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Compilation Geologic Map
of the Pasco Basin,
South Central Washington
RHO-BWI-ST-4
12 Sheets

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6 of 11

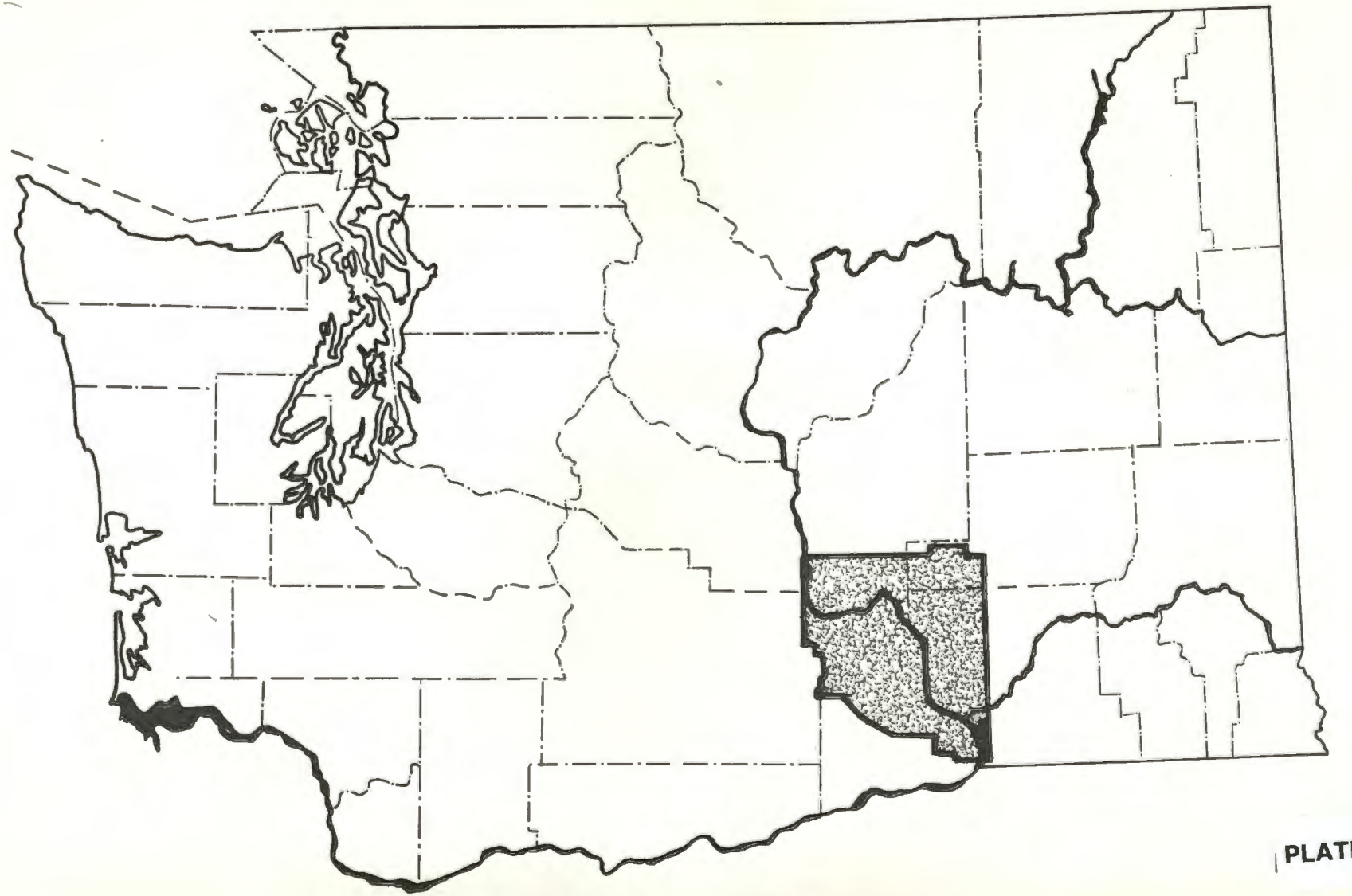

PLATE III-1

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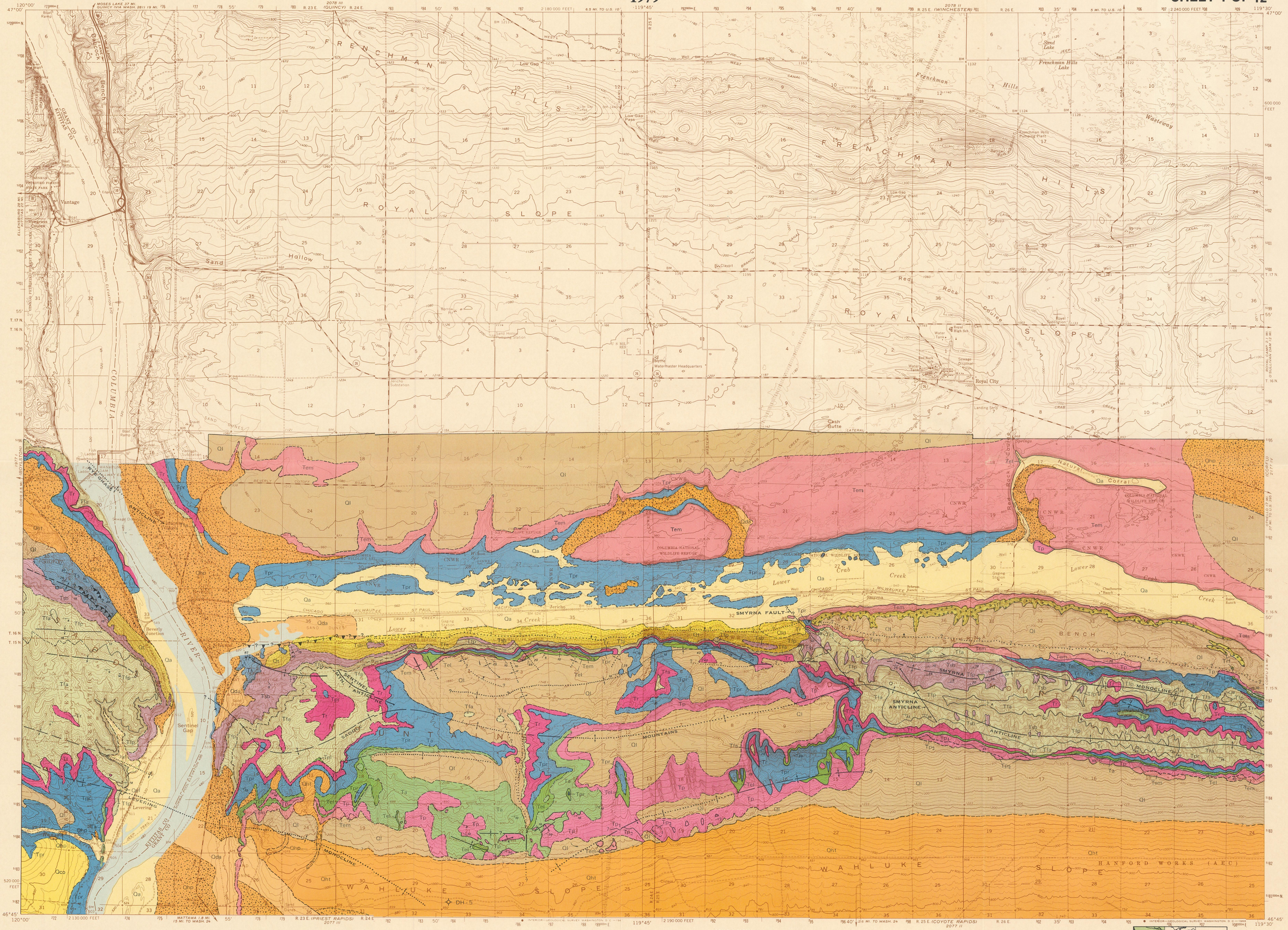
COMPILATION GEOLOGIC MAP OF THE PASCO BASIN, SOUTH CENTRAL WASHINGTON 1979

