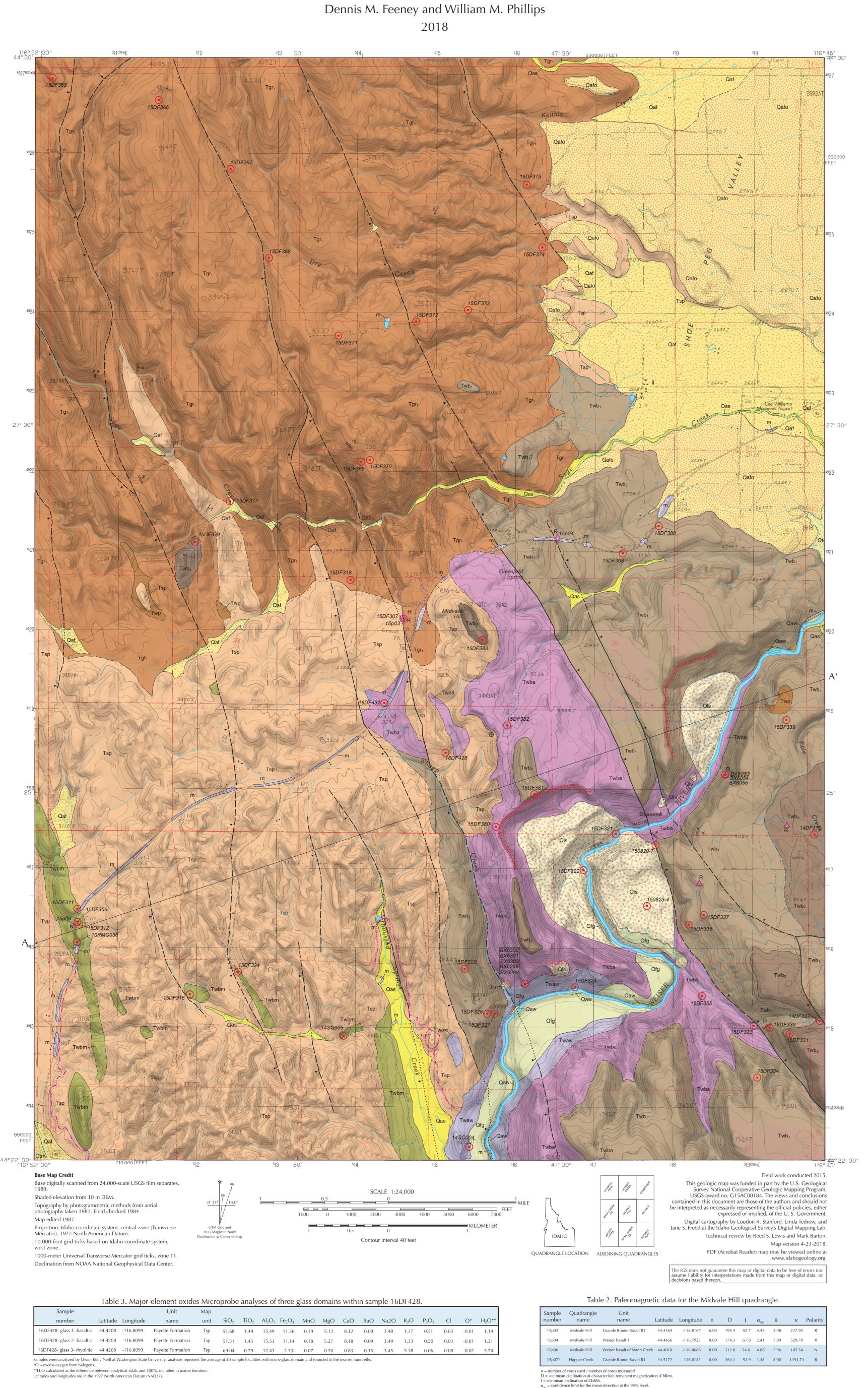
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Geologic Map of the Midvale Hill Quadrangle, Washington County, Idaho

Dennis M. Feeney and William M. Phillips



Polarity: N = normal: R = reverse.

