GEOLOGIC MAP OF THE

RITZVILLE

1:100,000 QUADRANGLE, WASHINGTON

Compiled by

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WASHINGTON DIVISION OF GEOLOGY AND EARTH RESOURCES

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This report has not been edited or reviewed for conformity with
Division of Geology and Earth Resources standards and nomenclature

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INTRODUCTION

The Ritzville quadrangle is one of sixteen 1:100,000-scale quadrangles that cover the northeast quadrant of Washington State (Fig. 1). Geologic maps of these quadrangles have been compiled by Washington Division of Geology and Earth Resources (DGER) geologists and will be the principal data sources for a new 1:250,000-scale geologic map of northeastern Washington. Fourteen of these quadrangles will be released as DGER open-file reports (listed below). The Chelan and Wenatchee quadrangles will not be open-filed because they have been published recently by the U.S. Geological Survey (Tabor and others, 1982, 1987).

Literature review and preliminary compilation of the Ritzville quadrangle geologic map began in 1985. Sources of geologic data for the Ritzville quadrangle geologic map are shown in Figure 2.

Units on the Ritzville quadrangle geologic map are age-lithology units. Upper case letters in the map symbol indicate unit age; lower case letters in the map symbol indicate lithology. Map symbol subscripts identify the formal or informal name of the unit. Thus, the Priest Rapids Member of the Wanapum Basalt, a Miocene basalt flow, is portrayed with the map symbol Mv_{wpr}.

Age assignments of geologic units were made following the flow chart in Figure 3. The geologic time scale devised for the "Correlation of Stratigraphic Units of North America (COSUNA)" project of the American Association of Petroleum Geologists (Salvador, 1985) was used, with slight modifications of the Eocene-Oligocene and Pliocene-Pleistocene boundaries (Armentrout and others, 1983; Prothero and Armentrout, 1985; Montanari and others, 1985; Aguirre and Pasini, 1985).

Volcanic rock names were assigned using whole rock geochemical data and the total alkali-silica (TAS) diagram (Zanettin, 1984).

<u>DGER Northeast Quadrant Open-File Reports</u>[1]

Bunning, B. B., compiler, 1990, Geologic map of the east half of the Twisp 1:100,000 quadrangle, Washington: Washington Division of Geology and Earth Resources Open File Report 90-9, 52 p., 1 pl.

Gulick, C. W., compiler, 1990, Geologic map of the Moses Lake 1:100,000 quadrangle, Washington: Washington Division of Geology and Earth Resources Open File Report 90-1, 9 p., 1 plate, scale 1:100,000.

Gulick, C. W., compiler, 1990, Geologic map of the Ritzville 1:100,000 quadrangle, Washington: Washington Division of Geology and Earth Resources Open File Report 90-2, 7 p., 1 pl.

Gulick, C. W.; Korosec, M. A., compilers, 1990, Geologic map of the Banks Lake 1:100,000 quadrangle, Washington: Washington Division of Geology and Earth Resources Open File Report 90-6, 20 p., 1 pl.

Gulick, C. W.; Korosec, M. A., compilers, 1990, Geologic map of the Omak 1:100,000 quadrangle, Washington: Washington Division of Geology and Earth Resources Open File Report 90-12, 52 p., 1 pl.

