Base map enlarged from part of Army Map Service Boise quadrangle, 1:250,000, 1962; place names and roads revised, 1966, by the authors from field checking, local informants, and planimetric maps of the Bureau of Land Management

Based on detailed field mapping, photogeologic mapping, and reconnaissance by the authors, 1958-1966, compiled by L. R. Kittleman, 1966, who is solely responsible for any errors or inaccuracies introduced during compilation

Scale 1:125,000

1 0 1 2 3 4 5 6 7 8 9 10 MILES

1 0 1 2 3 4 5 6 7 8 9 10 KILOMETERS

Contour interval 200 feet with supplementary contours at 100 foot intervals

Datum is mean sea level

OREGON

AREA OF THIS MAP

RESPONSIBILITY MAP

1965 MAGNETIC DECLINATION

SYMBOLS

Contacts
Dashed where approximately located; dotted where inferred

Faults
Dashed where approximately located or inferred; bar and ball on downthrown side

Double line: paved highway
Solid line: improved dirt road
Long-dashed line: unimproved dirt road
Short-dashed line: jeep trail

EXPLANATION

ROCKS OF UNCERTIAN STRATIGRAPHIC POSITION

Stratigraphic relations not implied by position — TERTIARY AND (?) QUATERNARY

Trr | Tri | Tro — Intrusive and extrusive rhyolites

Trr, *dark-colored, porphyritic rhyolite; erupted from a dike that forms the arrow northern part of The Roostercomb ridge; passes into flows in the southern part; intrudes rocks of late Miocene age or younger (Kittleman and others, 1965, p. 17)*

Tri, *undifferentiated intrusive and extrusive rhyolitic rocks of limited areal extent; includes intrusive and extrusive rhyolites at Windfall Butte, light-gray, lithoidal intrusive rhyolite at Horse Butte, and various smaller dikes and volcanic necks throughout the mapped area*

Tro, *grayish-red, flow-foliated, porphyritic rhyolite; at Owyhee Dam; the rock is apparently intrusive, but passes into a flow to the south and west; intrudes and overlies the Sucker Creek Formation (late Miocene) and underlies the Owyhee Basalt (Kittleman and others, 1965, p. 7)*

Tdsi | Tbs | Tbi | Tgi — Intrusive and extrusive basaltic rocks

Tdsi, *ophitic olivine basalts intrusive into rocks of the Deer Butte Formation; resemble extrusive basalts of the formation and believed to be related to them*

Tbs, *peperites and basaltic intrusions within the Drip Spring Formation; altered and zeolitized*

Tbi, *small basaltic intrusions, volcanic necks, and minor flows or sills of various modal compositions; present throughout the mapped area*

Tgi, *gabbroic intrusion; single body in the vicinity of the Bishop ranch*

Tvc — Volcaniclastic rocks

Undifferentiated volcaniclastic rocks; includes poorly consolidated surficial deposits and minor interbeds in west-central part of the mapped area, volcaniclastic rocks associated with the Time Peak Basalt in the northern part, surficial deposits on the southwestern flank of the Mahogany Mountains, and other local occurrences of unassignable volcaniclastic rocks

TERTIARY AND QUATERNARY

Late Tertiary, Pleistocene and recent

Qal | QTc — Alluvium and colluvium

Qal, *alluvium of modern streams and terrace deposits associated with the modern drainage; mapped only where conspicuously developed*

QTc, *colluvium; coarse talus, land-slide debris, or fine-grained surficial deposits in small basins; in places, not distinguished from associated alluvium*

TERTIARY

Pliocene and (?) Pleistocene

QTbc | QTbu — Younger basaltic flows

QTbc, *thin flow of olivine basalt, which appears unweathered; forms eastern rim-rock of the canyon of the South Fork, Malheur River just beyond the western boundary of the map; exposed at the southwestern border of the map and accessible in the vicinity of Chapman ranch, from which it is informally called the basalt at Chapman ranch (Kittleman and others, 1965, p. 18); overlies middle Pliocene Drewsey Formation (of Bowen and others, 1963, p. 28-41)*

