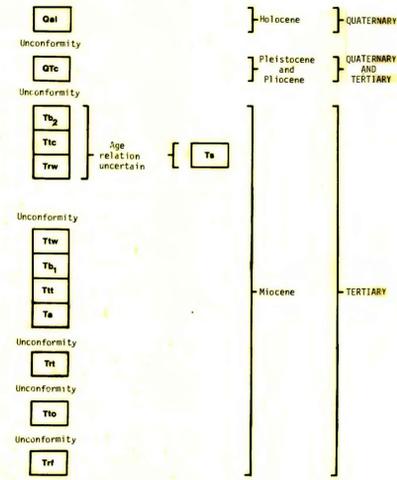
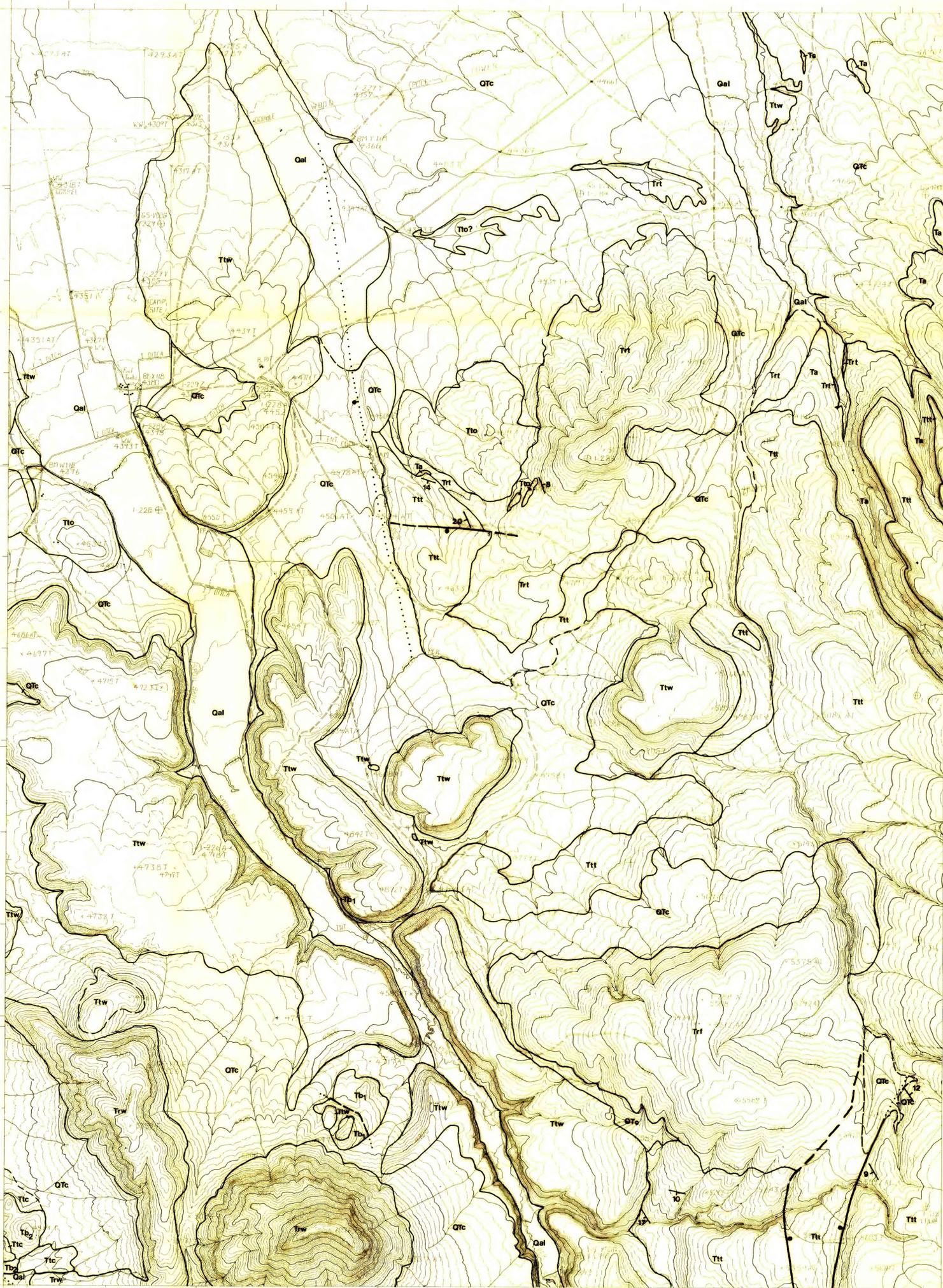