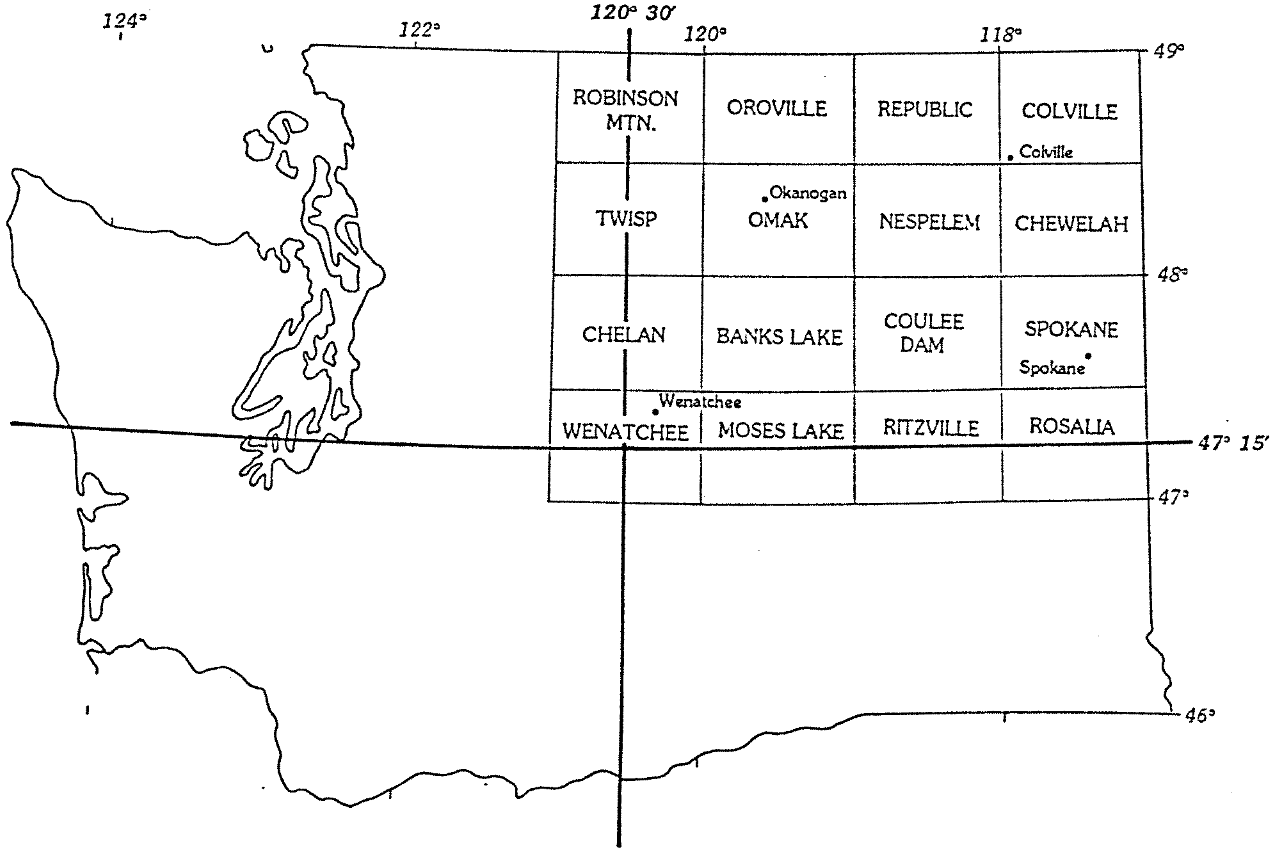

Figure 1. 1:100,000-scale quadrangles in the northeast quadrant of Washington.

Joseph, N. L., compiler, 1990, Geologic map of the Colville 1:100,000 quadrangle, Washington-Idaho: Washington Division of Geology and Earth Resources Open File Report 90-13, 78 p., 1 pl.

Joseph, N. L., compiler, 1990, Geologic map of the Nespelem 1:100,000 quadrangle: Washington Division of Geology and Earth Resources Open File Report 90-16, 47 p., 1 pl.

Joseph, N. L., compiler, 1990, Geologic map of the Spokane 1:100,000 quadrangle, Washington-Idaho: Washington Division of Geology and Earth Resources Open File Report 90-17, 29 p., 1 pl.

Stoffel, K. L., compiler, 1990, Geologic map of the Oroville 1:100,000 quadrangle, Washington: Washington Division of Geology and Earth Resources Open File Report 90-11, 58 p., 1 pl.

