GEOLOGIC MAP GM-35

GEOLOGIC MAP OF THE BLUELIGHT 15-MINUTE QUADRANGLE, WASHINGTON

by

R. D. BENTLEY, N. P. CAMPBELL, and JOHN E. POWELL

WASHINGTON DIVISION OF GEOLOGY AND EARTH RESOURCES

GEOLOGIC MAP GM-35

1988

WASHINGTON STATE DEPARTMENT OF
Natural Resources

Brian Boyle - Commissioner of Public Lands
Art Stearns - Supervisor

Division of Geology and Earth Resources
Raymond Lasmanis, State Geologist

WASHINGTON STATE DEPARTMENT OF
Natural Resources
Brian Boyle Commissioner of Public Lands
Art Stearns Supervisor
Division of Geology and Earth Resources
Raymond Lasmanis State Geologist

Washington Division of Geology and Earth Resources
Geologic Map GM-35

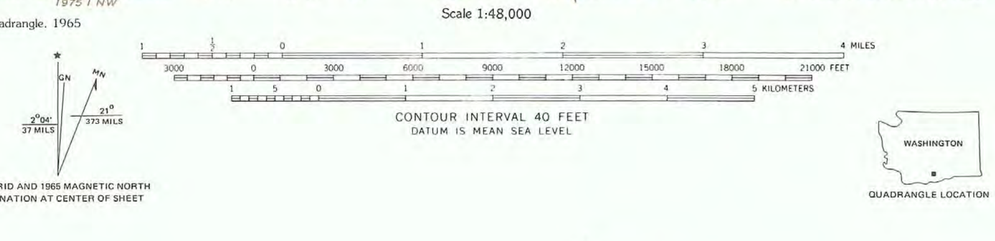
GEOLOGIC MAP OF THE BLUELIGHT 15-MINUTE QUADRANGLE, WASHINGTON

R. D. Bentley, N. P. Campbell,
and John E. Powell

1988

Base map from U.S. Geological Survey 15 minute Bluelight quadrangle, 1965

Scale 1:48,000



Prepared in cooperation with the U. S. Department of Energy
under contract number DE-AC06-81RL10297

DESCRIPTION OF MAP UNITS

SURFICIAL DEPOSITS

Qas ALLUVIUM, sidestream facies—Stream deposits of silt, sand, and gravel dominantly of basaltic composition; largely confined to valley bottoms; includes local lacustrine, paludal, and eolian deposits in depressions; deposited by tributaries of the Yakima River (sidestream facies of Waitt, 1979)

Qe EOLIAN DEPOSITS—Silt and fine sand; pale orange to brown; locally contains multiple caliche deposits and tephra beds; includes the Palouse Formation and all younger loess

Qls LANDSLIDE DEPOSITS—Clay, silt, sand, and gravel; unstratified and poorly sorted; surface commonly hummocky; deposited by rotational-translational slides and flows

Qam ALLUVIUM, mainstream facies—Stream deposits of silt, sand, and gravel of mixed lithologies; largely confined to valley bottoms; includes local lacustrine, paludal, and eolian deposits in depressions; deposited directly by the Yakima River (mainstream facies of Waitt, 1979)

Qaf ALLUVIAL FAN DEPOSITS—Sand and gravel of diverse composition with basalt clasts dominant in larger sizes; cone-shaped deposits; little or no caliche development; surface relatively undissected

Qafo OLDER ALLUVIAL FAN DEPOSITS—Sand and gravel; semiconsolidated fanglomerate; primarily basalt clasts cemented by iron-stained clays; surface of fans commonly dissected and capped by well-developed caliche

Qfs CATASTROPHIC FLOOD SLACKWATER SEDIMENTS—Silt, with minor amounts of sand and gravel; rhythmically bedded and graded; deposited by lower energy slackwater floods or surges of catastrophic floods; includes the Touchet beds; locally contains clastic dikes, tephra beds, and ice-rafted fragments

ELLENSBURG FORMATION

Teu ELLENSBURG FORMATION UNDIFFERENTIATED—Gravel, sand, silt, and clay, white to light reddish-brown; weakly to moderately indurated fluvial and laharic deposits; dominated by pumiceous dacitic, andesitic, and basaltic clasts; grades downward into thin units of fluvial sand and clay, locally pebbly sand, with mixed volcanic clasts and locally hyaloclastic units; base defined as the top of the lowermost flow of the Columbia River Basalt Group, but the unit includes all conformably underlying sediments of similar lithology beyond the lowermost Columbia River basalt flow pinchout; top of the unit defined as below Thorp Gravel or other Pliocene(?)-Pleistocene units; to the east, intertongues with flows of Yakima Basalt Subgroup