QTbu, *undifferentiated younger basaltic flows of limited areal extent that overlie Miocene or Pliocene rocks; includes an unnamed basalt southeast of Crowley, basalt at Nathorn Reservoir, near Flying Pan Ranch (Kittleman and others, 1965, p. 17), and basalt at Graveyard Point*

Pliocene

Tsb — Shumuray Ranch Basalt

Flow of olivine basalt; overlies rocks of early or middle Pliocene age (Kittleman and others, 1965, p. 20)

Tab — Antelope Flat Basalt

Microcrystalline microporphyritic basalt or andesitic basalt; contains several flows, locally with important interbeds of volcaniclastic rocks; at Juniper Creek canyon, volcaniclastic rock at the base contains a mammalian fauna of Hemphillian (middle Pliocene) age (J. A. Shotwell, ms.; Kittleman and others, 1965, p. 17)

Twt — Wildcat Creek Welded Ash-Flow Tuff

Grayish-red, silicic welded ash-flow tuff with phenocrysts of potassium feldspar and clinopyroxene; conspicuously zoned; overlies rocks of late Miocene age (Kittleman and others, 1965, p. 16)

Twv — Welded ash-flow tuffs

Undifferentiated flows of silicic welded ash-flow tuff; areally restricted individually and confined to southwestern part of the mapped area; overlie rocks of late Miocene age (Kittleman and others, 1965, p. 17)

Ttb — Time Peak Basalt

Single and multiple flows of poikilitic olivine basalt; locally with interbedded volcaniclastic rocks; overlies rocks of late Miocene age and underlies rocks of early Pliocene age (Kittleman and others, 1965, p. 20)

Tvu — Volcanic rocks

Unnamed volcanic rocks; confined to the vicinity of Monument Peak; includes an underlying multiple-flow basalt or andesitic basalt and an overlying basaltic volcanic breccia; overlies rocks of late Miocene age (Kittleman and others, 1965, p. 20)

(?) Pliocene

Tbc — Bully Creek Formation

Interbedded diatomites, vitric tuffs, and volcaniclastic rocks; no diagnostic mammalian fossils known; overlies rocks of late Miocene age and underlies rocks of early or middle Pliocene age (Kittleman and others, 1965, p. 25)

Tdf — Drip Spring Formation

Volcaniclastic and clastic fluviatile and lacustrine rocks; similar in lithology and stratigraphic position to Deer Butte Formation; overlies rocks of late Miocene age and underlies rocks of early or middle Pliocene age; no diagnostic mammalian fossils known (Kittleman and others, 1965, p. 24)

Miocene and (?) Miocene

Tbv — Butte Creek Volcanic Sandstone

Volcaniclastic rocks; contains mammalian fauna of Barstovian (late Miocene) age (Gazin, 1932; J. A. Shotwell, ms.; Kittleman and others, 1965, p. 15); potassium-argon age, 15.7 m.y. (sample KA 1029, Evernden and others, 1964, p. 190)

Ttr — Littlefield Rhyolite

Multiple flows of grayish-red, porphyritic, flow-foliated rhyolite with phenocrysts of plagioclase, potassium feldspar, and pyroxene (Kittleman and others, 1965, p. 12)

Thb — Hunter Creek Basalt

Multiple flows of microcrystalline hyalo-basalt (Kittleman and others, 1965, p. 19)

Tdc — Dinner Creek Welded Ash-Flow Tuff

Silicic grayish-red welded ash-flow tuff with phenocrysts of anorthoclase and intermediate plagioclase; conspicuously zoned (Kittleman and others, 1965, p. 18; G. H. Haddock, ms.)

Tulc — Unnamed igneous complex

Multiple flows of basalt, porphyritic basalt, andesitic basalt, and basaltic volcanic breccia; locally divisible into an autoclastic breccia phase (vicinity of Crowley) composed of autoclastic basaltic breccia and dense aphanitic basalt, the Monumental Rock sequence (vicinity of Crowley) composed of porphyritic olivine basalt and flaggy trachytic basalt or andesitic basalt, and a basaltic breccia phase (vicinity of Monument Peak) composed of alternating porphyritic and aphanitic basalts and basaltic breccias (Kittleman and others, 1965, p. 14); equivalent to the part of the basement complex (of Bowen, Gray, and Gregory, 1963, p. 37) that lies stratigraphically below the Sucker Creek Formation (Miocene) and is, in part, correlative, in part, with rocks mapped as TTs by Walker and Repenning (1965), which include Steens Basalt (Steens Mountain Basalt of Fuller, 1931, p. 101) and Steens Mountain Volcanic Series (Steens Mountain Andesitic Series of Fuller, 1931, p. 74)