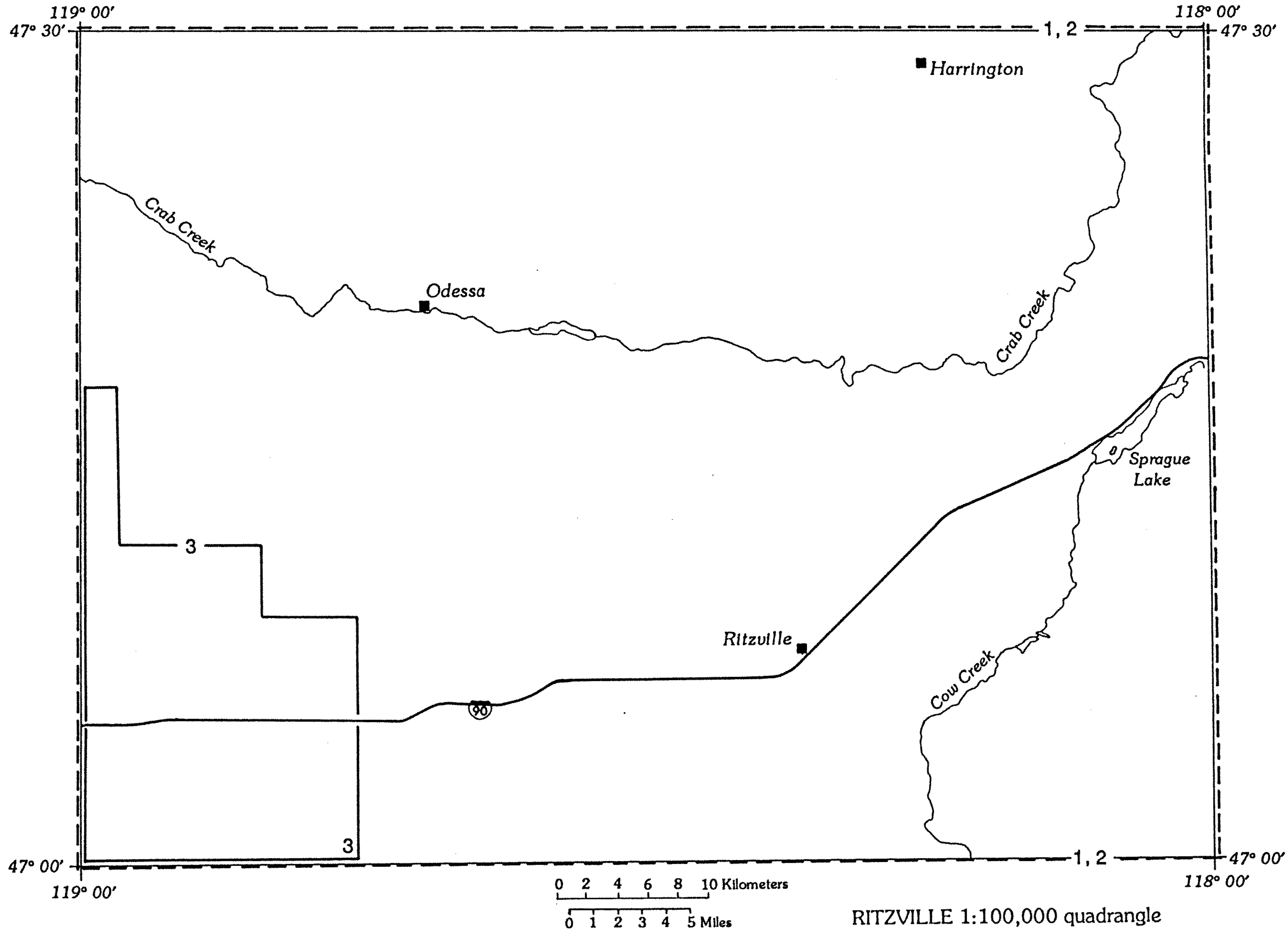

Figure 2. Sources of geologic data, Ritzville 1:100,00 quadrangle. 1, Hanson and others, 1979; 2, Swanson and others, 1979; 3, Grolier and Bingham, 1971.