Tc Snipes conglomerate (informal usage), mainstream facies—Silt, sand, and gravel; light yellow-tan to reddish-orange; weakly to strongly indurated fluvial deposits; dominated by well-rounded quartzite pebbles, with significant numbers of granite, gneiss, and andesite clasts deposited by the ancestral Columbia River; interfingers with white fluvial and laharic deposits of the Ellensburg Formation; usually confined to that part of the Ellensburg Formation above the Elephant Mountain Member but also present in all interbeds within the Saddle Mountains Basalt; described by Russell (1893) and Waring (1913); may be correlative with the Hood River Conglomerate (Buwalda and Moore, 1927, 1929)

Tcs Snipes conglomerate (informal usage), sidestream facies—Silt, sand, and gravel; reddish-orange to dark-brown; weakly to moderately indurated fluvial deposits; dominated by a mixture of subangular basalt and well-rounded quartzite pebbles; fanglomerates and channel-fill deposits associated with tributaries from ancestral anticlinal ridges of the Yakima fold belt; here restricted to the north slope of the Horseheaven Hills

Trr Rattlesnake Ridge Member of Schmincke (1967)—Clay, silt, and sandstone; white to light greenish-gray; weakly to moderately indurated fluvial and laharic deposits; dominated by clayey and tuffaceous siltstone and sandstone; locally contains lenses of quartzite conglomerate; stratigraphic position defined by overlying Elephant Mountain Member of the Saddle Mountains Basalt and the next basalt stratigraphically below

Tb Mabton Member of Laval (1956)—Clay, silt, and fine sand; white to light-tan; weakly to moderately indurated fluvial deposits; dominated by tuffaceous and clayey quartzitic sandstone and siltstone; stratigraphic position defined by overlying Umatilla Member of the Saddle Mountains Basalt and the underlying Priest Rapids Member

COLUMBIA RIVER BASALT GROUP

YAKIMA BASALT SUBGROUP

SADDLE MOUNTAINS BASALT

Tem ELEPHANT MOUNTAIN MEMBER, Elephant Mountain flow(?)—Fresh surfaces are black; weathers gray-black; fine grained; sparsely to slightly phyric, with colorless plagioclase microphenocrysts; Elephant Mountain chemical type of Wright and others (1973); normal and transitional magnetic polarity (Choiniere and Swanson, 1979); K-Ar age about 10.5 m.y. (McKee and others, 1977); single flow in map area

Tp POMONA MEMBER, Pomona flow—Fresh surfaces are gray to blue-black; weathers gray; fine grained; abundantly to slightly phyric with abundant white to colorless plagioclase microphenocrysts; sparse plagioclase glomerocrysts; sparse olivine phenocrysts; invasive contacts common into Ellensburg Formation; well-developed entablature with fanning columns; where more than 150 ft thick, well-developed 0.5-1-m-diameter columns dominate the flow; Pomona chemical type (Wright and others, 1973); reversed magnetic polarity (Rietman, 1966; Choiniere and Swanson, 1979); K-Ar age about 12 m.y. (McKee and others, 1977); single flow in map area. This flow is the Wenas basalt of Smith (1903)

Tuu UMATILLA MEMBER, Umatilla flow—Fresh exposures are gray-black; weathers reddish-brown; very fine grained and sparsely plagioclase phyric; Umatilla chemical type (Wright and others, 1973); normal magnetic polarity; single flow in map area

WANAPUM BASALT

Tpr PRIEST RAPIDS MEMBER, Priest Rapids flows—Fresh exposures are gray-black; weathers rusty-brown; medium to coarse grained; aphyric, with rare plagioclase phenocrysts; diktytaxitic; well-developed colonnade with 0.5-1.5-m-diameter columns; two flows in map area; lower flow of Rosalia chemical type, upper flow of Lolo chemical type (Swanson and others, 1979b); reversed magnetic polarity (Rietman, 1966); age approximately 13.6 m.y. (McKee and others, 1977)