Tjr — Jump Creek Rhyolite

Multiple flows of grayish-red, porphyritic, flow-foliated rhyolite with phenocrysts of intermediate plagioclase, sanidine, and hypersthene; stratigraphic position not clear; overlies late Miocene Sucker Creek Formation (Kittleman and others, 1965, p. 7); may be correlative with part of the Idavada Volcanics (of Malde and Powers, 1962, p. 1109)

(?) Pliocene, Pleistocene and recent

Qby | QTbo — Basaltic flows of the Cow Creek Lakes area

Qby, *younger flows; olivine basalt, composed of several flow units derived from a small vent, Morcom Crater; exposed units have well preserved pahoehoe structure and other original surface features (Kittleman and others, 1965, p. 11)*

QTbo, *older flows, olivine basalt with minor local interbeds of volcaniclastic rocks; includes the flows within the mapped area (Kittleman and others, 1965, p. 11)*

Tmv — Volcanic rocks of the Mahogany Mountains

Flows of olivine basalt and silicic pyroclastic and volcaniclastic rocks; restricted to the southeastern flank of the Mahogany Mountains; overlie rocks of late Miocene age; inferred to be Pliocene on petrographic grounds

Pliocene

Tgb | Tgs — Grassy Mountain Formation

Tgb, *several flows of ophitic, holocrystalline olivine basalt interbedded with Tgs; first named Grassy Mountain Basalt by Bryan (1929, p. 55)*

Tgs, *volcaniclastic and clastic fluviatile sedimentary rocks, some urbanite; contains mammalian faunas of Clarendonian or Hemphillian (early or middle Pliocene) age (J. A. Shotwell, ms.; Kittleman and others, 1965, p. 11)*

Miocene

Tdb | Tds — Deer Butte Formation

Tdb, *extrusive, olivine basalts; includes two flows, named as members, confined to vicinity of Quartz Basin and lower Dry Creek drainage, and several unnamed flows (Kittleman and others, 1965, p. 8)*

Tds, *volcaniclastic and clastic fluviatile and lacustrine rocks that contain conspicuous arkose sandstone derived from a plutonic source; includes five named members distinguishable locally (Kittleman and others, 1965, p. 9); contains mammalian fauna of Barstovian (late Miocene) age (J. A. Shotwell, ms.); may be contiguous, in part, with Poison Creek Formation (of Swanson, 1931, p. 5) (Kittleman and others, 1965, p. 9), which contains a mammalian fauna of Pliocene (Clarendonian or Hemphillian) age (J. A. Shotwell, ms.)*

Tob — Owyhee Basalt

Multiple flows of olivine-poor basalt and andesitic basalt; lowest flows have a few percent olivine and are about 55% SiO_2 and upper flows have no olivine and are about 60% SiO_2 (Kittleman and others, 1965, p. 8); named by Bryan (1929, p. 52)

Tsc | Tig | Tsb | Tsr — Sucker Creek Formation

Tsc, *volcaniclastic and clastic rocks of primary-volcanic, fluviatile, and lacustrine origin; includes arkose and arkosic sandstones from plutonic sources; contains a mammalian fauna of Barstovian (late Miocene) age (Scharf, 1935; J. A. Shotwell, ms.; Kittleman and others, 1965, p. 6)*

Tig, *Leslie Gulch Ash-Flow Tuff Member (Kittleman and others, 1965, p. 6); thick, compactly zoned silicic ash-flow tuff composed of equant phenocrysts of quartz and sanidine in an altered, vitreoclastic matrix; intercalated laterally and basally with Tsc*

Tsb, *extrusive, olivine-poor aphanitic basalt exposed mainly in the vicinity of the Bishop ranch*

Tsr, *unnamed, minor rhyolitic flows restricted to small area near the eastern border of map*

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GEOLOGIC MAP OF THE OWYHEE REGION, MALHEUR COUNTY, OREGON

by

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1967