RHO-BWI-ST-4
SHEET 1 OF 12

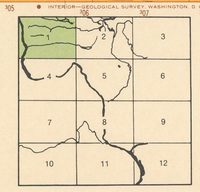


Base from U.S.G.S., 1:62,500
Beverly and Smyrna Quadrangles

SCALE 1:62500

CONTOUR INTERVAL 20 AND 40 FEET
DATUM IS MEAN SEA LEVEL

UTM GRID AND 1965 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET



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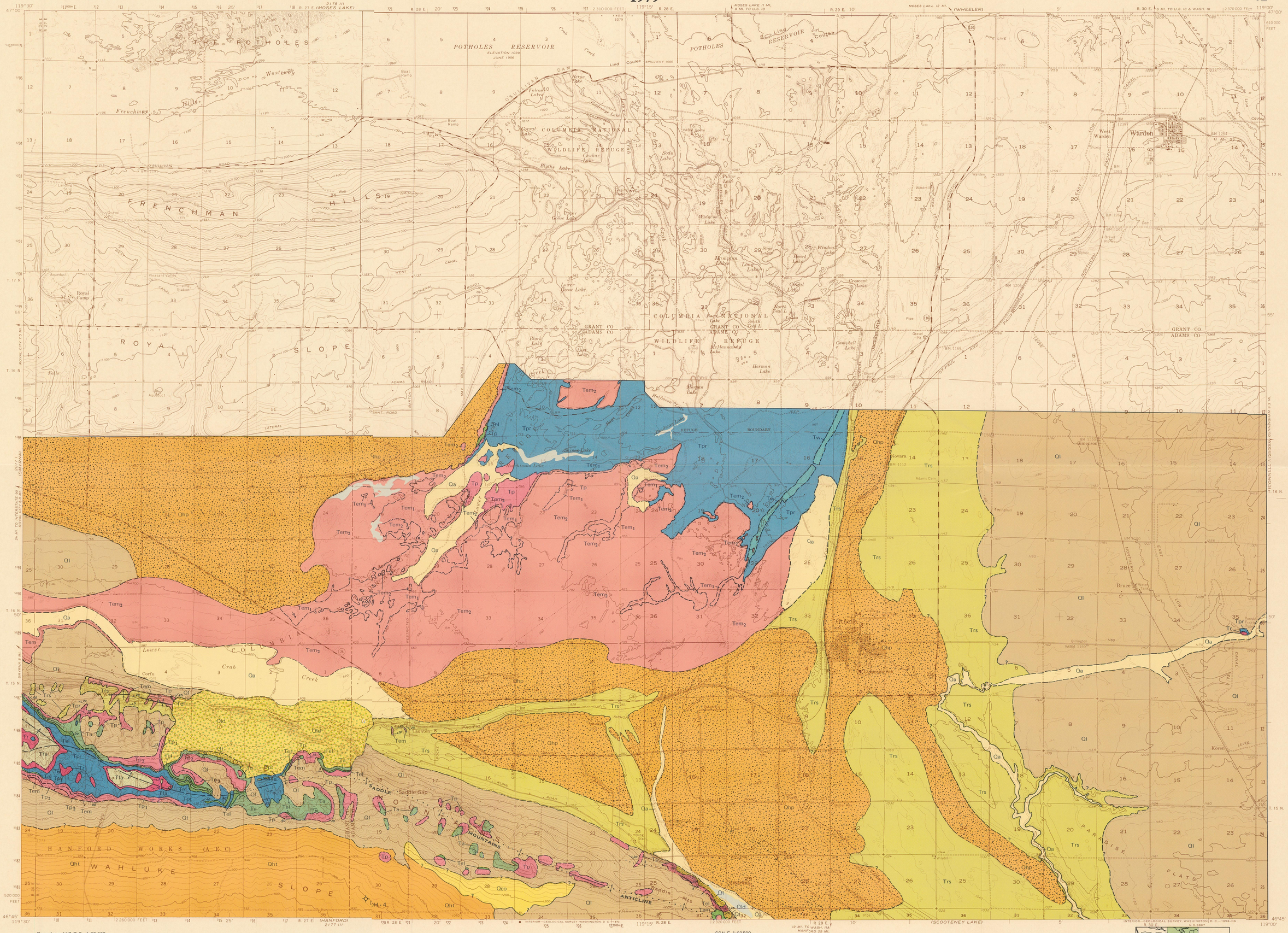
COMPILATION GEOLOGIC MAP OF THE PASCO BASIN, SOUTH CENTRAL WASHINGTON 1979

RHO-BWI-ST-4
SHEET 2 of 12



Base from U.S.G.S., 1:62,500
Corfu and Othello Quadrangles

SCALE 1:62500

CONTOUR INTERVAL 20 AND 40 FEET
DATUM IS MEAN SEA LEVEL

1TM GRID AND 1965 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

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COMPILATION GEOLOGIC MAP OF THE PASCO BASIN, SOUTH CENTRAL WASHINGTON

1979

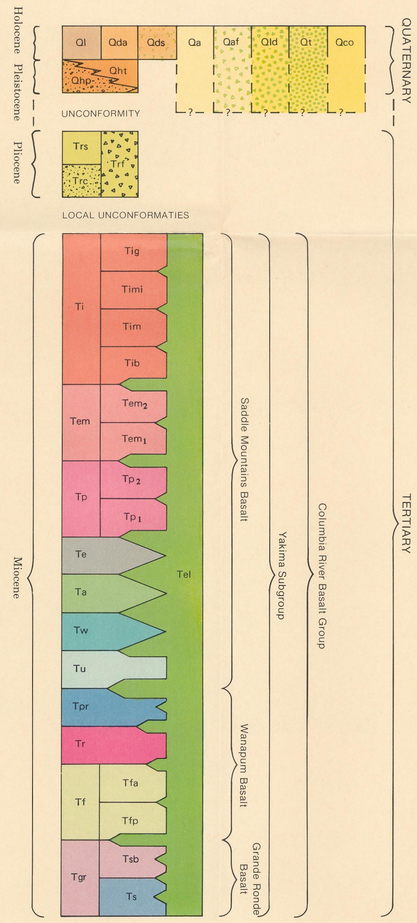
SCALE 1:62500

CONTOUR INTERVALS 20 AND 40 FEET

Base from U.S.G.S., 1:62,500
Shano Quadrangle

EXPLANATION

CORRELATION OF MAP UNITS



SUMMARY

This map represents a 1:62,500-scale compilation of Pasco Basin geologic mapping at scales of 1:24,000 and 1:62,500. This geologic mapping is part of the Basalt Waste Isolation Program of Rockwell Hanford Operations for the United States Department of Energy - Richland Operations Office. Mapping was performed by Rockwell Hanford Operations' geologists and Geosciences Research Consultants' geologists with individual mapping responsibilities as shown on the index map. Also shown on the index map are the areas of three other additional geologic maps utilized in the preparation of the compilation geologic map: (1) the map by Swanson and Helz (1979) was used extensively for compilation of basalt geology in the eastern map area; the map by Grolier and Bingham (1971) was used for sediment geology compilation in the northern and eastern map area; and (3) the reconnaissance map by Bentley (1977) was consulted during field mapping of basalt geology in the western map area.

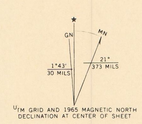
Primary emphasis was directed toward mapping basalt outcrops at a scale of 1:24,000; sediment outcrops were mapped only in a reconnaissance nature at a scale of 1:62,500. Field identification of basalt flows was verified by x-ray fluorescence chemical analyses.

The Pasco Basin is located in the central part of the Columbia Plateau within the shrub-steppe region of south-central Washington. This structural and topographic basin is bounded on the north by the Saddle Mountains and on the south by the Horse Heaven Hills and Rattlesnake Hills. Land surface near the center of the basin is about 120m above mean sea level. The surrounding hills and mountains have crests that are over 1000m above mean sea level and that generally decrease in elevation toward the eastern side of the basin.

The approximate western boundary of the Pasco Basin map area is west of the Columbia River at 120° west longitude and the approximate eastern boundary is at 119° west longitude.

The basalt flows that crop out within the Pasco Basin are part of the Columbia River Basalt Group of Miocene age, and are divisible into three formations; Grande Ronde Basalt, Wanapum Basalt and Saddle Mountains Basalt. On the basis of mineralogy and chemistry, the basalt flows of these three formations are classified as tholeiitic. The known source vents for most flows in the Pasco Basin are to the east of the map area; however, some of the youngest flows have vent systems along the eastern margin of the Pasco Basin. Interbedded with the basalt flows are the laterally discontinuous and lithologically varied volcaniclastic sediments of the Ellensburg Formation. Major sedimentary units that overlie the basalt are the Ringold Formation of Pliocene age and flood deposits of Pliestocene age, informally named the Hanford Formation. The Ringold Formation is primarily a fluvial deposit with minor lacustrine and fanglomerate facies. The Hanford Formation was deposited during catastrophic Pliestocene-age flooding caused by failure of ice-dammed lakes in Montana, Idaho, and northeastern Washington. Holocene sand dunes and loess forms a mantle of varying thickness across much of the Pasco Basin. Alluvium is primarily Holocene in age.

The mountains and hills within and bordering the Pasco Basin are predominately anticlinal ridges. These ridges are east-west and northwest-southeast trending folds with subsidiary folds and faults on their limbs.