2x vertical exaggeration

*Located north of Midvale Hill quadrangle. Latitudes and longitudes are in the 1927 North American Datum (NAD27).

Demag Level: alternating field demagnetization used to isolate ChRM.

All analyses performed at the Pacific Northwest Paleomagnetic Laboratory at Western Washington University, Bellingham, Washington.

Deposits OUATERNARY Volcanic Rocks Rhyolite and Basaltic andesite

Basalt Group

*40Ar/39Ar dates personal communication from R. Gaschnig, 2015.

approximately 4 m (13 ft) thick.

Lower terrace alluvium of Weiser River (Holocene)—Predominantly well-

or during winter rain-on-snow events in headwaters.

rounded basaltic cobbles and brown silty sand and clayey sand; thickness

of about 1.8 to 6 m (6 to 20 ft). Subject to flooding during spring snowmelt

supported gravel and sand capped with eolian sediments and sandy collu-

vium. Consists of well-rounded imbricated cobbles of basalt with light-

brown medium- to coarse-grained arkosic sand matrix. Locally interbedded

with orange-brown, coarse- to medium-grained arkosic sand. The sand

beds are cross-bedded and form lenticular, discontinuous beds. Unit is

composed of locally derived basalt, basaltic andesite, and andesite,

together with light-colored rhyolite and tuffaceous siltstone. Clasts are

subangular to sub-rounded, poorly sorted, and supported by a sandy to

granular, poorly sorted matrix. Bedding is massive. Flood gravel thickness

increases downstream from thin deposits <3 m (<10 ft) overlying bedrock

and landslide deposits, to bars as much as 50 m (160 ft) thick. Bar surfaces

are littered with boulders up to 1.5 m (5 ft) in length. A reddish-brown

sandy silt loam soil about 0.5 m (1.5 ft) thick overlies the gravels. Flood

gravels are differentiated from landslide and colluvial deposits by the

presence of multiple lithologies, a sandy matrix, and greater rounding of

clasts. Stereo aerial photos and lidar images show that bars are streamlined

2,600 ft in sec. 2, T. 12 N., R. 4 W. There, flood gravels overlie landslide

deposits and bedrock, and do not extend upstream. Faint streamlining of

these deposits is visible on LiDAR imagery. This area comprises the

discharge channel of a former landslide dam. The flood gravels have been

traced about 14.5 km (9 mi) down the canyon of the Weiser River to sec. 3,

T. 11 N., R. 1 W. where they end abruptly at an expansion reach (Feeney

and others, 2014). Catastrophic deposition of the flood gravels by a sudden

dam break indicated by the coarse grain size, lack of sorting, great deposit

thickness, and sudden termination of the deposit downstream. The

Holocene-Late Pleistocene age assignment of the flood gravels is based on

limited development of soils capping the unit, good preservation of flood

bar geomorphic features, and cross-cutting of younger (Holocene) deposits.

poorly sorted, subangular to subrounded, cobble- to pebble-sized gravel, in

a sand to silt matrix deposited as fans into Shoe Peg Valley. These fans have

coalesced into semi-continuous fan aprons that fill channels in dissected

older alluvial fans (Qafo). Apparent thickness from topography and water

wells is 3 to 8 m (10 to 26 ft; IDWR, 2016). Commonly grades into alluvium

subangular to subrounded, cobble- to pebble-sized gravel, in a sand to silt sized matrix deposited as fans into Shoe Peg Valley. Fans are highly

dissected. Water wells indicate a thickness from 4.5 to 7.6 m (15 to 25 ft).