19 15 00

42 22 30



DESCRIPTION OF MAP UNITS

Qal ALLUVIUM (Quaternary)—Unconsolidated poorly bedded gravel, sand, and minor silt. Includes talus, stream, and terrace deposits

Qtc CONGLOMERATE (Quaternary and Tertiary)—Weakly consolidated poorly bedded conglomerate and sandstone. Locally includes fanglomerate and lag gravel

Tt BASALT FLOWS (Miocene)—Dense black aphyric to weakly porphyritic basalt flows. Flows are locally vesicular and weather dark red brown to tan. Phenocrysts consist of up to 1 percent plagioclase in an aphyritic groundmass. Flow breccia present at base of flow locally

Tt1 TROUT CREEK FORMATION (Miocene)—Trout Creek Formation (Tt1), first described by Smith (1927) consists of gray to tan tuffaceous sandstone and siltstone and shale interstratified with white to tan dacite. Pumice lapilli tuff and tuffaceous conglomerate are locally present

Tt2 RHYOLITE DUMES AND FLOWS (Miocene)—Rhyolite of Whitehorse Butte consists of domes and associated flows and flow breccia. Rhyolite is gray to black, aphyric to weakly porphyritic with phenocrysts of sanidine in a glassy groundmass. Contorted flow foliation is common. Flow breccia is monolithic and contains clasts as much as several meters in diameter

Tt3 SEDIMENTS (Miocene)—White to tan tuffaceous sandstone and siltstone. Local interbeds of pumice lapilli tuff and pebble conglomerate

Tt4 TUFF OF WHITEHORSE CREEK (Miocene)—Unwelded to densely welded peralkaline 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 this 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. Above ash-flow tuff is a dark-gray to black unwelded tuff containing abundant lithic fragments. Upper welded zone is tan to brown and contains as much as 3 percent phenocrysts of sanidine. Lithophysal 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)

Tt5 BASALT AND SEDIMENTS (Miocene)—Black, aphyric basalt flows, locally amygdaloidal, and associated agglomerate. Uppermost flow in unit has large, up to 3 cm long, glassy labradorite phenocrysts

Tt6 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 partly welded porphyritic gray tuff containing 26 percent anorthoclase phenocrysts, 1 percent ferrowinchite, 1 to 5 percent sanidine, 1 percent quartz, and 1 percent clinopyroxene. Titanite 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 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 latite up to 1 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)

Tt7 ANDESITE AND QUARTZ LATITE FLOWS (Miocene)—Black to dark-gray iron-rich andesite and quartz latite flows, which commonly have vesicular tops; locally contain interflow breccia. Weathers tan to brown and forms steep talus slopes composed of platy andesite and quartz latite

Tt8 RHYOLITE TUFF (Miocene)—Densely welded rhyolite ash-flow tuff. Basal vitrophyre is gray brown with abundant gray to black flame up to 10 cm in length and lithic fragments of andesite. Above vitrophyre is a lithophysal zone characterized by large, up to 6 cm, black lithophysae. Above this zone tuff is green-gray rhyolite with 5 percent sanidine phenocrysts in a vapor-phase recrystallized groundmass. Secondary flow foliation and lineations are well developed. Included in the unit are well-sorted white to gray pumice lapilli tuffs that occur below the vitrophyre

Tt9 TUFF OF OREGON CANYON (Miocene)—Unwelded to densely welded light-blue-green to white andesitic 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 16,140.2 m.y. (E. H. McKee, written comm., 1981)

Tt10 RHYOLITE FLOWS (Miocene)—Maroon to red-brown porphyritic rhyolite. Phenocrysts comprise 24 percent rock and consist of 21 percent subhedral sanidine as much as 5 m long, 1 percent green hornblende, and 2 percent subhedral quartz in a spherulitic groundmass. Spherulites are composed of quartz and potassium feldspar and have an average diameter of 2 mm. A weak flow foliation is present locally

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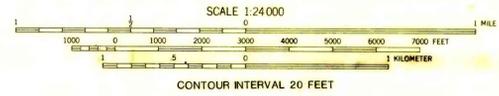
Smith, W. D., 1927, Contributions to the geology of southeastern Oregon: Journal of Geology, v. 35, p. 421-441.

CONTACT—Dashed where approximately located

FAULT—Dotted where concealed and dashed where uncertain. Ball and bar on downthrow side

STRIKE AND DIP OF BEDS

Based by U.S. Geological Survey 1978



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 WHITEHORSE RANCH QUADRANGLE, HARNEY AND MALHEUR COUNTIES, OREGON,

By
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