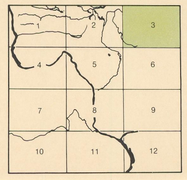


UTM GRID AND 1965 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:62500

CONTOUR INTERVAL 20 AND 40 FEET

DATUM IS MEAN SEA LEVEL



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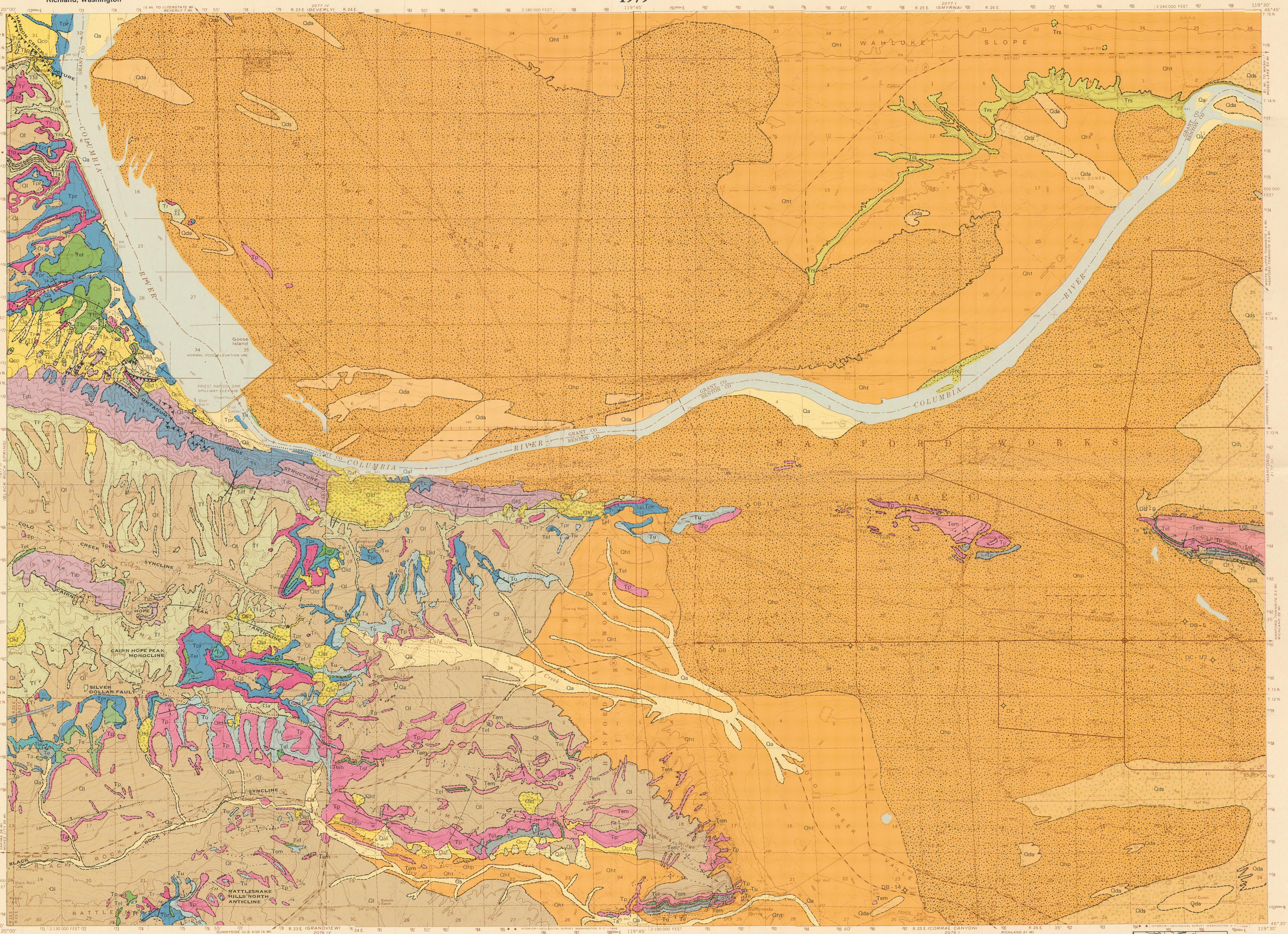
COMPILATION GEOLOGIC MAP OF THE PASCO BASIN, SOUTH CENTRAL WASHINGTON 1979

RHO-BWI-ST-4
SHEET 4 of 12

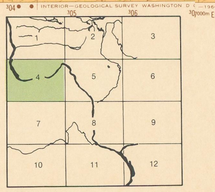


Base from U.S.G.S., 1:62,500
Priest Rapids and Coyote Rapids Quadrangles

UTM GRID AND 1965 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:62500

CONTOUR INTERVAL 20 AND 40 FEET
DATUM IS MEAN SEA LEVEL



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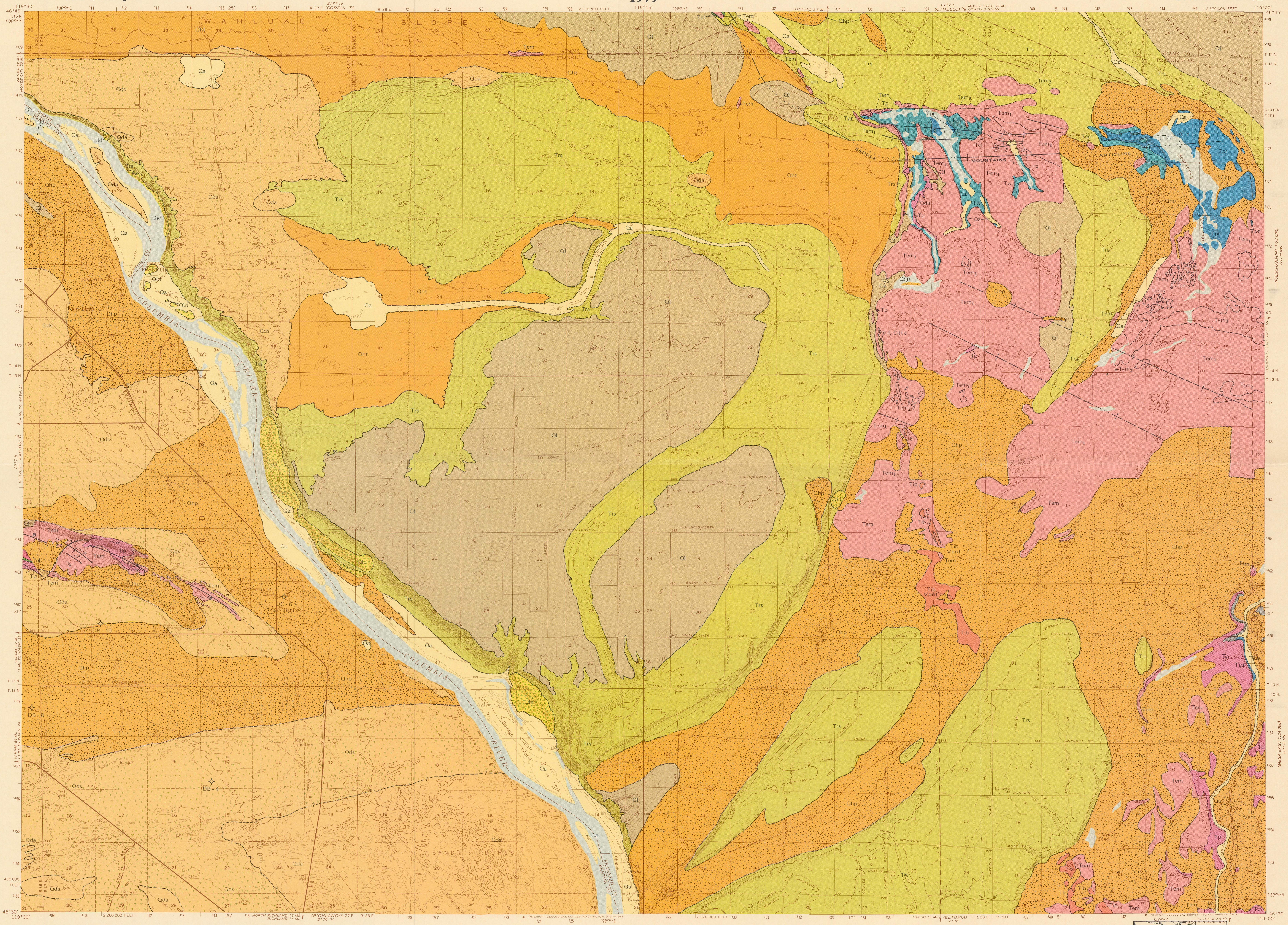
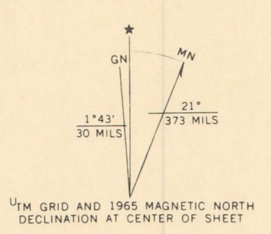
COMPILATION GEOLOGIC MAP OF THE PASCO BASIN, SOUTH CENTRAL WASHINGTON
1979



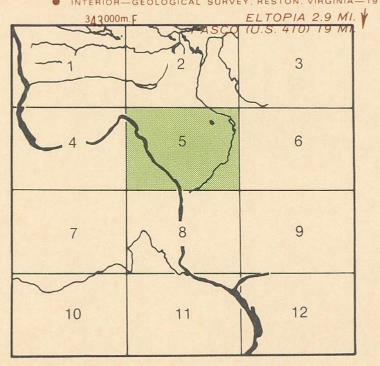
Base from U.S.G.S., 1:62,500
Hanford and Mesa Quadrangles



