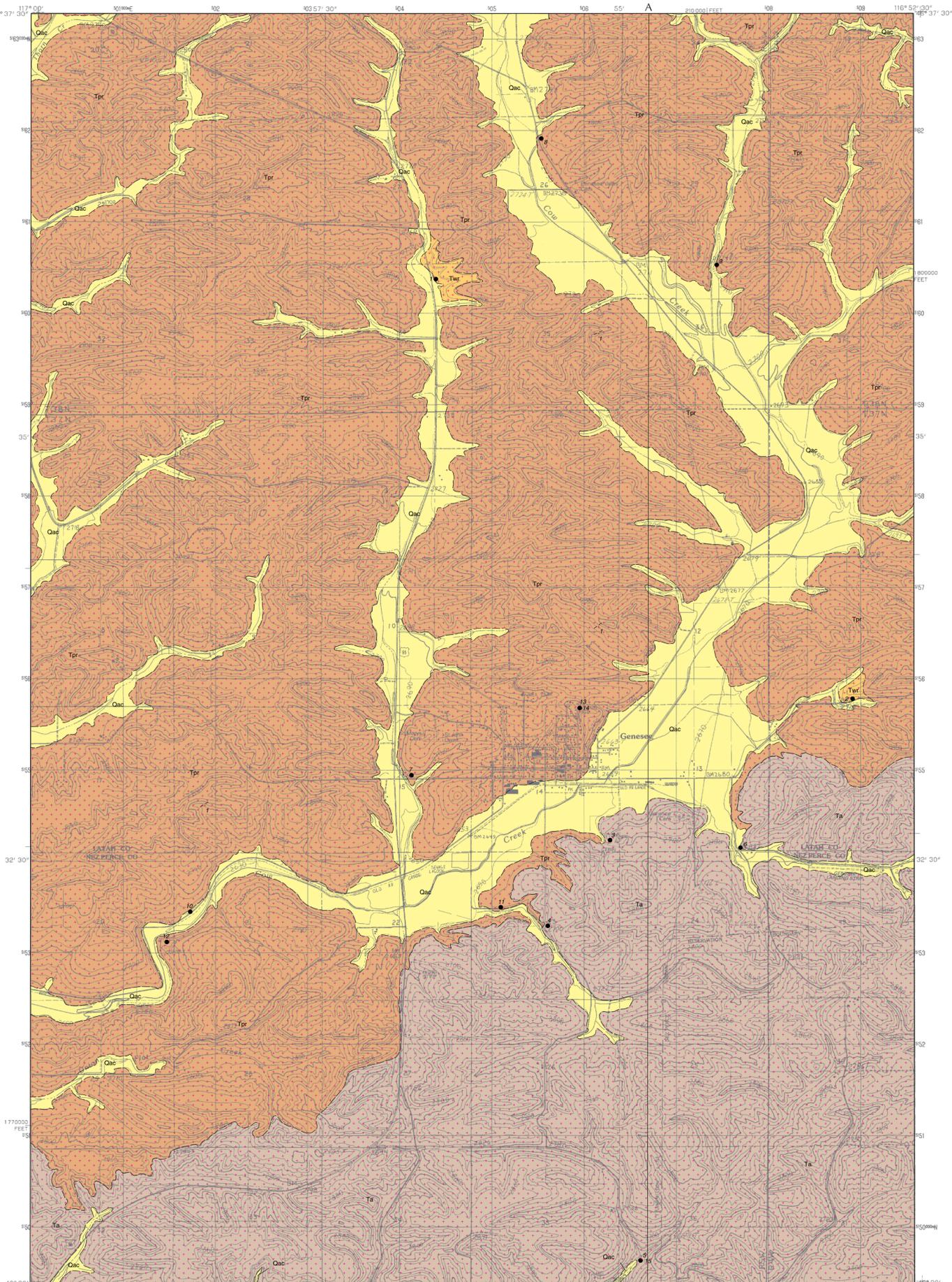
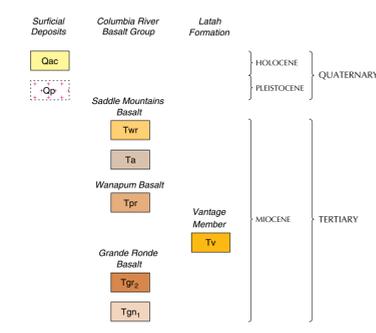


BEDROCK GEOLOGIC MAP OF THE GENESEE QUADRANGLE, LATAH AND NEZ PERCE COUNTIES, IDAHO

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CORRELATION OF MAP UNITS



INTRODUCTION

The bedrock geologic map of the Genesee quadrangle was produced from field mapping, published and unpublished research, and water well data. The quadrangle is in the eastern part of the Palouse, a geomorphic region of the southeastern Columbia Plateau with its distinctive rolling hills developed on Pleistocene loess. For this map, however, the distribution of the loess, recognized as the Palouse Formation, is intentionally ignored in order to emphasize bedrock units. For the map of surficial deposits, see Othberg and others (2001a). The loess, shown on the cross section only, buries the nearly flat upper surface of the plateau basalts. Three basalt units from this plateau surface in the Genesee quadrangle: the Priest Rapids Member of the Wanapum Basalt and the Astoin Member and Weissensfels Ridge Member of the Saddle Mountains Formation. Outcrops of basalt are rare.