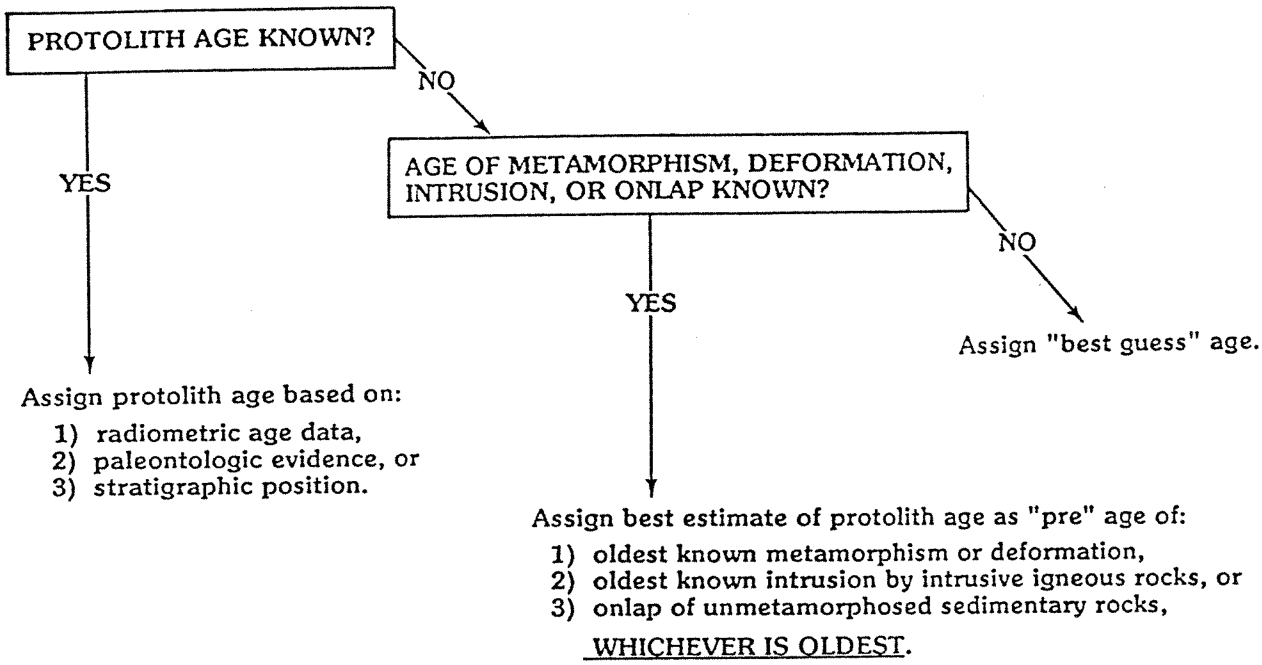

Figure 3. Flow chart for age assignment of geologic units. Protolith age or estimated protolith age may be assigned by correlation with other geologic units. The unit description includes information on how the age of the unit was determined.

Stoffel, K. L., compiler, 1990, Geologic map of the Republic 1:100,000 quadrangle, Washington: Washington Division of Geology and Earth Resources Open File Report 90-10, 62 p., 1 pl.

Stoffel, K. L.; McGroder, M. F., compilers, 1990, Geologic map of the Robinson Mtn. 1:100,000 quadrangle, Washington: Washington Division of Geology and Earth Resources Open File report 90-5, 39 p., 1 pl.

Waggoner, S. Z., compiler, 1990, Geologic map of the Chewelah 1:100,000 quadrangle, Washington-Idaho: Washington Division of Geology and Earth Resources Open File Report 90-14, 63 p., 1 pl.

Waggoner, S. Z., compiler, 1990, Geologic map of the Coulee Dam 1:100,000 quadrangle, Washington: Washington Division of Geology and Earth Resources Open File Report 90-15, 40 p., 1 pl.

Waggoner, S. Z., compiler, 1990, Geologic map of the Rosalia 1:100,000 quadrangle, Washington: Washington Division of Geology and Earth Resources Open File Report 90-7, 20 p., 1 pl.

ACKNOWLEDGMENTS

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DESCRIPTION OF MAP UNITS

Quaternary Sedimentary Deposits

Qa

Alluvium (Holocene to Pleistocene)--Silt, sand, and gravel in stream beds, floodplains, and terraces; includes stratified sand and gravel in alluvial fans.

Ql

Loess (Holocene to Pleistocene)--Eolian silt with sand and clay, includes some volcanic ash; locally contains caliche and tephra beds.

Qls

Landslide deposits (Holocene to Pleistocene)--Unstratified and poorly sorted clay, silt, sand, and gravel deposited by rotational and translational landslides and flows (Hanson and others, 1979).

Deposits of Outburst Floods from Glacial Lake Missoula

Qfg

Gravel (Pleistocene)--Fluvial gravel, ranging from boulder gravel to fine sand and generally consisting of rounded basalt fragments; locally contains granitic and metamorphic rocks; deposited by high-energy waters of glacial outburst floods.