SCALE 1:62500

1 ½ 0 1 2 3 4 MILES
3000 0 3000 6000 9000 12000 15000 18000 21000 FEET
1 .5 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 20 AND 40 FEET
DATUM IS MEAN SEA LEVEL



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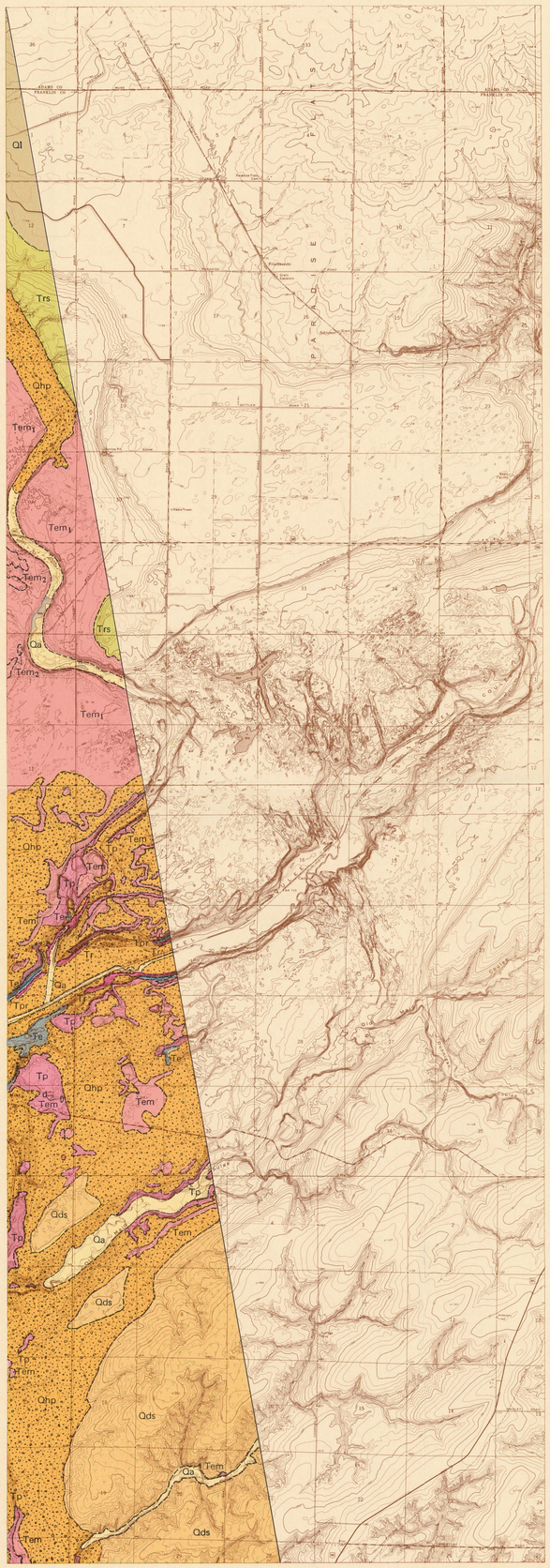
COMPILATION GEOLOGIC MAP OF THE PASCO BASIN, SOUTH CENTRAL WASHINGTON 1979



Base from U.S.G.S., 1:62,500
Mesa East and Frischknecht Quadrangles

DESCRIPTION OF MAP UNITS

SURFICIAL QUATERNARY UNITS

Ql — loess (HOLOCENE) - *Predominately silt, includes some fine grained sand. Volcanic ash horizon common. Includes minor Pleistocene and older loess above maximum Pleistocene flood level (~330m)*

Qda — active sand dunes (HOLOCENE) - *Chiefly medium-to-fine grained quartz sand. Some dunes contain high percent basalt sand*

Qds — stabilized sand dunes (HOLOCENE) - *Chiefly medium-to-fine grained sand. Some dunes contain high percent basalt sand and/or silt. Volcanic ash horizon common*

Qa — alluvium (HOLOCENE-PLEISTOCENE) - *Clay, silt, sand and gravel of variable thickness and sorting. Composition variable. Chiefly Holocene, includes some Pleistocene and older alluvium on ridges. At elevations below maximum Pleistocene flood level, composed of basalt, Ellensburg sediments and/or loess. Above flood level, composed of basalt, Ellensburg sediments and/or loess*

Qaf — alluvial fan (HOLOCENE-PLEISTOCENE) - *Composition variable, same as alluvium, alluvial fans below maximum Pleistocene flood level are Holocene; alluvial fans above flood level may be Pleistocene or older*

Qld — landslide (HOLOCENE-PLEISTOCENE) - *Consists of basalt and/or Ringold sediments displaced by gravity movement. Includes large slump blocks, block slides and earth flow. Active landslides on White Bluffs related to irrigation. Landslides composed of basalt associated with anticlinal ridges, Pleistocene or older*

Qt — talus (HOLOCENE-PLEISTOCENE) - *Angular rock debris at base of cliffs and steep rock slopes. Chiefly basalt with Ellensburg sediments and loess*

Qco — colluvium (HOLOCENE-PLEISTOCENE) - *Silt, sand, rock rubble and gravel generally poorly bedded overlying basalt. Generally < 1m thick. Includes slope wash and minor mass wastage debris. Clasts generally angular. Composed of basalt fragments and Hanford sediments, and loess deposits, often intermixed. Mapping unit used where sediment cover is thin and of multiple genesis*

HANFORD FORMATION* (PLEISTOCENE)

Qht — Touchet Beds (Flint, 1938) - *Rhythmically bedded silt with stringers of coarse-grained sand and gravel. Deposited in low energy slackwater areas of Pleistocene floods, Predominately quartz and feldspar, often containing discrete ash horizons. Ice-rafted debris locally on top surface of unit.*

Qhp — Pasco Gravels* - *Sorting and texture variable, includes sand to boulders; generally decreases in grain size away from major flood current channels. Multiple bedding forms and large flood bars common. Textural variations indicate major shifting of current channels, flood pulsations and/or multiple flood events. Composed chiefly of basalt, granite, quartzite, diorite, and porphyries. Primarily deposits of last major Pleistocene flood, 13,000 years B.P. (Mullineaux, et al., 1977). Includes older flood deposits with well-developed calcic horizons*

RINGOLD FORMATION (PLIOCENE)

Trs — *Sand, silt and clay facies; includes pebble lenses and stringers. Silty clay units horizontally laminated, generally lacking current sedimentary structures. Silt and sand units display horizontal, ripple and cross bedding. Sand chiefly quartz and feldspar. Usually capped with caliche horizons. Contains diatomite beds, ash beds and fossils. Predominately fluvial, some lacustrine and eolian sediments*

Trc — *Conglomerate facies, well rounded pebbles and cobbles supported by a sand matrix, includes lenses of coarse to medium-grained sand. Generally massively bedded with some minor imbrication; sand lenses often show cross bedding or foreset bedding. Pebbles and cobbles chiefly quartzite, granite, basalt, metamorphics and volcanic porphyries; sand matrix composed primarily of quartz and feldspar. Moderately to poorly indurated with silica, iron oxide and calcite*

Trf — *Fanglomerate facies, subangular to angular basalt fragments and Ellensburg sediments ranging in size from cobble to medium grained sand. Variably indurated with calcite. Generally poorly bedded, includes both fluvial and mass wastage deposits. Stratigraphic relationship to other Ringold facies not known in many localities*

COLUMBIA RIVER BASALT GROUP

SADDLE MOUNTAINS BASALT (MIOCENE)

ICE HARBOR MEMBER

Tig — Goose Island Flow - *Fresh surfaces dark gray; weathers tan. Phyric 2 to 10mm plagioclase phenocrysts, 2mm pyroxene phenocrysts and 1 to 3cm plagioclase-pyroxene glomerocrysts. Entablature microvesicular with brick-bat jointing. Colonnade well formed with 0.5-1.5m diameter columns. Goose Island chemical type (Swanson and Others, 1979). Fluxgate magnetics: normal polarity. Flow found only in southeastern Pasco Basin. Vents are near Ice Harbor Dam. Age is approximately 8.5 million years.*

Timi — Indian Memorial Flow - *Fresh surfaces are dull black. Scattered aligned vesicles. Phyric: abundant microphenocrysts of placioclase; 1 to 4mm plagioclase and pyroxene phenocrysts. Entablature obscured due to erosion. Colonnade consists of 1.0 to 1.5m diameter columns with platy jointing. Indian Memorial chemical type (Helz, 1978). Fluxgate magnetics: normal polarity. Flow found only in southeastern Pasco Basin. Vents are east of Ice Harbor Dam. Age is approximately 8.5 million years*

Tim — Martindale Flow - *Fresh surfaces are black to gray; weathers reddish. Fine to medium-grained; vesicular to microvesicular. Phyric: plagioclase phenocrysts and glomerocrysts of plagioclase, pyroxene and olivine up to 3cm. Thick scoria top and well-developed entablature overlying poorly developed colonnade with up to 1.5m diameter columns. Martindale chemical type (Swanson and Others, 1979). Fluxgate magnetics: reversed to variable polarity. Flow occurs primarily in southern Pasco Basin. Known source area near Ice Harbor Dam. Age is approximately 8.5 million years*

