WASHINGTON DIVISION OF GEOLOGY AND EARTH RESOURCES
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GEOLOGIC MAP OF THE SOUTH HALF OF THE TACOMA QUADRANGLE, WASHINGTON

Compiled by

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WASHINGTON DIVISION OF GEOLOGY AND EARTH RESOURCES

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WASHINGTON STATE DEPARTMENT OF
Natural Resources
Brian Boyle - Commissioner of Public Lands
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CONTENTS

FIGURES

TABLES

GEOLOGIC MAP OF THE SOUTH HALF OF THE TACOMA QUADRANGLE, WASHINGTON

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INTRODUCTION

This map is one of a series of 1:100,000-scale geologic maps compiled by staff geologists of the Division of Geology and Earth Resources and used as source maps of the southwest quadrant of the geologic map of Washington (Walsh and others, in press) . Other maps in the series are available for all 1:100,000-scale quadrangles within the southwest quadrant, that is south of 47°15' north latitude and west of 120°30' west longitude.

The 1:100,000-scale maps in this series that have been released to date are:

Korosec, M. A., compiler, 1987, Geologic map of the Mount Adams quadrangle, Washington: Washington Division of Geology and Earth Resources Open File Report 87-5, 41 p., 1 pl., scale 1:100,000

Korosec, M. A., compiler, 1987, Geologic map of the Hood River quadrangle, Washington and Oregon: Washington Division of Geology and Earth Resources Open File Report 87-6, 42 p., 1 pl., scale 1:100,000

Logan, R. L., compiler, 1987, Geologic map of the Chehalis River and Westport quadrangles, Washington: Washington Division of Geology and Earth Resources Open File Report 87-8, 18 p., 1 pl., scale 1:100,000

Logan, R. L., compiler, 1987, Geologic map of the south half of the Shelton and the south half of the Copalis Beach quadrangles, Washington: Washington Division of Geology and Earth Resources Open File Report 87-9, 17 p., 1 pl., scale 1:100,000

Phillips, W. M., compiler, 1987, Geologic map of the Mount St. Helens quadrangle, Washington and Oregon: Washington Division of Geology and Earth Resources Open File Report 87-4, 63 p., 1 pl., scale 1:100,000

Phillips, W. M., compiler, 1987, Geologic map of the Vancouver quadrangle, Washington and Oregon: Washington Division of Geology and Earth Resources Open File Report 87-10, 32 p., 1 pl., scale 1:100,000

Phillips, W. M.; Walsh, T. J., compiler, 1987, Geologic map of the northwest part of the Goldendale quadrangle, Washington: Washington Division of Geology and Earth Resources Open File Report 87-13, 9 p., 1 pl., scale 1:100,000

Schasse, H. W., compiler, 1987, Geologic map of the Centralia quadrangle, Washington: Washington Division of Geology and Earth Resources Open File Report 87-11, 27 p., 1 pl., scale 1:100,000

Schasse, H. W., compiler, 1987, Geologic map of the Mount Rainier quadrangle, Washington: Washington Division of Geology and Earth Resources Open File Report 87-16, 43 p., 1 pl., scale 1:100,000

Walsh, T. J., compiler, 1986, Geologic map of the west half of the Toppenish quadrangle, Washington: Washington Division of Geology and Earth Resources Open File Report 86-3, 8 p., 1 pl., scale 1:100,000

Walsh, T. J., compiler 1986, Geologic map of the west half of the Yakima quadrangle, Washington: Washington Division of Geology and Earth Resources Open File Report 86-4, 12 p., 1 pl., scale 1:100,000

Walsh, T. J., compiler, 1987, Geologic map of the Astoria and Ilwaco quadrangles, Washington and Oregon: Washington Division of Geology and Earth Resources Open File Report 87-2, 30 p., 1 pl., scale 1:100,000

