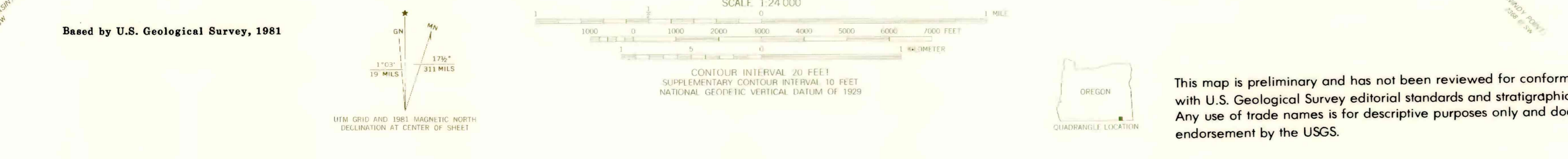


- DESCRIPTION OF MAP UNITS**
- Qa SAND (Quaternary)—Tan to white well-sorted windblown sand. Includes sand dunes.
  - Op PLAYA DEPOSITS (Quaternary)—Clay, silt, sand, and some minor concrete deposits.
  - Qsc SAND AND CONGLOMERATE (Quaternary)—Lacustrine sandstone and conglomerate, weakly consolidated, in the form of beaches, bars, spits, and deltas.
  - Qal ALLUVIUM (Quaternary)—Unconsolidated fluvial gravel, sand, and silt. In places includes talus, fanlomerate, and slope wash.
  - Tcs CONGLOMERATE AND SANDSTONE (Miocene)—Weakly consolidated massively bedded gray to gray-brown conglomerate and sandstone. Clasts consist dominantly of basalt and andesite with lesser amounts of metamorphic rocks. Rare clasts of the Tuff of Trout Creek Mountains are also present.
  - Tts TUFFACEOUS SEDIMENTS (Miocene)—White to tan tuffaceous sandstone, siltstone, and claystone interbedded with massive beds of bentonite up to 15 m thick and minor pink to white recrystallized beds of diatomite. Near the top of the unit conglomerates composed dominantly of clasts of Tuff of Trout Creek Mountains are interbedded with the tuffaceous sediments. A massive bed of breccia (Ttbb) about 10 m thick is composed of clasts of the Tuff of Trout Creek Mountains up to 4 m in length. Clasts are locally silicified and bleached white to form opalite. Breccia is locally cemented with iron oxides.
  - Ttbb TUFF BRECCIA (Miocene)—Green to gray-green breccia composed of angular clasts of Tuff of Trout Creek Mountains. Clasts are up to 2 m in diameter. Rare clasts of andesite, basalt, and metamorphic rocks are present locally.
  - Trp RHYOLITE PORPHYRY (Miocene)—Brown to purple-brown flow-banded porphyritic rhyolite with 5 percent sandstone and less than 1 percent olivine, magnetite phenocrysts. Near margins of rhyolite dome black vitrophyre with 5 percent sandstone is present.
  - Ts SEDIMENTS (Miocene)—White to tan tuffaceous sandstone and siltstone. Local interbeds of pumice lapilli tuff and pebble conglomerate.
  - Ttt TUFF OF TROUT CREEK MOUNTAINS (Miocene)—Unwelded to densely welded vapor-phase recrystallized andesitic ash-flow tuff. Included in the unit is unwelded tan to yellow-brown air-fall 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 simple cooling unit. Basal part consists of unwelded to partly welded porphyritic gray tuff containing 26 percent anorthoclase phenocrysts, 1 percent ferrobenedictine, 1 to 5 percent saniginite, 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. Above the vitrophyre tuff is 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 smoky quartz phenocrysts are present. Tuff is locally columnar jointed. K-Ar date on sanidine of 15,940.3 m.y. (Greene, 1976).
  - Tab ANDESITE AND BASALT DEBRIS FLOW (Miocene)—Black to gray unsorted debris flow consisting of fragments of andesite and basalt, up to 12 cm in length. Matrix consists of sand and silt size fragments of andesite and basalt.
  - Ttl LITHIC TUFF (Miocene)—Unwelded 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 Ttlv is vertically foliated and pumice is partly welded.
  - Tto TUFF OF OREGON CANYON (Miocene)—Unwelded to densely welded light-blue-green to white committic 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 indicates rhyolite is peralkaline. 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 16,102.2 m.y. (K. H. McKee, written commun., 1981).
  - Ta ANDESITE FLOWS (Miocene)—Light-gray to gray-green aphyric andesite flows.
  - 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 aphanitic groundmass. Texture generally shows well-developed flow banding with trachytic flow texture.

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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 TUM TUM LAKE QUADRANGLE, HARNEY COUNTY, OREGON,**

By

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