Tib — Basin City - *Fresh surfaces are gray to black. Fine-grained. Phyric: olivine and plagioclase phenocrysts and plagioclase glomerocrysts up to 2cm. Poorly exposed. Vesicular flow top; massive interior with poorly developed colonnade. Basin City chemical type (Swanson and Others, 1979). Fluxgate magnetics: normal polarity. Flow occurs in eastern Pasco Basin. Known vents and dikes near Basin City and along Snake River above Ice Harbor Dam. Age approximately 8.5 million years*

ELEPHANT MOUNTAIN MEMBER

Tem_2 — Upper Flow - *Fresh surfaces are black; weathers reddish brown. Fine to coarse-grained, locally diktytaxitic and generally coarser-grained than lower flow of Elephant Mountain Member. Aphyric with abundant microphenocrysts of plagioclase. Vesicular flow top, thin entablature and well-developed colonnade with up to 2m diameter columns. Platy jointing resulting from vesicle sheets. Locally pillowed base. Elephant Mountain chemical type (Wright and Others, 1973). Fluxgate magnetics: normal polarity. Flow occurs throughout the Pasco Basin. Age is approximately 10.5 million years.*

Tem_1 — Lower Flow - *Fresh surfaces are black to dark gray; weathers reddish gray. Fine-grained to glassy and locally diktytaxitic. Aphyric with felty texture resulting from abundant plagioclase microphenocrysts. Thick, locally tiered entablature resulting from horizontal vesicle sheets. Well-developed colonnade with 1.0 to 2.0m diameter columns. Local pillows and vesicle cylinders. Elephant Mountain chemical type (Wright and Others, 1973). Fluxgate magnetics: reversed polarity. Thicker of the two Elephant Mountain flows: occurs throughout the Pasco Basin. Age is approximately 10.5 million years*

POMONA MEMBER

Tp_2 — Upper Flow - *Fresh surfaces are black to gray-black; weathers gray. Fine to medium-grained. Phyric with plagioclase and olivine phenocrysts up to 5mm. Locally microvesicular to diktytaxitic. Well-developed entablature, generally with fanning columns. Poor to well-developed colonnade with 1m diameter columns. Pomona chemical type (Wright and Others, 1973). Fluxgate magnetics: reversed polarity. Upper Pomona flow is thinner (10-20m) of two flows comprising the Pomona Member and confined to eastern and southern Pasco Basin. Age is approximately 12 million years*

Tp_1 — Lower Flow - *Fresh surfaces are blue-black; weathers black-gray. Fine to medium-grained. Contains plagiocase phenocrysts up to 1cm, sparse olivine phenocrysts up to 0.5m and glomerocrysts of placioclase and pyroxene up to 2cm. Well-developed entablature, hackly jointing and fanning columns. Pomona chemical type (Wright and Others, 1973). Fluxgate magnetics: reversed polarity. Widespread throughout Pasco Basin. Locally has a pillowed base with spiracles and is invasive into sediments. Occurs as sheet flow and intracanyon flow. Age is approximately 12 million years*

ESQUATZEL MEMBER

Te — *Fresh exposures are blue-black, weathers brownish. Fine-grained. Aphyric, with sparse plagioclase phenocrysts 0.3 to 1.5cm. Locally diktytaxitic with fine vesicle trains. Well-developed entablature with hackly jointing. Well-developed colonnade with 1m diameter columns, locally tiered. Esquatzel chemical type (Swanson and Others, 1979). Fluxgate magnetics: normal polarity. Restricted to the southeast, central and eastern Pasco Basin. Two flows in core holes. Age between approximately 13.6 and 12 million years*

ASOTIN MEMBER

Ta — Huntzinger Flow - *Fresh exposures are black and gray; weathers gray. Fine-to medium-grained. Aphyric, with olivine microphenocrysts up to 0.5cm and rare plagioclase phenocrysts. Glassy, locally ophitic and diktytaxitic. Thin scoria top, well-developed entablature with hackly jointing and fanning columns, and well-developed colonnade with 1m diameter columns. Asotin chemical type (Swanson and Others, 1979), but chemistry variable in Pasco Basin. Fluxgate magnetics: normal polarity. Primarily intracanyon flow but also sheet flow in Pasco Basin. Usually one flow but locally up to three flows or flow lobes. Age between approximately 13.6 and 12 million years*

WILBUR CREEK MEMBER

Tw — Wahluke Flow - *Fresh surfaces are black to blue-black; weathers gray-black. Fine-grained. Aphyric with plagioclase microphenocrysts and rare phenocrysts. Thin entablature and well-developed colonnade with 0.5-1.0m diameter columns. Local hackly jointing and pillows. Wilbur Creek chemical type (Swanson and Others, 1979). Fluxgate magnetics: normal polarity. Occurs as intracanyon and sheet flow in Pasco Basin. Age between approximately 13.6 and 12 million years*

UMATILLA MEMBER

Tu — *Fresh exposures are black; weathers yellow-orange 'pseudo palagonite'. Glassy to fine-grained; locally medium-grained. Aphyric with rare plagioclase phenocrysts up to 0.7cm. Well-developed entablature (normally 80 percent of flow) with hackly jointing. Local colonnade. Umatilla chemical type (Wright and Others, 1973). Fluxgate magnetics: normal polarity. One to two flows: restricted to central and southern Pasco Basin. Age approximately 13.5 million years*

WANAPUM BASALT (MIOCENE)

PRIEST RAPIDS MEMBER

Tpr — *Fresh exposures are gray-black; weathers rusty brown. Fine-to medium-grained with local diabasic texture in top flow. Aphyric, with rare plagioclase phenocrysts. Diktytaxitic. Lower flows are generally coarser than upper flow. Well-developed colonnade with 0.5-1.5m diameter columns. Upper flow has well-developed entablature with hackly jointing. Curvi-platy jointing occurs locally between two distinct colonnades in thicker lower flows. Upper flow is Lolo chemical type (Wright and Others, 1973); lower flows are Rosalia chemical type (Swanson and Others, 1979). Fluxgate magnetics: reversed polarity. Two to three flows crop out in the Pasco Basin with an interbed locally present between upper flows. Age approximately 13.6 million years*

ROZA MEMBER

Tr — *Fresh exposures are gray-black; weathers reddish-brown. Fine-to medium-grained, with plagioclase phenocrysts and glomerocrysts generally 0.5-2.0cm. Well developed colonnade with up to 1m diameter columns that locally pinch and swell. Locally diktytaxitic. Frenchman Springs chemical type. Fluxgate magnetics: normal polarity (Laboratory results indicate transitional after demagnetization, Packer and Petty, 1979). One to two flows are present throughout the Pasco Basin. Resembles plagioclase-phyric flows of Frenchman Springs Member. Age between approximately 14.5 and 13.6 million years*

FRENCHMAN SPRINGS MEMBER

Tfa — Aphyric Flows - *Fresh exposures are gray-black. Fine-grained. Generally aphyric with sparse plagioclase phenocrysts up to 2cm. Well-developed entablature with hackly jointing. Colonnade with 1.5-2.0m diameter columns and locally pillowed base. Frenchman Springs chemical type (Wright and Others, 1973). Fluxgate magnetics: normal polarity. Locally subdivided on basis of plagioclase phenocrysts (Bentley, 1977). Two or more flows occur above plagioclase-phyric flows of Frenchman Springs Member and below Roza flow. Present throughout Pasco Basin. Age between approximately 14.5 and 13.6 million years*

Tfp — Phyric Flows - *Fresh exposures are gray-black; weathers to reddish-gray. Fine-to medium-grained. Phyric with abundant plagioclase phenocrysts and glomerocrysts up to 2cm. Thin entablature and well-developed colonnade with 0.5-1.5m diameter columns. Frenchman Springs chemical type (Swanson and Others, 1979). Fluxgate magnetics: normal polarity. Generally one or more flows that occur immediately above the Grande Ronde Basalt. Present throughout the Pasco Basin. Age is younger than approximately 14.5 million years*

GRANDE RONDE BASALT (MIOCENE)

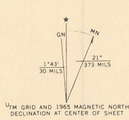
Tsb — Sentinel Bluffs Flows - *Fresh exposures are gray-black; weathers gray. Fine-grained. Aphyric but some flows have locally scattered plagioclase phenocrysts up to 1cm and rare orthopyroxene phenocrysts (Reidel and Others, 1978). Well-developed entablature with hackly jointing, brick-bat jointing, and fanning columns. Well-developed colonnades with 0.5m diameter columns, ball and socket joints, and pinch and swell features. Some flows have abundant vesicle cylinders. High Mg-Grande Ronde chemical type. Fluxgate magnetics: normal polarity (N_v of Swanson and Others, 1979) Locally exposed on anticlinal ridges throughout Pasco Basin. Age is older than approximately 14.5 million years*