MASS WASTING DEPOSITS

and transitional slides involving blocks of competent basalt over less-

competent, weakly consolidated sediments. Main body of the slide deposit

typically consists of mega-blocks to blocks of intact basalt sections in

diamict matrix with a hummocky surface. The landslide centered at sec. 2,

T. 12 N., R. 4 W. impounded the Weiser River, creating a reservoir that,

based on elevation (2,600 ft), extended upstream to the southern end of

Cambridge canyon (lat. 44.5133°N., long. 116.6848°W.). Laminated

clay-rich sediments exposed in Midvale Valley (Feeney and Phillips, 2016)

may have been deposited, in part, in this reservoir. The rupture of the latter

dam and the draining of the reservoir resulted in the deposition of Qfg. It is

likely that the landslide located at sec. 36 T. 13 N., R. 4 W. also impounded

SEDIMENTARY DEPOSITS

(highly silicified), tan to buff, and light-orange coarse to fine, subangular to

subrounded arkosic sands, silty sand, clayey silt, and dark-gray,

dipping. Sands contain grains of quartz, potassium feldspar, plagioclase

feldspar, and localized grains of biotite and muscovite. Laminar beds,

climbing ripples, and cross-bedding are present in outcrops. Payette

Formation has mostly weathered into gently rolling hills 60 m (200 ft) high;

outcrop exposures include road cuts, walls along steep creeks, interstitial

pale-yellow, and off-white tuffaceous interbeds. Flat-lying to gently

Payette Formation (middle Miocene)—Unconsolidated to well-consolidated

the Weiser River.

Qaf Alluvial fan deposits (Holocene and Late Pleistocene)—Crudely bedded,

Qafo Older alluvial fan deposits (Pleistocene)—Crudely bedded, poorly sorted,

Landslide deposits (Late Pleistocene)—In the Weiser River corridor, rotational

Qfg Flood gravels (Holocene to Late Pleistocene)—Cobbles and boulders

Terrace alluvium of Mann Creek (Late Pleistocene)—Poorly exposed clast-

CORRELATION OF MAP UNITS

INTRODUCTION

The geologic map of the Midvale Hill 7.5' quadrangle depicts the rock units exposed at the surface or underlying a thin cover of soil or colluvium; alluvial and man-made surficial deposits are also shown where they form significant mappable units. This map is a result of fieldwork conducted in the summer and autumn of 2015 by the authors. Previous mapping in the area includes reconnaissance mapping of Kirkham (1931), the reconnaissance geologic map of the Weiser geothermal area (McIntyre, 1976), the basalt of the Weiser embayment 1:250,000-scale map (Fitzgerald, 1981; 1982), the Baker 1:250,000-scale surficial geologic map (Othberg, 1982), and the 1:100,000-scale geologic map of the Payette National Forest (Lund, 2004). The unpublished field maps, field notes, hand-held magnetometer data, and XRF whole rock geochemistry (which were reanalyzed in 2015 for trace elements) from James Fitzgerald's PhD were also consulted where appropriate. Additional references are provided in the Description of Map

The basement rocks of the Midvale Hill 7.5' quadrangle are the Miocene Grande Ronde Basalt flows of the Columbia River Basalt Group. The Grande Ronde Basalt is generally dipping 6° to 11° to the east. Overlying unconformably on the Grande Ronde Basalt are the compositionally diverse flows of the Weiser volcanics. The Miocene Weiser volcanics include basalt, basaltic andesite, and andesite. Volcanic correlation and stratigraphy was determined using whole-rock XRF geochemistry (Table 1), petrology, paleomagnetic data (Table 2), and geomorphic expressions. Volcanic rocks are classified based on the total alkalis versus silica chemical classification of the International Union of Geological Sciences (Figure 1; LeBas and Streckeisen, 1991). Though there are local variations in the Weiser volcanics, the general dip of the volcanic flows is gentle (1° to 5°) towards Shoe Peg Valley and Middle Valley.

The deposition of Payette Formation sediments occured contemporaneous with, and subsequent to the Columbia River Basalt Group and Weiser volcanics. The majority of the sediments are found south of Sage Creek and west of Sheep Creek.

SYMBOLS

Contact: dashed where approximately located.

Normal fault: ball and bar on downthrown side; dashed where approximately located; dotted where concealed.

Fault: dashed where approximately located; dotted where concealed. L_{12} Strike and dip of bedding.

Strike and dip of horizontal bedding.

Strike and dip of basalt flows. Approximate strike and dip of basalt flows.

15p04 \Diamond_{N} Paleomagnetic sample location (R - reverse; N - normal).

R△ Fluxgate magnetometer reading location (R - reverse; N - normal).

15DF339 • Geochemical sample location. Landslide scarp and headwall

Gravel pit or quary.