Tr ROZA MEMBER, Roza flow—Fresh exposures are gray-black; weathers reddish-brown; fine to medium grained, with plagioclase phenocrysts and glomerocrysts generally 0.5-1.0 cm; phenocrysts commonly a few hundred per square meter of surface area; well-developed colonnade with column diameter as much as 1 m; locally diktytaxitic; Frenchman Springs chemical type (Wright and others, 1973); normal magnetic polarity; laboratory results indicate transitional polarity after demagnetization (Rietman, 1966); resembles plagioclase-phyric flows of Frenchman Springs Member, but phenocrysts generally more abundant and of smaller average size; one flow in map area

Tfu FRENCHMAN SPRINGS MEMBER, Union Gap flows—Fresh exposures are gray-black; weathers gray to reddish-gray; fine to medium grained; generally aphyric with rare plagioclase phenocrysts as large as 2 cm; phenocrysts average about 3 glomerocrysts per 10 square meters of surface area; colonnade with 1.5-2.0-m-diameter columns and locally pillowed base; some flows have hackly entablature; Frenchman Springs chemical type (Wright and others, 1973); normal magnetic polarity; one of these flows covers most of map area

SELECTED REFERENCES

Bentley, R. D.; Anderson, James Lee; Campbell, N. P.; Swanson, D. A., 1980, Stratigraphy and structure of the Yakima Indian Reservation, with emphasis on the Columbia River Basalt Group, Washington: U.S. Geological Survey Open-File Report 80-200, 86 p., 1 plate.

Buwalda, J. P.; Moore, B. N., 1927, Age of the "Satsop" and the Dalles Formations of Oregon and Washington: Science, v. 66, p. 236.

Buwalda, J. P.; Moore, B. N., 1929, Age of the Dalles beds and the "Satsop" Formation, and history of the Columbia River Gorge [abstract]: Geological Society of America Bulletin, v. 40, no. 1, p. 176-177.

Choiniere, S. R.; Swanson, D. A., 1979, Magnetostratigraphy and correlation of Miocene basalts of the northern Oregon coast and Columbia Plateau, southeast Washington: American Journal of Science, v. 279, no. 7, p. 755-777.

Laval, W. N., 1956, Stratigraphy and structural geology of portions of south-central Washington: University of Washington Doctor of Philosophy thesis, 223 p.

Mackin, J. H., 1961, A stratigraphic section in the Yakima Basalt and the Ellensburg Formation in south-central Washington: Washington Division of Mines and Geology Report of Investigations 19, 45p.

McKee, E. H.; Swanson, D. A.; Wright, T. L., 1977, Duration and volume of Columbia River basalt volcanism, Washington, Oregon, and Idaho [abstract]: Geological Society of America Abstracts with Programs, v. 9, no. 4, p. 463-464.

Rietman, J. D., 1966, Remanent magnetization of the late Yakima Basalt, Washington State: Stanford University Doctorof Philosophy thesis, 87 p.

Russell, I. C., 1893, A geologic reconnaissance in central Washington: U.S. Geological Survey Bulletin 108, 108 p.

Schmincke, Hans-Ulrich, 1967, Stratigraphy and petrography of four upper Yakima Basalt flows in south-central Washington: Geological Society of America Bulletin, v. 78, no. 11, p. 1385-1422.

Smith, G. O., 1903, Description of the Ellensburg quadrangle: U.S. Geological Survey Geologic Atlas of the United States, Folio 86, 7 p., maps.

Swanson, D. A.; Anderson, James Lee; Bentley, R. D.; Byerly, G. R.; Camp, V. E.; Gardner, J. N.; Wright, T. L., 1979a, Reconnaissance geologic map of the Columbia River Basalt Group in eastern Washington and northern Idaho: U.S. Geological Survey Open-File Report 79-1363, 26 p., 12 plates.

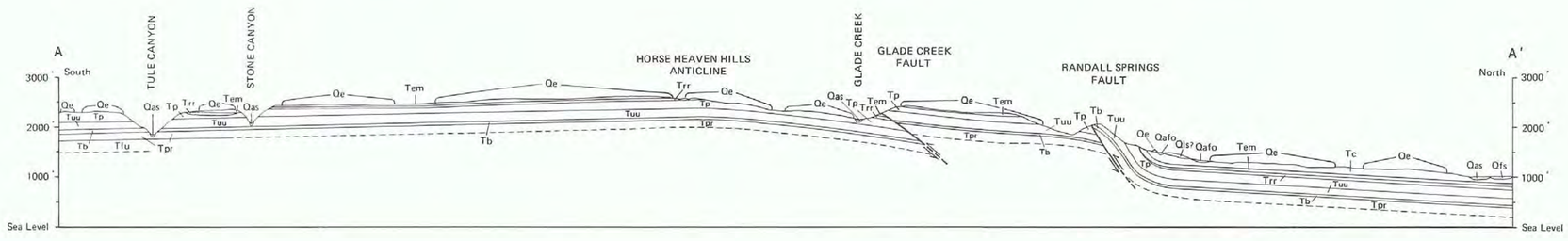
Swanson, D. A.; Wright, T. L.; Hooper, P. R.; Bentley, R. D., 1979b, Revisions in stratigraphic nomenclature of the Columbia River Basalt Group: U.S. Geological Survey Bulletin 1457-G, 59 p.