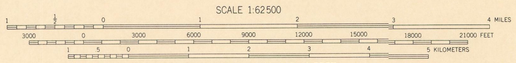
Ts — Schwana Flows - *Fresh exposures are gray-black; weathers gray. Fine-grained. Aphyric with rare plagioclase phenocrysts. Well-developed entablature and colonnade with features similar to Sentinel Bluffs flows. Low Mg-Grande Ronde chemical type and very high Mg-Grande Ronde chemical type (Swanson and Others, 1979). Note: Grande Ronde flows of the very high Mg-chemical type are known only from core holes in the Pasco Basin, surface outcrops in the Pasco Basin of this chemical type have not been found. Fluxgate magnetics: exposed units are generally normal (N_v) polarity but deeper unexposed units are both reversed (R_v) and normal polarity. Locally exposed on anticlinal ridges in western Pasco Basin*

ELLENSBURG FORMATION (MIOCENE)

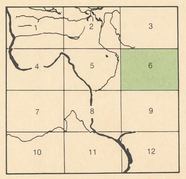
Tel — *Sedimentary interbeds. Intertongued with basalt flows. Predominately volcaniclastics layers, locally reworked, consisting of pumicite, tuff, and tuffaceous sand and clay. Also contains arkosic sandstones and conglomerate; basaltic fanglomerate, fluvial units, and diatomaceous units. Highly varied lithofacies, commonly intercalated. Units of the formation intertongued with the Grande Ronde, Wanapum and Saddle Mountains Basalt. Locally subdivided. Discontinuous throughout the Pasco Basin*

*Informal Name
Note: All radiometric ages are as reported in Swanson and Others (1979).*





CONTOUR INTERVAL 20 AND 40 FEET
DATUM IS MEAN SEA LEVEL



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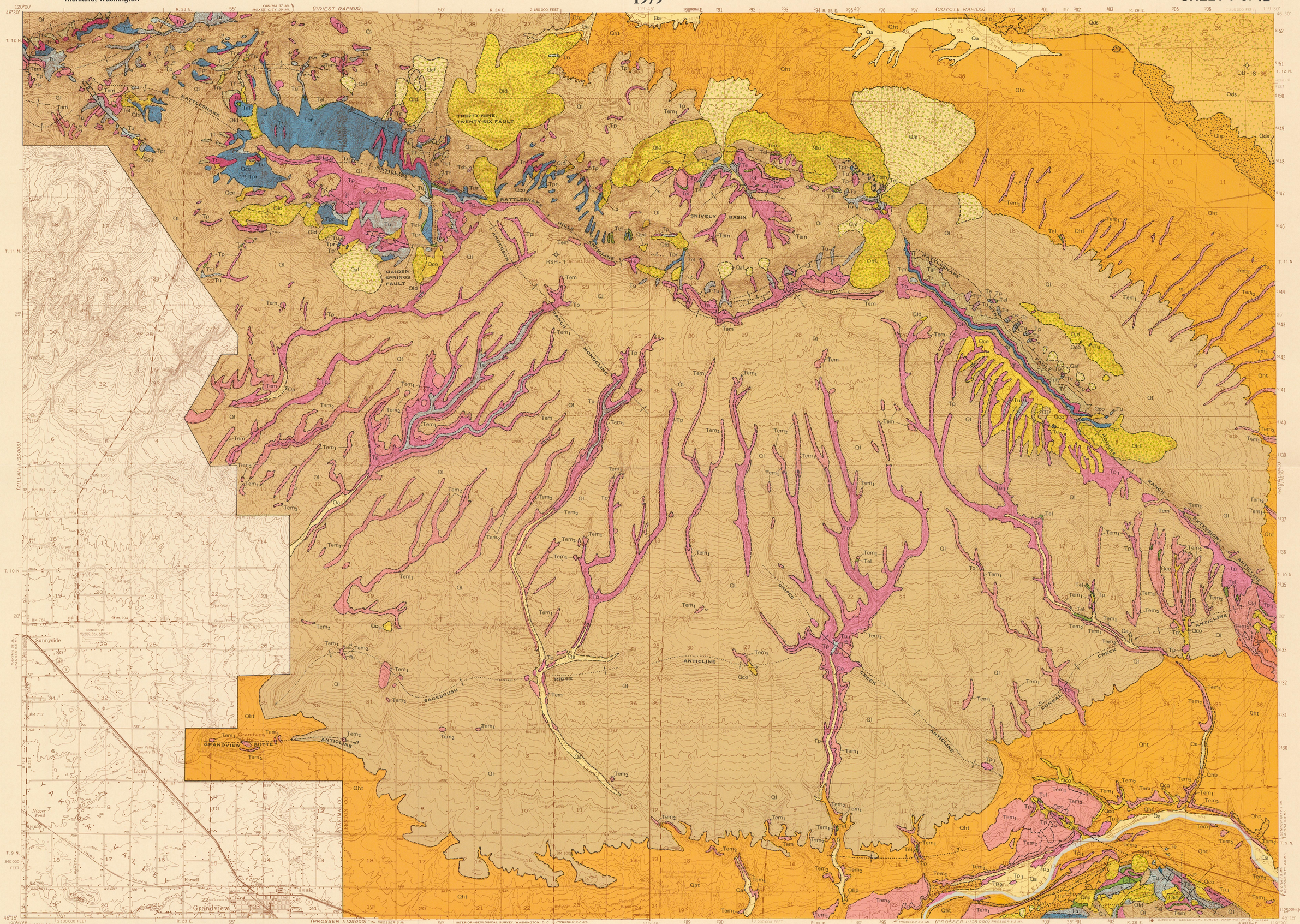
COMPILATION GEOLOGIC MAP OF THE PASCO BASIN, SOUTH CENTRAL WASHINGTON 1979

RHO-BWI-ST-4
SHEET 7 of 12



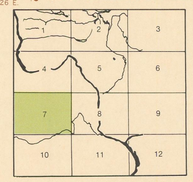
Base from U.S.G.S., 1:62,500
Grandview and Corral Canyon Quadrangles

1°43' 30 MILS
21° 373 MILS

UTM GRID AND 1965 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:62500

CONTOUR INTERVAL 20 AND 40 FEET
DATUM IS MEAN SEA LEVEL



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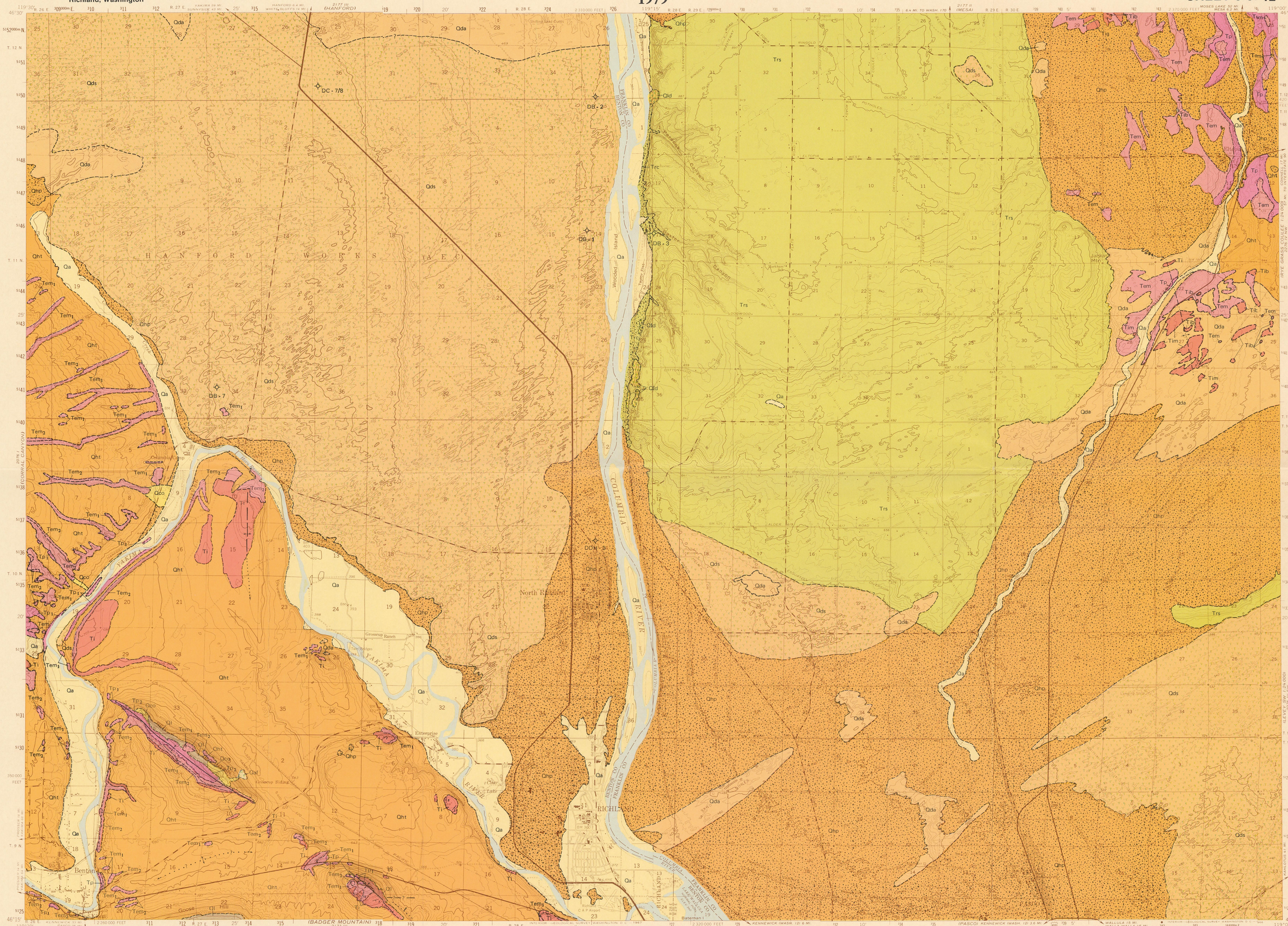
COMPILATION GEOLOGIC MAP OF THE PASCO BASIN, SOUTH CENTRAL WASHINGTON 1979