Patterned ground: Circular to elongate silty mounds separated by gravelly zones form a pattern of contrasting soil characteristics and vegetation that are readily mappable from aerial images. The mounds average 9 to 29 m (30 to 95 ft) in diameter and 0.3 to 2 m (1 to 6 ft) in height. They are associated with a grain size contrast that varies from silt and clay in the mounds to gravel in the intermounds. The patterned ground occurs on surfaces of gravel terraces, alluvial fans, and basalt flows with varying degrees of weathering. Malde (1964) noted that patterned ground of soil mounds and stone pavements is common in southern Idaho on gravel fans, basaltic lava flows, and rocky colluvium. His description is aptly applied to the best-developed patterned ground observed in this quadrangle: "Soil mounds in flat areas are closely packed, monotonously uniform circular heaps 50-60 feet across and 3 feet high, but on slopes they are elliptical and lie in rows along paths of soil that trend downhill. Each mound is composed of a lens-shaped cap of silt about 18 inches thick, abruptly underlain by 1-2 feet of brown clay" (Malde, 1964: p. 191). It is likely that the patterned ground formed through periglacial processes during times of colder climate in the Pleistocene. These processes are investigated and modeled by Kessler and Werner (2003), who attribute the resulting

STRUCTURE

landform to freeze-thaw cycles that sort stones and soil.

Structure in the Midvale Hill quadrangle consists of northwest-trending down-to-the-east and down-to-the-west normal faults. The faults are the northwesternmost portion of the Paddock Valley fault system. Faults are mapped based on stratigraphic offset, linear geomorphic features, and in-line springs. The earliest phase of faulting occurred after the emplacement of Grande Ronde Basalt and resulted in the development of the Weiser basin, which the Weiser volcanics and majority of Payette sediments subsequently filled. These large basin-forming faults are present in the northwest part of the map area. Offsets for these faults are as much as 152 m (500 ft). The second phase of faulting was syn- and post-Weiser volcanics and Payette Formation deposition. These faults are likely to be a continuation of earlier basin-forming activity, but to much less of a degree as the Weiser volcanics are only shallowly dipping toward Middle Valley. There is no evidence of Quaternary faulting, which suggests all faulting ceased by the end of the Pliocene.

PALEOMAGNETISM

The apparent magnetic polarity (normal or reversed) of volcanic rocks was measured in the field using a hand-held fluxgate magnetometer (MEDA Model µMAG). This procedure cannot resolve true polarity in samples with 5 samples per site were required. Isolation of Characteristic Natural Remanent Magnetization (ChRM; Butler, 1992) in rock cores was performed at the Pacific Northwest Paleomagnetism Laboratory at Western Washington University. These results provide reliable declination and inclination data for ChRM in addition to polarity. Details of ChRM measurement procedures are given in Table 2.

DESCRIPTION OF UNITS

ARTIFICIAL DEPOSITS

m Man-made land (Holocene)—Boulder, sand, and gravel fill. Makes up the abandoned Pacific and Idaho Northern railroad grade along the Weiser River, portions of Highway 95, and small stock-water dams. Thickness is from 3 to 10 m (10 to 32 ft).

ALLUVIAL DEPOSITS Qas Alluvium of side streams (Holocene)—Clayey sand, silt, and fragments of shale

in small channels draining landscapes of Tertiary sediments. In streams draining basaltic landscapes such as Sage Creek and Dry Creek deposits include well-rounded basaltic cobbles and gravel. Thicknesses range from <1 to 2 m (<3 to 6.5 ft). Many tributary streams are ephemeral. Subject to seasonal flooding during spring snowmelt and summer thunderstorms.

Alluvium of Weiser River (Holocene)— Rounded cobbles, granules, and boulders composed of locally derived volcanic rocks, and coarse to very coarse, poorly sorted sand, composed of mafic lithic fragments, quartz, and plagioclase. Mica is rare or absent. Forms bars and low islands that are subject to flooding. Thickness is <3 m (<10 ft).