Walsh, T. J., compiler, 1987, Geologic map of the south half of the Tacoma quadrangle, Washington: Washington Division of Geology and Earth Resources Open File Report 87-3, 12 p., 1 pl., scale 1:100,000

DESCRIPTION OF MAP UNITS
OF THE
SOUTH HALF OF THE TACOMA QUADRANGLE, WASHINGTON

Quaternary Unconsolidated Deposits

Holocene Nonglacial Deposits

Qal

Alluvium--Silt, sand, and gravel deposited in streambeds and fans; surface relatively undissected; includes some low level terraces and some lacustrine deposits

Qp

Peat--Organic and mineral sediments deposited in closed depressions; includes peat, muck, silt, and clay

Qls

Landslide debris--Rock fragments, colluvium, soil, and locally, organic matter deposited by mass wasting; unstratified and poorly sorted; surface commonly hummocky

Qme

Electron Mudflow--Unsorted mixture of andesitic rock fragments in a clayey sand matrix; rock fragments chiefly of Mount Rainier provenance; radiocarbon age of contained wood is 530±200 years (Crandell, 1963); confined to Puyallup River valley

Qmo

Osceola Mudflow--Unsorted mixture of andesitic rock fragments in a clayey sand matrix; rock fragments chiefly of Mount Rainier provenance; forms terraces along the White River; radiocarbon ages range from 4,700 to 4,950 years (Crandell, 1963)

Pleistocene Glacial Deposits

DEPOSITS OF CONTINENTAL GLACIERS-- CORDILLERAN ICE SHEET

Vashon Stade of Fraser Glaciation

Qdva

Vashon advance outwash--Outwash sand and gravel and lacustrine clay, silt, and sand deposited during glacial advance; sands commonly thick, well sorted, and fine-grained, with lenses of coarser sand and gravel; locally contains nonglacial sediments. Includes the Colvos Sand

Qdvt

Vashon till--Gray, unsorted, unstratified, highly compacted mixture of clay, silt, sand, gravel, and boulders deposited directly by glacier ice; locally contains outwash sand and gravel both within and overlying till; age of maximum advance in this area estimated to be approximately 14,000 years (Porter, 1970) to 12,600 years (Carson, 1970)

Qdvm

Vashon moraines--Ridges of unsorted and unstratified glacial drift; composed chiefly of till with lesser outwash

Qdvs

Vashon outwash sand--Recessional and proglacial stratified outwash
sand

Qdv

Vashon drift, undifferentiated--Chiefly recessional and proglacial stratified outwash sand and gravel, locally containing silt and clay; also contains lacustrine deposits and ice-contact stratified drift

Pre-Fraser Glaciations

Qdp

Pre-Fraser drift, undifferentiated--Till, outwash sand and gravel, and loess; represents the penultimate glaciation in the south Puget Sound area; called "Salmon Springs?" by Noble and Wallace (1961); correlated with Double Bluff Drift or Possession Drift by Easterbrook (1985)

Qds

Salmon Springs Drift--Oxidized sand and gravel and till; locally contains silt, peat, and volcanic ash; reversely magnetized; ash yields fission track ages on zircon and glass of 0.66 to 0.87 million years (Easterbrook and others, 1981)

Qdst

Stuck Drift--Very compact till and oxidized outwash sand and gravel; locally contains compact laminated sand and silt; reversely magnetized, suggesting an age >690,000 years (Easterbrook and others,1985)

Qdo

Orting Drift--Deeply oxidized sand and gravel and minor amounts of sand and compact till; reversely magnetized, suggesting an age >690,000 years (Easterbrook and others, 1985)

DEPOSITS OF ALPINE GLACIERS

Fraser Glaciation

Qde

Evans Creek Drift--Coarse, bouldery unoxidized till and pebble- to boulder-outwash gravel in Carbon River valley; pebbles are of central Cascade provenance but only 2% are of Mount Rainier provenance (Crandell, 1963)