Concealed by thick loess, the contacts between basalt units can only be drawn according to regional trends adapted from Swanson and others (1980), from mapping in the adjacent quadrangles in Washington by Hooper and Webster (1982), and from new mapping in the adjacent Green Knob, Lewiston Orchards North, and Lapwai quadrangles (Bush and Garwood, 2001; Bush and others, 2001; Garwood and Bush, 2001; and Othberg and others, 2001b). Most known exposures of basalt are marked on the map and numbered where samples were taken for chemical and paleomagnetic analyses.

DESCRIPTION OF MAP UNITS

The stratigraphic nomenclature for the Columbia River Basalt Group is based on that presented by Swanson and others (1979). The group is divided into four formations: from base upward, these are the Imnaha, Grande Ronde, Wanapum, and Saddle Mountains. The Imnaha and Grande Ronde are not exposed in the Genesee quadrangle. However, water wells that penetrate more than 250 feet probably reach the upper flows of the Grande Ronde Basalt. Samples of twelve outcrops and two cuttings from the Genesee city water well were analyzed for major chemical elements to assist in mapping (Table 1).

SURFICIAL DEPOSITS

Qac Alluvium and colluvium (Holocene)—Stream, slope wash, and debris-flow deposits. Predominantly silt interbedded with silty sand, granules, and pebbles. Silt is mostly reworked loess; gravel fragments are basalt, granitoid mineral grains, and vein quartz. Stream-channel and overbank deposits typically are thin and interfinger with laterally thickening deposits of slope wash and debris flows derived from erosion and mass wasting of the Palouse Formation. The basalt surface is shallow under wide, nearly flat stream valleys. The sharp change in stream direction and the wide flood plain of Cow Creek probably are the effects of Miocene stream diversion and gradient control along the margin of the Astoin flow (Bush and others, 1998b).

Op Palouse Formation (Pleistocene and Holocene)—Silty and clayey loess that composes the Palouse hills of the eastern Columbia River Plateau. The formation overlies a Miocene surface developed on the Priest Rapids, Astoin, and Weissensfels Ridge basalts. The loess forms hills up to 200 feet thick on this surface.

LATAH FORMATION

Tv Vantage Member (Miocene)—Sedimentary interbed between the Priest Rapids Member and the Grande Ronde Basalt identified in Genesee city well no. 6 by Lawrence (1995). Probably includes part of the weathered upper surface of Grande Ronde Basalt. Shown only in the cross section.

COLUMBIA RIVER BASALT GROUP

Saddle Mountains Basalt
Twr Weissenfels Ridge Member (Miocene)—Medium- to coarse-grained basalt with microphenocrysts of plagioclase and olivine in an intergranular groundmass with minor glass and normal magnetic polarity (Hooper and Webster, 1982; Hooper and others, 1985). Two outcrops were identified in the Genesee quadrangle (Table 1). Analysis of major chemical elements indicates the flow is the basalt of Lewiston Orchards. This flow probably did not have wide lateral extent. Outcrops near Colton, Washington, and Moscow, Idaho, are in places intercalated with or overlies sediments of Saddle Mountains age (Hooper and Webster, 1982; Bush and Provant, 1998; Bush and others, 1998b).

Ta Astoin Member (Miocene)—Dense, aphyric basalt with microphenocrysts of plagioclase and olivine. Primarily distinguished from the Priest Rapids flows by its normal magnetic polarity and distinct chemistry (Table 1). The Astoin Member is part of the Uniontown flows of Swanson and others (1975, 1980), that they describe as filling a paleovalley on the Uniontown plateau. This paleovalley probably developed in the troughs of shallow synclinal features. In the Genesee quadrangle, the distribution of the Astoin Member and the location of its onlap contact with the Priest Rapids Member are inferred from a regional trend identified by previous and new mapping of the adjoining Green Knob, Lapwai, and Lewiston Orchards North quadrangles. Swanson and others (1980) show the presence of the Wilbur Creek Member in the southern part of the quadrangle. None of the samples collected for our project has chemistry indicative of the Wilbur Creek Member.