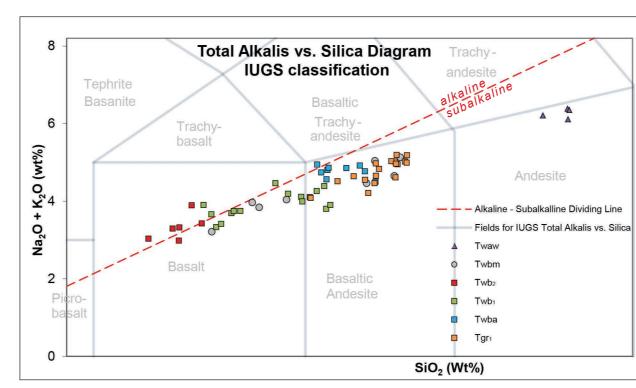


Figure 1. Total alkali (Na₂0+ K₂0) vs silica (SiO₂) plot of all analyzed and normalized samples from Midvale Hill quadrangle. The plot includes the chemical rocks classification based on IUGS standards (LeBas and Streckeisen, 1991) with an alkalinity line (Irvine and Baragar, 1971) showing most of the samples plotting as subalkaline.

deposits between volcanics flows, and zones of high silicification. Microprobe analyses obtained from three separate glass domains within a single tuff sample indicate both basalt and rhyolite glass compositions (Table 3). Unit thickness is estimated to be 76 m (250 ft).

Ash deposits—Finely laminated beds of reworked, white and off-white ash surrounded by beds of arkosic sand, up to 2 m (6 ft) thick.

Diatom deposits—White to light-yellow blocky diatom bed, composed primarily of Melosira sp. with impurities of clay and micas, ranging in thickness from 0.5 to 3 m (2 to 18 ft). Powers (1947) described three diatom-bearing beds found from the southwest corner of the map to Thousand Springs Creek and Sage Creek, and noted primarily Aulacoseira sp.(= Melosira) and rare Stephanodiscus sp., Navicula sp., and Fragilaria sp.

VOLCANIC ROCKS

Weiser volcanics

Twaw Weiser andesite of Weiser River (middle Miocene?)—Medium- to dark-gray, conchoidally fractured mostly aphyric andesite (Table 1). Contains 15 percent microphenocrysts of plagioclase (80 percent) and augite (20 percent); the remaining is groundmass with approximately 25 percent glass and 5 percent opaques. The andesite of Weiser River was informally referred to as Twa, in the Mann Creek SE quadrangle (Feeney and others, 2014), where it emerges as a dome of stacked flows north of Concrete siding. In the Midvale Hill quadrangle, outcrops are adjacent to the modern Weiser River and Thousand Springs Creek, suggesting that the unit filled an ancestral river channel. Unit is tentatively included in the Weiser volcanics, however morphology of the unit and location in the modern Weiser River channel may indicate this unit is as young as the Pliocene. The highly conchoidal nature of fractures in the andesite makes it a significant archaeological source of "Paiute" tool stone (Bakewell, 2002; Bakewell,

Twbm Weiser basalt of Mann Creek (middle Miocene)—Three to five flows of dark-gray to medium bluish-gray, and dark reddish-brown, fine- to medium-grained basalt and basaltic andesite (Table 1) with normal magnetic polarity as determined by ChRM analyses (Table 2). Flows range from 3 to 7 m (10 to 23 ft) thick. Plagioclase abundant and as much as 2 mm in length. The best exposure is a roadcut along Highway 95 (SW1/4 sec. 6, T.12 N., R. 4 W). The roadcut shows the complex relationship of the basalt of Mann Creek and the Payette Formation. This zone includes grayish-yellow palagonitic basalt, localized blocks of glassy basalt, zones with siderite nodules, and interfingering zones of baked Payette Formation; all indicating these basalts interacted with water and Payette Formation as the flows followed the ancestral Mann Creek drainage. The top flow is overlying a diatom bed that is 40 to 70 cm thick.

eiser pyroclastic rocks (middle Miocene)—Yellow-buff and light-gray to olive-green tuff. Contains abundant 0.5 to 5 cm subrounded to angular, finely vesiculated, rusty-brown to reddish-brown clasts of basalt in a poorly sorted matrix. Layers are crudely sorted and the unit is characterized by little or no soil development. Fitzgerald (1979) interprets the zone of Twp mapped across secs. 25 and 36, T. 13 N., R. 4 W. as a vent. Similar pyroclastic deposits are found in abundance as interbeds with Weiser volcanics. More work is necessary to subdivide the pyroclastic deposits in the region. Thickness ranges from 2 to 5 m (6 to 16 ft).

