



**DESCRIPTION OF MAP UNITS**

**Qa1** SAND (Quaternary)—Tan to white well-sorted windblown sand. Includes sand dunes.

**Qa2** DEBRIS FLOW (Quaternary)—Unconsolidated debris flow consisting of clasts up to 2 m in diameter of Tuff of Trout Creek Mountains and Tuff of Oregon Canyon.

**Op** FLAYA DEPOSITS (Quaternary)—Clay, silt, sand, and some minor evaporite deposits.

**Qs** SAND AND CONGLOMERATE (Quaternary)—Lacustrine sandstone and conglomerate, weakly consolidated, in the form of beaches, bars, spits, and deltas.

**Qal** ALLUVIUM (Quaternary)—Unconsolidated fluvial gravel, sand, and silt. In places includes talus, fanloam, and slope wash.

**Tb** BASALT FLOWS (Miocene)—Black to dark-gray aphyric to porphyritic basalt flows. Top of flows are vesicular and base of flows are brecciated. Interbeds of pumice lapilli tuff, locally stained red, and tuffaceous sediments are present. Porphyritic flows contain up to 3 percent clear, glassy feldspar phenocrysts up to 3 cm in length.

**Ttw** TUFF OF WHITEHORSE CREEK (Miocene)—Dowelled to densely welded peraluminous ash-flow tuff composed of several ash flows as well as interstratified air-fall tuffs. Basal ash flow consists of light-gray to white unwelded aphyric tuff with abundant white to gray pumice in a light-gray ash matrix. Lithic fragments are locally abundant. Above the basal ash flow are beds of air-fall tuff consisting of interstratified lapilli-rich and ash-rich layers. Above air-fall tuff is an ash-flow tuff which is unwelded near base and densely welded at top; locally it is columnar jointed. Ash-flow tuff is light gray, aphyric, and unwelded tuff containing abundant lithic fragments. Upper welded zone is tan to brown and contains as much as 3 percent phenocrysts of sanidine. Lithophylous zones are common near base of welded zone. Tuff locally rests on basalt, which in places is so obscured by talus from tuff that it may be locally included in this unit. K-Ar date on sanidine of 15,040.3 m.y. (Rytuba and others, 1981).

**Trp** RHYOLITE PORPHYRY (Miocene)—Brown to purple-brown, flow-banded, porphyritic rhyolite with 5 percent sanidine phenocrysts. Near margins of rhyolite dome black vitrophyre with 5 percent sanidine is present.

**Ttt** TUFF OF TROUT CREEK MOUNTAINS (Miocene)—Dowelled to densely welded vapor-phase recrystallized comenditic ash-flow tuff. Included in the unit is unwelded tan to yellow-brown air-fall tuffs and pumice lapilli tuffs with a total thickness of 1 to 4 m which occur below the base of the tuff. The tuff is a single cooling unit. Basal part consists of unwelded to partly welded porphyritic gray tuff containing 26 percent anorthoclase phenocrysts, 1 percent ferrowhite, 1 to 3 percent sanidine, 1 percent fayalite, and 1 percent quartz. Ilmenite occurs as inclusions in clinopyroxene and all phases contain apatite inclusions. Sparse phenocrysts of augite and hypersthene also are present. Tuff grades upward into black vitrophyre 1/2 to 1 m thick, and unwelded to partly welded. Densely welded green, blue-green, to green-gray porphyritic tuff containing vapor-phase cavities developed within partly flattened tan to white pumice up to 5 cm long. Lithic fragments of andesite and basalt up to 4 cm in length are locally abundant. Phenocrysts of anorthoclase vary from about 5 to 25 percent and locally up to 3 percent amoly quartz phenocrysts are present. Tuff is locally columnar jointed. K-Ar date on sanidine of 15,940.3 m.y. (Greene, 1976).

**Tt1** LITHIC TUFF (Miocene)—Dowelled tan to brown porphyritic rhyolite ash-flow tuff. Brown pumice up to 20 cm in length occur in a tan ash matrix. Phenocrysts of clear blocky sanidine up to 0.5 cm in length comprise 6 percent of the rock. In vent area tuff Tt1 is vertically foliated and pumice is partly welded. Lithic fragments of andesite are locally common.

**Tto** TUFF OF OREGON CANYON (Miocene)—Dowelled to densely welded light-blue-green to white comenditic tuff. Gray to tan air-fall tuffs occur at the base of the unit and are overlain by gray basal vitrophyre 1 to 2 m thick. Above vitrophyre tuff is blue green to white and vapor-phase recrystallized. Phenocrysts consist of 5.5 percent sanidine, 4 percent quartz, and 1 percent arfvedsonite; they occur in a finely crystalline groundmass of quartz, potassium feldspar, and arfvedsonite. Arfvedsonite gives rock a blue-green color and its presence indicates rhyolite is peraluminous. Flattened pumice fragments are replaced by quartz, potassium feldspar, and arfvedsonite. Lithic fragments of porphyritic andesite are locally abundant. Top 10 m of tuff is red brown and unwelded to partly welded. Dark-gray to brown partly flattened pumice as much as 10 cm long occur in a red-brown ash matrix. Lithic fragments are abundant in this upper zone. Phenocrysts in top 10 m of tuff consist of 4 percent sanidine, 1.3 percent quartz, and 0.2 percent clinopyroxene. Transition zone from blue-green lower part of tuff to upper red-brown part is gradational over approximately 2 m and consists of red-brown pumice in a green matrix. Unit forms cliffs and locally displays columnar jointing. K-Ar date on sanidine of 16,140.2 m.y. (R. H. McKee, written commun., 1981).

**Ts** SEDIMENTS (Miocene)—White to tan tuffaceous sandstone and siltstone. Local interbeds of pumice lapilli tuff and pebble conglomerate.

**Trb** RHYOLITE AND BRECCIA (Miocene)—Medium-light-gray to grayish-blue porphyritic rhyolite flow and flow breccia. Phenocrysts comprise 17 percent of rock and consist of 15 percent subhedral to euhedral sanidine and 2 percent magnetite, all in an aphyritic groundmass. Texture generally shows well-developed flow banding with trachytic flow textures. Breccia at top of unit is locally silicified (Trbs) and cut by white opaline siltites. In areas where breccia is intensely silicified, rock is blue gray in color.

Based by U.S. Geological Survey, 1971



CONTOUR INTERVAL 30 FEET  
 DOTTED LINES REPRESENT 5-FOOT CONTOURS  
 DATUM IS MEAN SEA LEVEL



This map is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature. Any use of trade names is for descriptive purposes only and does not imply endorsement by the USGS.

RECONNAISSANCE GEOLOGIC MAP OF THE BORAX LAKE QUADRANGLE, HARNEY COUNTY, OREGON ,

By

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