RHO-BWI-ST-4
SHEET 8 of 12



Base from U.S.G.S., 1:62,500
Richland and Eltopia Quadrangles

SCALE 1:62500

CONTOUR INTERVAL 20 AND 40 FEET
DATUM IS MEAN SEA LEVEL

UTM GRID AND 1965 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

Rockwell International

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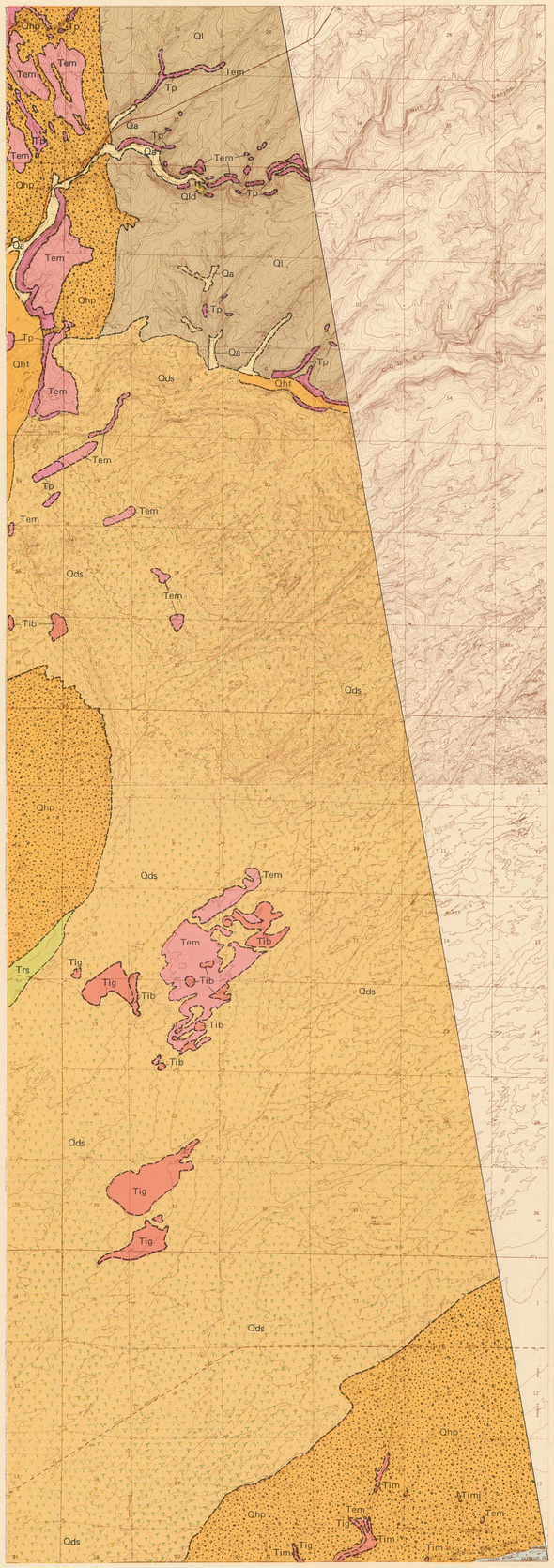
Energy Systems Group
Richland, Washington

COMPILATION GEOLOGIC MAP OF THE PASCO BASIN, SOUTH CENTRAL WASHINGTON 1979



Base from U.S.G.S., 1:62,500
Levy-SW and Rye Grass Coulee Quadrangles

GEOLOGIC MAP SYMBOLS

Contact
Dashed where approximately located; dotted where concealed; queried where doubtful or arbitrary

Fault
Dashed where inferred; dotted where concealed; queried where unknown or doubtful; ball and bar appear on downthrown side; thrust indicated by sawteeth on side of upper plate

Anticline
Showing crestline; dashed where approximately located; dotted where concealed; arrowhead on crestline indicates direction of plunge; short arrow indicates steeper limb.

Overturned Anticline

Syncline
Showing troughline; dashed where approximately located; dotted where concealed; arrowhead on troughline indicates direction of plunge; short arrow indicates steeper limb.

Overturned Syncline

Monocline
Showing trace of axis; dashed where approximately located; arrows indicate direction of dip; dotted where concealed.

Minor Anticline
Showing plunge of axis

Strike and dip of units

Inclined

Overturned

Vertical

Horizontal

Strike and dip of joints

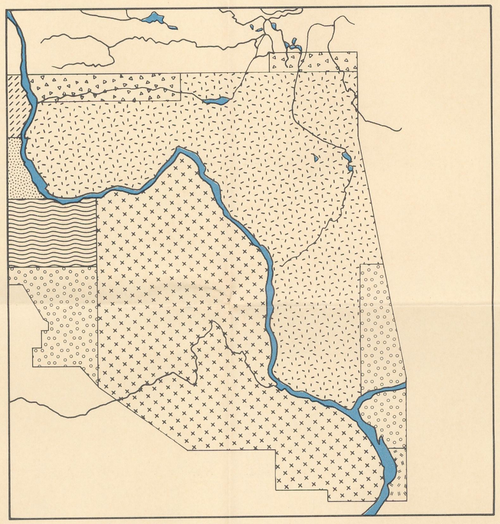
Inclined

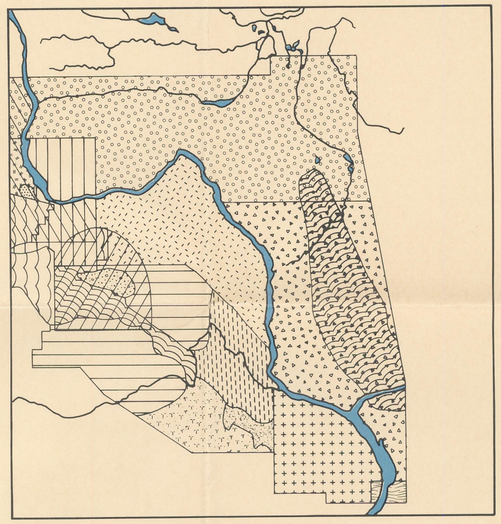
Vertical

Breccia
Flow top, deposited or tectonic in origin

Borehole

MAPPING RESPONSIBILITIES AND COMPILATION SOURCES



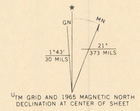


Sediment Mapping

- J. T. Lillie, Rockwell; M. J. Grolier and J. W. Bingham (1971)
- J. T. Lillie, Rockwell
- S. P. Reidel, Rockwell; M. J. Grolier and J. W. Bingham (1971)
- Geoscience Research Consultants (GRC)
- F. E. Goff, Rockwell; J. T. Lillie, Rockwell
- A. M. Tallman, Rockwell; S. P. Reidel, Rockwell
- K. R. Fecht, Rockwell; G. D. Webster, Washington Division of Geology and Earth Resources
- E. H. Price, Rockwell; R. D. Bentley, Consultant; A. M. Tallman, Rockwell

Basalt Mapping

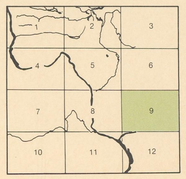
- F. E. Goff, Rockwell
- W. Barrash, GRC
- J. N. Gardner, Consultant (Reconnaissance)
- R. D. Bentley (1977) (Reconnaissance)
- J. D. Kauffman, GRC; W. Barrash, GRC
- D. A. Swanson and R. T. Helz (1979)
- J. D. Kauffman, GRC
- S. P. Reidel, Rockwell
- W. Barrash, GRC; J. D. Kauffman, GRC; J. G. Bond, GRC
- K. R. Fecht, Rockwell
- M. G. Jones, Rockwell; R. D. Landon, Rockwell
- E. H. Price, Rockwell
- D. A. Miller, GRC
- R. D. Bentley, Consultant (Detail)
- J. N. Gardner, Rockwell; M. G. Jones, Rockwell; K. R. Fecht, Rockwell
- M. G. Jones, Rockwell; E. H. Price, Rockwell
- J. C. Brown, GRC; J. H. Bush, GRC
- J. G. Bond, GRC