Waitt, R. B., 1979, Late Cenozoic deposits, landforms, stratigraphy, and tectonism in Kittitas Valley, Washington: U.S. Geological Survey Professional Paper 1127, 18 p.

Waring, G. A., 1913, Geology and water resources of a portion of south-central Washington: U.S. Geological Survey Water-Supply Paper 316, 46 p.

Wright, T. L.; Black, K. N.; Swanson, D. A.; O'Hearn, Tim, 1980, Columbia River basalt; 1978-1979 sample data and chemical analyses: U.S. Geological Survey Open-File Report 80-921, 99 p.

Wright, T. L.; Grolier, M. J.; Swanson, D. A., 1973, Chemical variation relative to the stratigraphy of the Columbia River basalt: Geological Society of America Bulletin, v. 84, no. 2, p. 371-385.

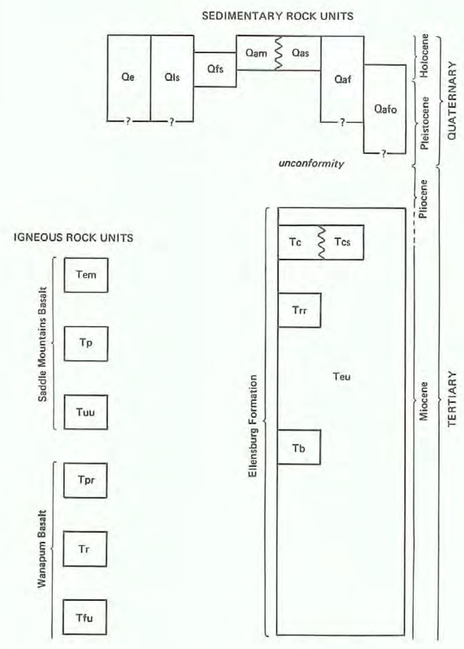


MAJOR ELEMENT ANALYSES OF ROCKS FROM THE BLUELIGHT QUADRANGLE, WASHINGTON

Sample locality	Geologic unit	Sample no.	Location	SiO_2	Al_2O_3	TiO_2	Fe_2O_3	FeO	MnO	CaO	MgO	K_2O	Na_2O	P_2O_5	TOTAL
1	Tem	RDB-9BC	SE/4,NE/4, sec. 09(7-21E)	52.06	14.06	3.59	2.00	12.11	0.20	8.35	3.87	1.21	2.06	0.49	100.00
2		RDB-3GG	NE/4,SW/4, sec. 03(7-22E)	52.25	13.74	3.60	2.00	12.68	0.19	8.20	3.82	1.15	1.87	0.51	100.01
3		RDB-7JB	NW/4,NW/4, sec. 07(7-22E)	51.86	14.13	3.52	2.00	12.75	0.20	8.21	4.15	1.05	1.63	0.49	99.99
4		JNG78-027	SW/4,SE/4, sec. 19(7-22E)	50.61	13.99	3.52	2.00	13.22	0.22	8.40	3.83	1.31	2.40	0.48	99.98
			n=4 mean	51.70	13.98	3.56	2.00	12.69	0.20	8.29	3.92	1.18	1.99	0.49	
5	Tp	SW79-014	SW/4,SW/4, sec. 15(7-21E)	51.90	15.35	1.64	2.00	9.06	0.17	10.47	6.66	0.47	2.04	0.24	100.00
6		RDB-7HH	SW/4,SW/4, sec. 07(7-22E)	52.70	15.47	1.67	2.00	7.77	0.73	10.92	6.30	0.38	1.78	0.28	100.00
7		JNG78-031	Cen,NW/4, sec. 08(7-22E)	51.53	15.31	1.59	2.00	8.98	0.20	10.74	6.75	0.39	2.29	0.22	100.00
			n=3 mean	52.04	15.38	1.63	2.00	8.60	0.37	10.71	6.57	0.41	2.04	0.25	
8	Tuu	JNG78-028	NW/4,NW/4, sec. 14(6-21E)	54.39	14.32	2.50	2.00	11.16	0.21	6.05	2.69	2.86	2.94	0.89	100.01
9		RDB-2CH	NE/4,SE/4, sec. 02(7-21E)	54.63	14.62	2.83	2.00	10.69	0.20	6.11	2.83	2.90	2.38	0.79	99.98
10		SW79-013	SW/4,NW/4, sec. 21(7-21E)	54.16	14.70	2.53	2.00	11.02	0.22	6.05	2.90	2.96	2.60	0.86	100.00
11		JNG78-023	CEN,SE/4, sec. 35(8-22E)	54.10	14.27	2.93	2.00	10.76	0.20	6.36	2.80	2.46	3.39	0.74	100.01
12		JNG78-021	NW/4,NW/4, sec. 36(8-22E)	54.93	14.62	2.66	2.00	10.88	0.21	5.97	2.21	2.72	2.94	0.86	100.00