Pre-Fraser Glaciations

Qdh

Hayden Creek Drift--Yellowish-brown to brown, oxidized till; stones near the top of the till have weathering rinds which range in thickness from 0.5 to 2.5 mm; original topography considerably modified but many large moraines still recognizable (Crandell and Miller, 1974)

Qdw

Wingate Hill Drift--Dark-brown, oxidized, compact till; weathering rinds on andesite stones range from 2 to 7mm; original topography extensively modified and moraines are only rarely recognized (Crandell and Miller, 1974)

Pleistocene Nonglacial Deposits

Qk

Kitsap Formation--Laminated clay and silt, peat, and minor sand and gravel; immediately subjacent to Vashon Drift and overlying Qdp; finite radiocarbon ages range from 27,900 to 50,500 years (Yount and others, 1980; this report), although all finite ages other than 50,500 are suspect (Fairhall and others, 1966, p. 501); for the present report, two radiocarbon ages were obtained for the Kitsap Formation (Table 1); grades laterally into Skokomish Gravel

Qsk

Skokomish Gravel--Poorly sorted, oxidized gravel in a sand, silt, and clay matrix; locally contains peat beds; gravel is mostly basalt reworked from Crescent Formation; lower 75-80 feet interbedded with Kitsap Formation (Molenaar and Noble, 1970)

Qpu

Puyallup Formation--"Chiefly unoxidized sand gravel and very compact mudflows of Mount Rainier provenance, and a few highly compressed peat beds, deposited in lowland during nonglacial climatic conditions" (Crandell, 1963)

Qad

Alderton Formation--"Principally unoxidized sand and gravel and very compact mudflows of Mount Rainier provenance, and a few highly compressed peat beds; deposited in lowland during nonglacial climatic conditions" (Crandell, 1963)

Qlc

Lily Creek Formation--Deeply weathered, compact mudflows of Mount Rainier provenance interbedded with stream gravel; inferred to be correlative with Puyallup and Alderton Formations by Crandell (1963), although Hopson in Crandell (1963) suggests a Pliocene age

Pleistocene Deposits Undivided

Qu

Pre-Fraser sediments--Glacial and nonglacial sediments beneath Vashon Drift that are not separable at this scale

Tertiary Stratified Rocks

Miocene Rocks

Tvs

Miocene volcanic sediments--"Semiconsolidated lacustrine sand, silt, and clay, and alluvial sand and gravel that consist chiefly of detritus from the Ohanapecosh Formation"(Gard, 1968); locally contains volcanic ash, pumice gravel, and mudflow deposits

Oligocene Rocks

Toh

Ohanapecosh Formation--"Greenish-gray conglomerate, sandstone, siltstone, and shale composed of water-laid andesitic and basaltic volcanic rock detritus, and tuff" (Gard, 1968); exposed only along eastern edge of map

Eocene Rocks

Tsi

Spiketon Formation (Upper Eocene)--"Light-gray to buff micaceous arkosic sandstone and siltstone, and gray to black shale and coal" (Gard, 1968); exposed only along eastern edge of map

Tno

Northcraft Formation (Upper Eocene)--"Dark-reddish-brown to dark-greenish-gray andesitic and basaltic pyroclastic breccia, volcanic mudflow breccia, flow(?) breccia, and minor interbeds of volcanic sandstone, conglomerate, and tuff" (Gard, 1968)

Tca

Carbonado Formation (Middle? and upper Eocene)--"Light-gray to buff micaceous arkosic sandstone and siltstone, and gray to black shale and coal" (Gard, 1968)

Tcr

Crescent Formation (Middle Eocene)--Fine-grained, dominantly submarine tholeiitic basalt flows and flow breccia, typically zeolitized and chloritized; commonly pillowed

