walker and others, 1974
L-5	Tat	Welded tuff	Middle or early Pliocene	Moderately to poorly welded tuff. Maximum thickness about 15 ft. Unit may correlate with Rattlesnake Ash-flow Tuff (Greene, 1973, p. 4).	Greene, 1973; Walker and Swanson, 1968a, 1968b
L-6	Tat	Silicic ash-flow tuff	Miocene 6 to 9 m.y.	Ash-flow tuff and pumiceous air-fall tuff, mostly of rhyolitic and rhyodacitic composition; includes minor tuffaceous sedimentary rocks. Unit may correlate with Rattlesnake Ash-flow Tuff (Greene, 1973, p. 4).	Greene, 1973; Walker, 1977

Part C.--PRE-QUATERNARY CALDERAS

Caldera name	Comments	References
	HARNEY COUNTY	
Burns caldera	Inferred source of Devine Canyon Ash-flow Tuff which had an original extent of 7,200 mi^2 and volume of over 47 mi^3. Its age is about 9 m.y.	Greene, 1973; Walker, 1981
Harney Lake caldera	Inferred buried caldera, age unknown.	Walker, 1981
Malheur Lake caldera	Inferred buried caldera, age unknown.	Walker, 1981
Whitehorse caldera	Miocene, 15 m.y. old, collapse structure. Source of peralkaline rhyolite tuff of Whitehorse Creek. Circular caldera with diameter of about 15 mi.	Rytuba and others, references 2, 3, 4, 5, 6, 7, 8, and 9
	LAKE COUNTY	
Frederick Butte caldera	Domes along caldera ring-fracture zone.	Walker and Nolf, 1981
Wart Peak caldera	Age approximately 4.5 m.y.	Luedke and Smith, 1982; MacLeod, Norman, S., U.S. Geological Survey, written commun., 1983; MacLeod, Walker, and McKee, 1976
Yamsay Mountain volcanic center	Buried caldera about 3.7 mi in diameter. Probably 4.5 to 6.5 m.y. old; recalculated age of rhyodacite from Yamsay Mountain dome is 4.79±0.17 m.y. Probable source of Silver Creek welded tuff of Hering (1981).	Fiebelkorn and others, 1982; Hering, 1981
	MALHEUR COUNTY	
McDermitt caldera complex (in Oregon it consists of Washburn and Long Ridge calderas).	Washburn and Long Ridge calderas represent the latest stage of volcanism of McDermitt caldera complex, 15.8±0.3 m.y. ago. A ring fracture zone encircles both calderas, and they are separated from each other along the 118° longitude line.	Greene, 1976; Rytuba and others, reference 3

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