Veiser basalt 2 (middle Miocene)—Two to three flows of medium- to dark-gray with shades of purple, fine- to medium-grained basalt. Phenocrysts and microphenocrysts compose 15 percent; phenocrysts are plagioclase as long as 3 mm, iddingsite up to 2 mm, and microphenocrysts of olivine and augite; the remaining 85 percent is groundmass. Normal magnetic polarity as determined by ChRM analyses from mapped quadrangles to south (Feeney and others, 2014; Garwood and others, 2014), and by evaluating the 'apparent' magnetic polarity data in the field notebooks of James Fitzgerald. Vent area unknown. Whole-rock geochemical analyses from this quadrangle (Table 1) and adjacent quadrangles (Feeney and Phillips, 2016; Feeney and others, 2014; Feeney and others, 2016; Garwood and others, 2014) show Twb, contains 48.2 to 49.9 weight percent SiO₂, 1.7 to 2.6 weight percent TiO₂, and >0.56 weight percent P₂O₅. Flows typically cap high hills. Thickness ranges from 3 to 9 m (9 to 30 ft).

Veiser basalt 1 (middle Miocene)—Purplish-gray to dark-gray, medium-to coarse-grained basalt. Phenocrysts and microphenocrysts make up 40 percent of the rock with the remaining 60 percent being groundmass; phenocrysts are interlocking plagioclase as long as 8 mm, corroded augite, iddingsite, olivine, and trace interstitial hornblende. Voids are common among the interlocking crystals. Reverse magnetic polarity as determined by ChRM analyses in this quadrangle (Table 2) and previously mapped quadrangles to the south (Feeney and others, 2014; Garwood and others, 2014), and by evaluating the 'apparent' magnetic polarity data in the field notebooks of James Fitzgerald. Outcrops are competent blocky knobs with well-vesiculated flow tops to ridges with partial colonnades. Vent area is unknown. Interpretations of whole-rock chemical analyses from this guadrangle (Table 1) and neighboring quadrangles (Feeney and Phillips, 2016; Feeney and others, 2014; Feeney and others, 2016; Garwood and others, 2014) show Twb, with a SiO, content ranging from 49.64 to 51.65 weight percent, TiO₂ content ranging from 1.19 to 1.64 weight percent, and P₂O₅ content ranging from 0.33 to 0.61 weight percent; differences in composition may reflect separate flows. Flows are 3 to 9 m (6 to 26 ft) thick. Sedimentary interbeds are locally present between flows but not thick enough to be mapped. Thickness is ~120 m (400 ft).

Twba Weiser basaltic andesite (middle Miocene)—Gray to dark-gray, fine-grained basaltic andesite with needle-like plagioclase in an aphyric matrix. Forty percent phenocrysts and microphenocrysts, 60 percent groundmass; phenocrysts are plagioclase as long as 8 mm, and subhedral augite. Reverse magnetic polarity as indicated by ChRM analyses from previous mapping to the south (Feeney and others, 2014; Garwood and others, 2014) and by evaluating the 'apparent' magnetic polarity data in the field notebooks of James Fitzgerald. Outcrops appear as colonnades and brecciated flows. Vent area is unknown. Whole-rock geochemical analyses from this quadrangle (Table 1) and adjacent quadrangles (Feeney and Phillips, 2016; Feeney and others, 2014; Garwood and others, 2014) shows Twba with SiO₂ content ranging from 52.57 to 57.01 weight percent, and TiO₂ content ranging from 0.76 to 1.48 weight percent. Differences in composition may reflect separate flows. A 40 Ar/39 Ar groundmass date from a sample low in the Twba section 13 km (8 mi) south in the Mann Creek SE quadrangle (Feeney and others, 2014) constrains the oldest Twba to 15.1 \pm 0.16 Ma (Richard Gaschnig, personal communication, 2015).