Intrusive Rocks

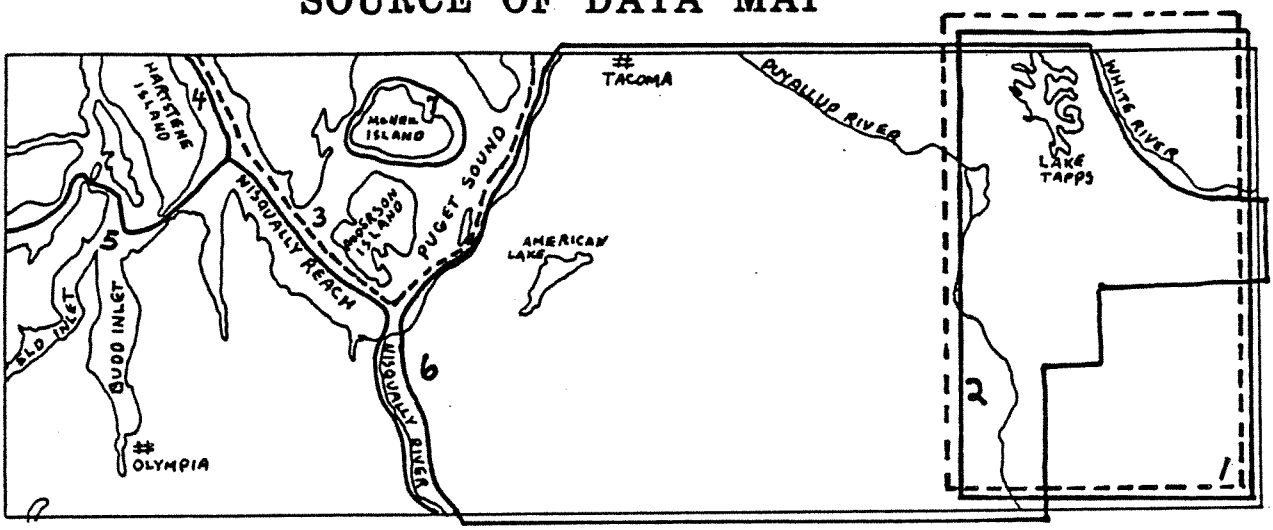
Tia

Andesite--Sills and dikes of dark gray, black, or greenish-gray pyroxene andesite; in the Carbon River gorge south of Carbonado, a porphyritic andesite and gabbro sill is propylitically altered; intrudes Carbonado, Northcraft, and Spiketon Formations

Til

Latite--Sills and dikes of light gray to creamy tan flow-banded latite; xenoliths common; well jointed and breaks into platy fragments; plagioclase is dominantly oligoclase and quartz is lacking; intrudes Northcraft Formation

SOURCE OF DATA MAP



TACOMA

1. Crandell, 1963
2. Gard, 1968
3. Garling and Molenaar, 1965
4. Molenaar and Noble, 1970
5. Noble and Wallace, 1966
6. Walters and Kimmel, 1968
7. This report

Figure 1. Sources of mapping used to compile the Tacoma 1:100,000 Quadrangle.

RADIOCARBON DATES FROM THE TACOMA 1:100,000 QUADRANGLE

1. MCNEILL ISLAND — >60,000

Peat from Kitsap Formation (interbedded gravel, laminated clayey silt, and peat). Overlying Vashon till is as much as 3 meters above the peat but locally scours through it. Sample taken from about 7 meters above the highest tide line.

2. DEVIL'S HEAD — 50,500±1200

Peat from Kitsap Formation (interbedded blue-gray sand, silt, clay, and peat). Overlies oxidized glacial gravel (unit Qdp) and is overlain by Vashon advance outwash. Sample taken from about 6 meters above highest tide line.

Table 1. New radiocarbon determinations in the Tacoma 1:100,000 Quadrangle. Analysis by Minze Stuiver, University of Washington.