Wanapum Basalt
Tpr Priest Rapids Member (Miocene)—Medium- to coarse-grained basalt with microphenocrysts of plagioclase and olivine in a groundmass of intergranular proxene, ilmenite blades, and minor devitrified glass. Distinguished from Saddle Mountains Basalt in the Genesee quadrangle by its reversed polarity and distinct chemistry. Previously described by Wright and others (1973) and Swanson and others (1980). Six exposures were analyzed and identified as the Lolo chemical type of the Priest Rapids Basalt (Table 1). Basalt chips from Genesee city well no. 6 were also sampled for chemical analysis (Table 1). Chemistry indicates sample GE205 from a depth of about 200 feet is from the Priest Rapids, whereas sample CE285 from 289 feet is from the Grande Ronde Formation. A sediment interbed beneath the Priest Rapids, that probably correlates to sediments identified in other wells, suggests the Priest Rapids Member is approximately 200 feet thick over much of the

Genesee quadrangle (Lawrence, 1995). Lawrence's study also suggests the Priest Rapids Member dips gently to the south and drops approximately 250 feet in elevation from the northwestern end of the quadrangle to the southeastern corner. The elevation of the top of the basalt section in the quadrangle (see cross-section) has been estimated from outcrop locations and records of basalt intersections in water-well logs. The Priest Rapids Member is the uppermost basalt in the northern two-thirds of the quadrangle.

Grande Ronde Basalt
R₂ magnetotatigraphic unit (Miocene)—Fine-grained to very fine-grained, aphyric, reverse magnetic polarity flows of Grande Ronde chemical type (Wright and others, 1973; Swanson and others, 1980; Reidel and others, 1989). Shown in the cross section only, because no exposures are known in the mapped area, but the formation was intersected in several deep wells (Lawrence, 1995). The uppermost Grande Ronde flows exposed at two localities about 6 miles south and southeast of Genesee have been mapped as the R₂ magnetotatigraphic unit (Swanson and others, 1980). The R₂ unit probably extends north to Genesee where a sample of the uppermost Grande Ronde flow in the Genesee city well no. 6 (sample GE285, Table 1) has major element chemistry similar to that of samples from the nearby R₂ exposures. In the adjoining Green Knob quadrangle, the unit consists of two flows ranging from 150 to 200 feet thick.

N₁ magnetotatigraphic unit (Miocene)—Fine-grained, aphyric, normal magnetic polarity flows of Grande Ronde chemical type (Wright and others, 1973) are shown here in cross section only and inferred from mapping in the adjoining Green Knob, Lapwai, and Lewiston Orchards North quadrangles.

SYMBOLS

- Contact: approximately located.
- - - Approximate strike and dip of basalt.
- Sample location for laboratory analysis (Table 1 and 2) collected from outcrop or from well cutting.

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Table 1. Major Chemical Elements* of Sampled Basalt Units

Map Number	Unit	Sample	SiO ₂	Al ₂ O ₃	TiO ₂	FeO**	MnO	CaO	MgO	K ₂ O	Na ₂ O	P ₂ O ₅
1	Twr	GE8	50.14	14.36	2.49	11.84	0.22	11.51	5.89	0.49	2.47	0.57
2	Twr	GE13	51.5	16.6	2.41	8.43	0.13	11.9	5.48	0.39	2.6	0.55
3	Ta	GE16	50.76	16.12	1.47	9.4	0.16	10.87	7.99	0.61	2.41	0.2
4	Ta	GE1	51.74	16.14	1.44	9.25	0.15	11	7.32	0.48	2.29	0.2
5	Ta	GE3	50.87	15.94	1.4	9.37	0.16	10.92	8.23	0.56	2.36	0.2
6	Ta	GE12	50.93	16.67	1.46	8.95	0.15	11.23	7.56	0.46	2.42	0.18
7	Tpr	GE7	49.86	13.9	3.32	13.51	0.22	9.38	5.4	0.67	2.75	0.8
8	Tpr	GE14	50.66	13.74	3.25	12.88	0.23	9.29	5.34	1.13	2.75	0.78
9	Tpr	GE15	50.64	13.94	3.37	12.52	0.22	9.39	5.27	1.05	2.82	0.78
10	Tpr	GE9	50.31	13.7	3.28	13.14	0.29	9.23	5.38	1.12	2.83	0.79
11	Tpr	GE11	50.38	13.67	3.23	13.42	0.23	9.17	5.3	0.99	2.79	0.81
12	Tpr	GE10	50.55	13.74	3.33	12.9	0.22	9.29	5.13	1.18	2.85	0.81
13	Tpr	GE205	50.54	13.49	3.15	13.62	0.25	9.12	5.13	1.09	2.83	0.77
14	Tpr	CE285	56.29	13.79	2.43	11.76	0.19	6.77	3.15	1.96	3.18	0.46

*Weight percent analysis at Washington State University's GeoAnalytical Laboratory by x-ray fluorescence under the direction of P.R. Hooper. Analyses are normalized on a volatile-free basis.
**Total Fe is expressed as FeO.

Table 2. Paleomagnetic Directions of Sampled Basalt Units

Map Number	Unit	Sample	Mean Declination	Mean Inclination	Alpha ₉₅
15	Ta	GE36	332.3	71.9	1.71