COLUMBIA RIVER BASALT GROUP Tgr₁ Grande Ronde Basalt R₁ magnetostratigraphic unit (middle Miocene)—Dark-

gray, red, and black, fine-grained aphyric to microporphyritic basaltic andesite. Conchoidal fracturing common. Plagioclase, clinopyroxene, and opaque oxides are the primary minerals and the matrix is glass-rich. Contains less than one percent microphenocrysts of plagioclase 1 mm or less in length. Grande Ronde activity started at ca. 16 Ma and ended at 15.6 Ma (Barry and others, 2013). The Grande Ronde Basalt has been informally subdivided into magnetostratigraphic units R₁, N₁, R₂, and N₂, (Swanson and others, 1979) respectively from oldest to youngest. Grande Ronde Basalt flows in Midvale Hill quadrangle are reverse magnetic polarity as determined by ChRM analyses (Table 2). Because Reidel and Tolan (2013) indicate only flows from magnetostratigraphic unit R₁ appear in west-central Idaho (Birch Creek and Downey Gulch members), we assign this unit to R, The majority of Grande Ronde Basalt is chemically classified as basaltic andesite (Figure 1; Table 1) and is distinguished from other regional basaltic andesites by having TiO₂ greater than 1.6 weight percent, Ni less than 56 ppm, and V greater than 225 ppm. An exposure on the west side of hill 4033 (SW1/4 sec. 7, T. 13 N., R. 4 W.) shows a thickness of 160 m (530 ft). Sedimentary interbeds are locally present between flows but not thick enough to be mapped. Aphyric flows of Grande Ronde basalt served as a source of tools for indigenous peoples; one of those sites is at the aggregate quarry on Midvale Hill (Bakewell, (2005).