Qfs

Sand and silt (Pleistocene)--Horizontally bedded, fine to coarse basaltic sand and silt; includes rhythmically bedded or laminated friable lacustrine fine sand and silt that contains lenses of basaltic sand and gravel and ice-rafted erratic boulders (Grolier and Bingham, 1971). These sediments were deposited in low-energy slack water environments created by temporary ponding of outburst flood waters (Hanson and others, 1979).

Quaternary and Tertiary Sedimentary Deposits

QRc

Ringold Formation (Pleistocene to Pliocene)--Reddish-brown, typically massive, poorly consolidated, tuffaceous sand and silt that occurs in two small exposures in Farrier Coulee and a northern tributary of Weber Coulee. Described by Grolier and Bingham (1978), who suggested that massive bedding and vertical prismatic partings in the sand and silt are indicative of primary eolian deposition. Pleistocene mammalian fossils (Merriam and Buwalda, 1917; Strand and Hough, 1952) and Pliocene to late Pleistocene mollusks and ostracods (Grolier and Bingham, 1978, p. 38) have been collected from various Ringold lithofacies in localities outside the map area.

Tertiary Volcanic Rocks

Yakima Basalt Subgroup of the Columbia River Basalt Group

$\cancel{M}v_{ssl}$

Saddle Mountains Basalt, basalt of Sprague Lake (Miocene)--Sparsely plagioclase-phyric flow(s) with normal magnetic polarity, which crop out directly west of the rest area on westbound Interstate 90, north of Sprague Lake. Swanson and others (1979) map the unit north nearly to Sheep Creek, but Hanson and others (1979) map the same area as loess. The basalt of Sprague Lake appears to have filled a shallow ancient valley on the eroded surface of the Priest Rapids Member (Swanson and others, 1979). Geochemical analyses of samples of the basalt of Sprague Lake (Wright and others; 1979, 1980) suggest it is correlative with the Weissenfels Ridge Member of the Saddle Mountains Basalt.

$\cancel{M}v_{wpr}$

Wanapum Basalt, Priest Rapids Member (middle Miocene)--Four flows of grayish-black (fresh) to red-brown (weathered), medium- to coarse-grained, slightly diktytaxitic basalt with reversed magnetic polarity. Large columns as much as 3 m (10 ft) in diameter are common, as are platy partings in the basal flow (Grolier and Bingham, 1978). Wanapum Basalts erupted between 15.5 and 14.5 m.y. ago (Long and Duncan, 1983).

$\cancel{M}v_{wr}$

Wanapum Basalt, Roza Member (middle Miocene)--Dark bluish-gray, medium- to coarse-grained, porphyritic basalt containing uniformly distributed, lath-shaped, transparent plagioclase phenocrysts averaging 1 cm in length. The Roza contains one or two flows that average 30 m (100 ft) in thickness and have a transitional magnetic polarity. The Roza Member overlies the Frenchman Springs Member and is overlain by the Priest Rapids Member (Grolier and Bingham, 1978).

$\cancel{M}v_{wfs}$

Wanapum Basalt, Frenchman Springs Member (middle Miocene)--Dark gray to black, medium-grained to aphanitic, sparsely porphyritic basalt which contains "large, internally shattered plagioclase phenocrysts that are partly resorbed or weakly zoned" (Grolier and Bingham, 1978, p. 24). The Frenchman Springs Member has a normal magnetic polarity. It is overlain by the Squaw Creek Member (diatomite) of the Ellensburg Formation or Roza Member and overlies either volcaniclastic sediments of the Vantage Member of the Ellensburg Formation or the weathered surface of the Grande Ronde Basalt (Grolier and Bingham, 1978; Swanson and others, 1979).

$\cancel{M}v_{gN2}$

Grande Ronde Basalt, magnetostratigraphic unit N_2 (middle Miocene)--Dark gray to black, fine-grained to aphanitic basalt that commonly displays columnar and fan joints. Assigned to magnetostratigraphic unit N_2 by Swanson and others (1979). Grande Ronde basalts erupted between 17 and 15.5 m.y. ago.

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