UTM GRID AND 1965 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:62500

CONTOUR INTERVAL 20 AND 40 FEET
DATUM IS MEAN SEA LEVEL



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COMPILATION GEOLOGIC MAP OF THE PASCO BASIN, SOUTH CENTRAL WASHINGTON 1979

RHO-BWI-ST-4
SHEET 10 of 12

Base from U.S.G.S., 1:62,500
Prosser and Whitstran Quadrangles

GN MN 21° 373 MILS 1°43' 30 MILS

UTM GRID AND 1965 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:62 500

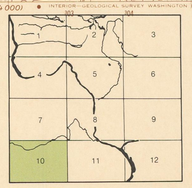
1 ½ 0 1 2 3 4 MILES

3000 0 3000 6000 9000 12000 15000 18000 21000 FEET

1 .5 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 20 AND 40 FEET

DATUM IS MEAN SEA LEVEL



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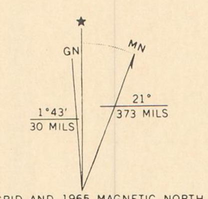
COMPILATION GEOLOGIC MAP OF THE PASCO BASIN, SOUTH CENTRAL WASHINGTON 1979

Base from U.S.G.S., 1:62,500
Pasco and Badger Mountain Quadrangles



UTM GRID AND 1965 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

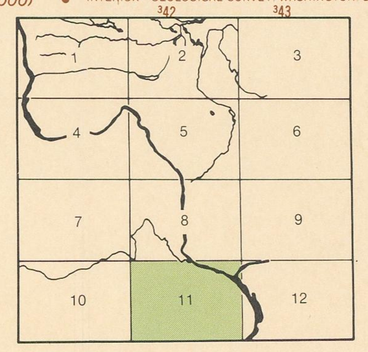
SCALE 1:62500

1 ½ 0 1 2 3 4 MILES

3000 0 3000 6000 9000 12000 15000 18000 21000 FEET

1 .5 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 20 AND 40 FEET
DATUM IS MEAN SEA LEVEL



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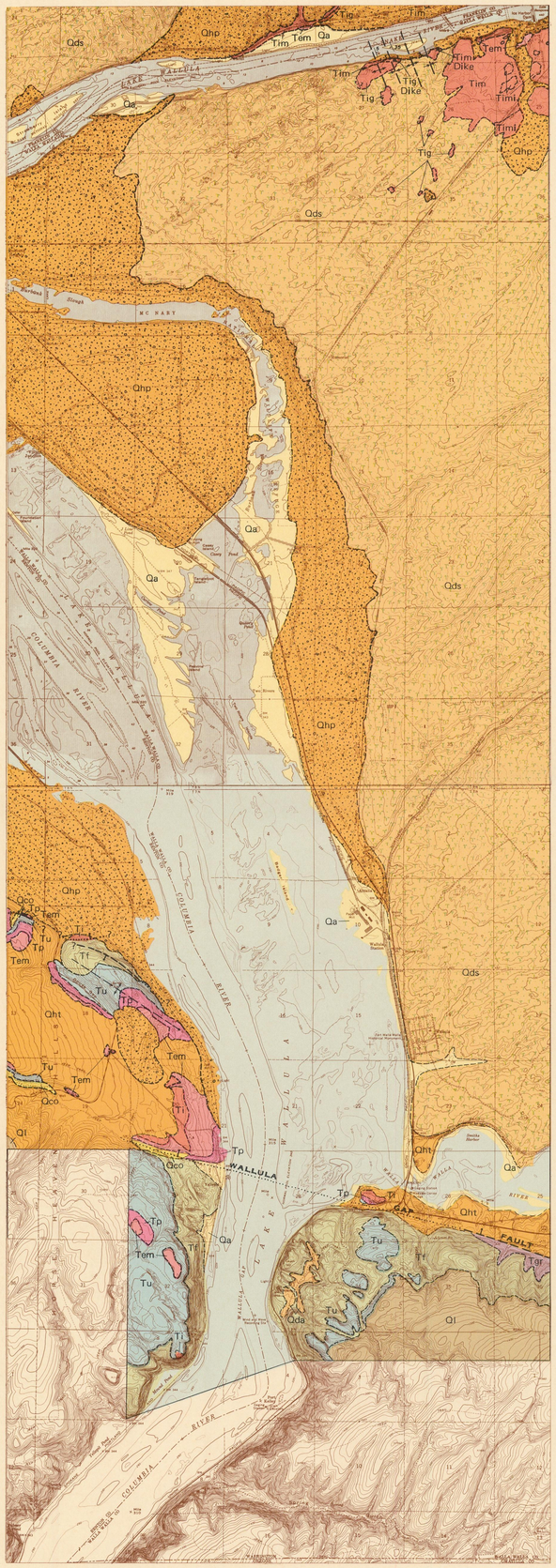
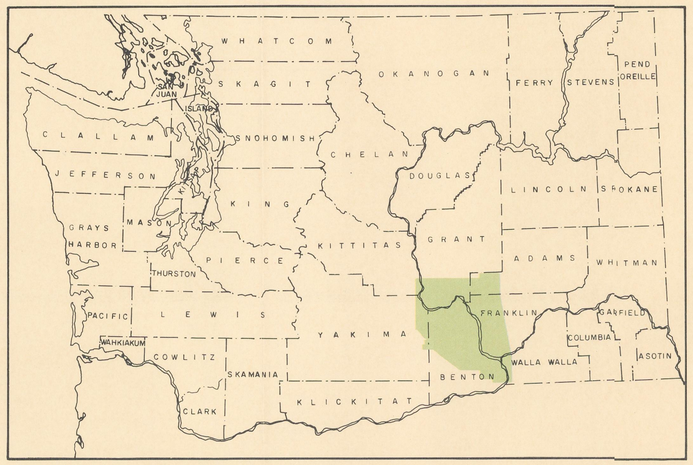
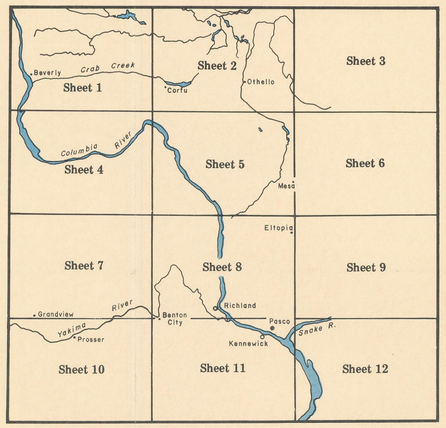
COMPILATION GEOLOGIC MAP OF THE PASCO BASIN, SOUTH CENTRAL WASHINGTON 1979



Base from U.S.G.S., 1:62,500
Wallula and Humorist Quadrangles



Index showing location within the state



Index showing sheet location

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T. L. Wright, M. J. Grolier, and D. A. Swanson, 1973, "Chemical Variation Related to the Stratigraphy of the Columbia River Basalt, "Geological Society of America Bulletin, 84, p. 371-386.

ACKNOWLEDGEMENTS

We acknowledge the kind permission from the many persons who allowed us access to their land during the data collection for this map. Among the many we thank are H. G. Anderson, I. Anderson, Leon Bailie, Paul Bernsen, Bill Blackburn - Ranch Director of Bailie Memorial Boy's Ranch, J. B. Barker, W. R. Dietderich - Commander, Yakima Firing Center, U. S. Army, Captain Tomsick - Yakima Firing Center, U. S. Army, Jack Fox - Priest Rapids Dam, Grant County P.U.D., R. M. Clark and family, Emmit Lynch, Rex Buck and the Wanapum Indian Tribe, Violet Michael, the R. McWorter Ranch, Ken and Keith Knight, B. J. Thomas, the Columbia National Wildlife Refuge, Washington State Department of Fish and Game, the Bureau of Reclamation, the south Columbia Basin Irrigation District, Badger Mountain Irrigation District, Kennewick Irrigation District, The Milwaukee Road, Union Pacific Railroad, Burlington Northern Railroad, Bonneville Power Administration, Ste. Michelle Vineyard, the cities of Pasco and Kennewick, Benton, Franklin, Grant, Adams and Yakima counties; and, the Kennewick Hospital District.

Technical construction of this map was performed by the following individuals and organizations:

Compilation by geologic staff of Rockwell Hanford Operations;
Basalt Waste Isolation Program.

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W. H. Crowley, Jr.	Rockwell

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Dorna Diven	Vitro Graphics
Evelyn Andrews	Vitro Graphics
John Crigler, Supervisor	Vitro Graphics
Floyd Harrow, Manager	Vitro Graphics

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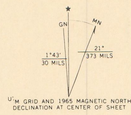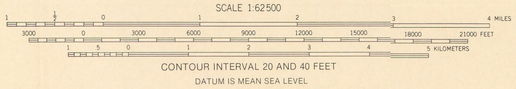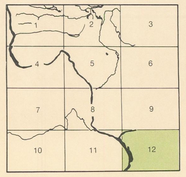
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