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Table 1. Major-oxide and trace-element analyses of samples collected in the Midvale Hill quadrangle. Trace elements in parts per million Major oxides in weight percent O, TiO, Al,O, Fe,O,* FeO** MnO MgO CaO Na,O K,O P,O, Sum LOI Ni Cr Sc V Ba Rb Sr Zr Y Nb Ga Cu Zn Pb La Ce Th Nd U Co 10.57 0.170 8.11 9.82 2.48 0.73 0.429 99.65 90 195 29 262 434 12 467 119 26 9.4 17 68 94 3 19 38 1 20 1 0.18 7.89 9.25 2.55 0.74 0.81 99.46 1.69 124 255 30 272 433 9.5 466 120 33.5 10.8 17.9 105 111 4 18 35 0.5 0.5 54 4DF310 44.4119 -116.7517 Weiser basalt 2 0.23 6.38 9.63 2.45 0.53 0.87 99.79 1.73 131 207 30 273 406 4.3 533 116 33.2 11.1 17.3 74 112 <1 18 29 <0.5 0.5 55 0.14 2.37 5.56 3.30 2.81 0.32 100.04 1.20 18 19 17 186 1113 46.1 400 169 25.3 9.6 19.0 57 79 2 20 42 8.2 1.5 20 9 69 30 249 432 8.2 589 131 27.8 7.6 18.1 103 91 3 17 36 0.5 0.6 36 0.16 4.67 8.67 3.61 1.25 0.47 99.80 2.31 67 59 20 203 789 12.6 796 100 24.6 6.6 18.4 106 78 4 19 43 <0.5 1.3 29 0.17 7.14 8.71 3.16 1.03 0.37 99.76 2.81 132 169 23 211 475 16.0 504 111 28.2 7.4 17.4 83 84 <1 18 42 <0.5 <0.5 36 0.14 5.7 9.89 3.11 0.73 0.44 100 5.10 139 204 27 236 381 5.5 552 114 31.6 8.7 18.1 103 93 <1 15 33 <0.5 0.5 42 0.20 3.43 6.41 3.32 1.7 0.35 100 1.27 10 13 26 368 653 34.4 325 181 35.0 10.5 21.9 40 111 8 19 40 7.4 <0.5 42 0.19 5.73 8.65 3.27 0.99 0.38 99.99 3.93 135 191 26 206 487 10.1 521 122 30.1 7.6 18.1 76 93 <1 19 44 <0.5 <0.5 39 0.29 5.01 7.62 3.93 1.20 0.36 99.91 1.79 212 292 21 196 721 19.8 481 119 29.7 8.3 17.1 60 106 1 18 40 3.1 0.5 38 0.21 6.78 7.22 3.88 1.16 0.33 99.55 0.47 77 261 19 201 676 14.2 435 120 26.5 8.0 17.1 68 82 <1 16 35 2.1 <0.5 39 0.21 6.28 7.87 3.43 1.03 0.37 100.00 2.22 197 281 22 208 614 13.4 442 117 26.3 8.2 16.7 68 92 <1 16 33 4.5 <0.5 42 0.25 3.29 6.63 3.49 1.70 0.36 99.67 -0.03 11 19 29 376 647 36.2 328 199 35.8 12.5 20.3 25 140 9 17 36 16.6 <0.5 44 DF318 44.4408 -116.8251 Grande Ronde Basalt R₁ Tgr 55.06 2.19 13.62 13.08 DF327 44.3916 -116.8023 Weiser basalt 1 DF331 44.3893 -116.7556 Weiser basalt 2 5DF332 44,3900 -116,7588 Weiser basaltic andesite DE333 44.3902 -116.7613 Weiser basaltic andesite 15DF334 44.3843 -116.7608 Weiser basalt 1 3 41 23 211 638 13.4 796 107 23.1 7.3 18.4 103 78 5 21 36 <0.5 <0.5 34 DF336 44.4017 -116.7716 Weiser basalt 1 DF337 44.4028 -116.7692 Weiser basalt 1 DF339 44.4249 -116.7561 Weiser basalt 1 5DF365 44.4977 -116.8723 Grande Ronde Basalt R. 5DF366 44.4952 -116.8555 Grande Ronde Basalt R, 5DF367 44.4874 -116.8441 Grande Ronde Basalt F 5DF368 44.4773 -116.8380 Grande Ronde Basalt R₁ DF369 44.4542 -116.8234 Grande Ronde Basalt R, 5DF370 44.4544 -116.8220 Grande Ronde Basalt R, 35 327 508 29.2 330 202 38.8 15.0 19.7 28 124 14 28 10.9 1.0 42 5DF371 44.4685 -116.8270 Grande Ronde Basalt R, 15DF372 44.4701 -116.8147 Grande Ronde Basalt R DF373 44.4714 -116.8065 Grande Ronde Basalt R. 3.27 1.75 0.35 99.98 0.67 DF375 44.4856 -116.7972 Grande Ronde Basalt R₁ DF377 44.4497 -116.8442 Grande Ronde Basalt R. 5DF379 44.4451 -116.8497 Weiser basalt 2 DF380 44.4128 -116.8021 Weiser basaltic andesite X6053 44.4187 -116.7658 Weiser basaltic andesite BX6054 44.4187 -116.7658 Weiser basalt 1 X6055 44.4187 -116.7658 Weiser basalt 1 245 32 277 476 10 567 109 32 15.1 19 73 121 5 20 46 1 31 1 BX6302 44.3950 -116.7975 Weiser basalt 2 0.23 4.72 8.81 3.69 1.29 0.45 99.49 2.44 66 47 21 201 677 14.2 795 107 23.8 7.1 18.1 97 77 <1 23 39 <0.5 0.5 30 16DF432 44.4268 -116.8197 Weiser basaltic andesite

Samples with prefix 14 and 15 were analyzed by Stanley Mertzman at Franklin and Marshall X-Ray Laboratory, samples with prefix 10, 13, and BX were analyzed by WSU Geoanalytical Laboratory Samples with prefix BX were sampled by James Fitzgerald in 1978 and 1979.

*Franklin and Marshall report total iron as Fe₂O₃. **WSU Geoanalytical Laboratoy reports total iron as FeC + Collected in-section, represented by one point on hill where samples were collected; lowest number indicates bottom of section. Latitudes and longitudes are in the 1927 North American Datum (NAD27)