			n=5 mean	54.44	14.51	2.69	2.00	10.90	0.21	6.11	2.69	2.78	2.85	0.83	
13	Tuu, HiTi	JNG78-024a	SE/4,SE/4, sec. 35(8-22E)	57.07	15.71	3.15	2.00	6.74	0.10	6.01	2.01	2.87	3.45	0.89	100.00
14		JNG78-024b	SE/4,SE/4, sec. 35(8-22E)	56.80	15.82	3.20	2.00	6.95	0.09	6.01	2.03	2.89	3.30	0.89	99.98
			n=2 mean	56.94	15.77	3.18	2.00	6.85	0.10	6.01	2.02	2.88	3.38	0.89	
15	Tpr, (Lolo)	RDB-35DG	NW/4,SE/4, sec. 35(8-22E)	51.74	14.28	3.24	2.00	11.30	0.20	8.75	4.54	1.09	2.18	0.68	100.00
16		JNG78-022	NW/4,SE/4, sec. 35(8-22E)	49.87	13.92	3.01	2.00	12.18	0.22	8.66	5.51	1.10	2.89	0.64	100.00
17		JNG78-020	SW/4,NW/4, sec. 36(8-22E)	49.76	14.28	3.04	2.00	11.98	0.24	9.13	5.17	1.18	2.58	0.65	100.01
			n=3 mean	50.46	14.16	3.10	2.00	11.82	0.22	8.85	5.07	1.12	2.55	0.66	
18	Tpr, (Rosalia)	JNG78-017	NE/4,SW/4, sec. 35(8-22E)	50.29	13.75	3.45	2.00	12.37	0.24	8.68	4.22	1.18	3.16	0.67	100.01
19		RDB-35DE	SW/4,NE/4, sec. 35(8-22E)	51.22	13.73	3.51	2.00	12.71	0.23	8.26	4.42	1.18	2.07	0.66	99.99
20		JNG78-025	SE/4,SE/4, sec. 35(8-22E)	49.48	13.49	3.44	2.00	13.28	0.24	8.63	4.54	1.24	3.02	0.65	100.01
21		JNG78-019	SW/4,NW/4, sec. 36(8-22E)	50.29	13.69	3.49	2.00	13.02	0.24	8.75	4.06	1.16	2.62	0.67	99.99
			n=4 mean	50.32	13.67	3.47	2.00	12.85	0.24	8.58	4.31	1.19	2.72	0.66	
22	Tr	JNG78-018	SE/4,NW/4, sec. 35(8-22E)	50.72	14.72	2.95	2.00	11.50	0.19	9.25	4.51	0.86	2.78	0.52	100.00

Analysis by XRF, Department of Geology, Washington State University, Pullman, WA; all analyses normalized to 100 percent on a volatile-free basis.

CORRELATION OF MAP UNITS



EXPLANATION

Contact

Strike-slip fault — *Dashed where approximately located; dotted where concealed. Arrows indicate direction of motion*

Normal fault — *Dashed where approximately located; dotted where concealed. Bar and ball on downthrown block*

Thrust fault — *Dashed where approximately located; dotted where concealed. Sawteeth on upper plate*

Lineament from aerial photographs

Anticline — *Showing trace of crest surface and direction of plunge; dashed where approximately located; dotted where concealed*

Syncline — *Showing trace of trough surface and direction of plunge; dashed where approximately located; dotted where concealed;*

Inclined — Horizontal

Strike and dip of beds

*9 Geochemical sample locality