CORRELATION CHART

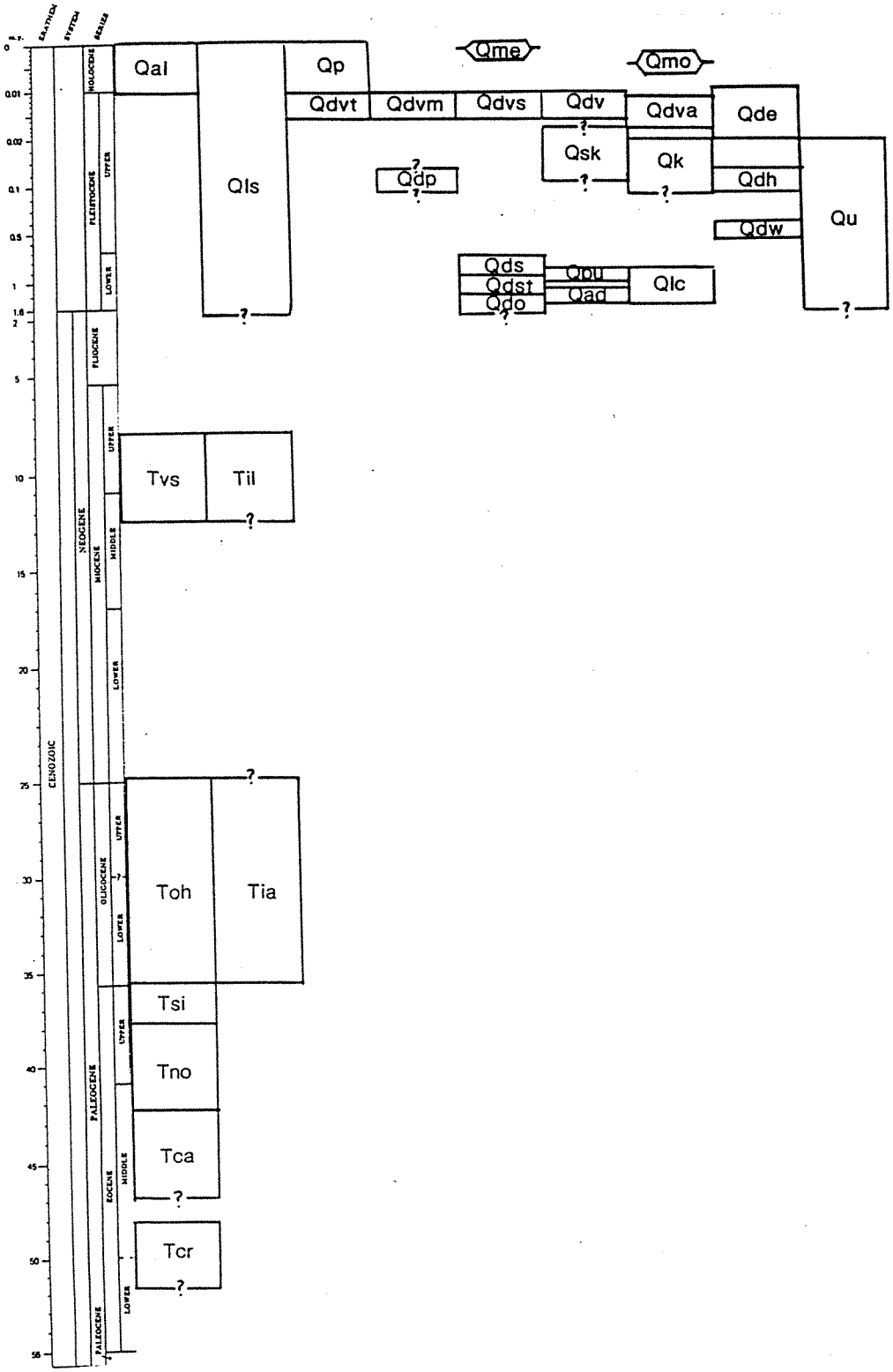


Figure 2. Correlation of map units on the Tacoma 1:100,000-scale Quadrangle . Time scale from Walsh and others (in press).

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