Geologic Map of the Cherry Gulch Quadrangle, Payette and Gem Counties, Idaho

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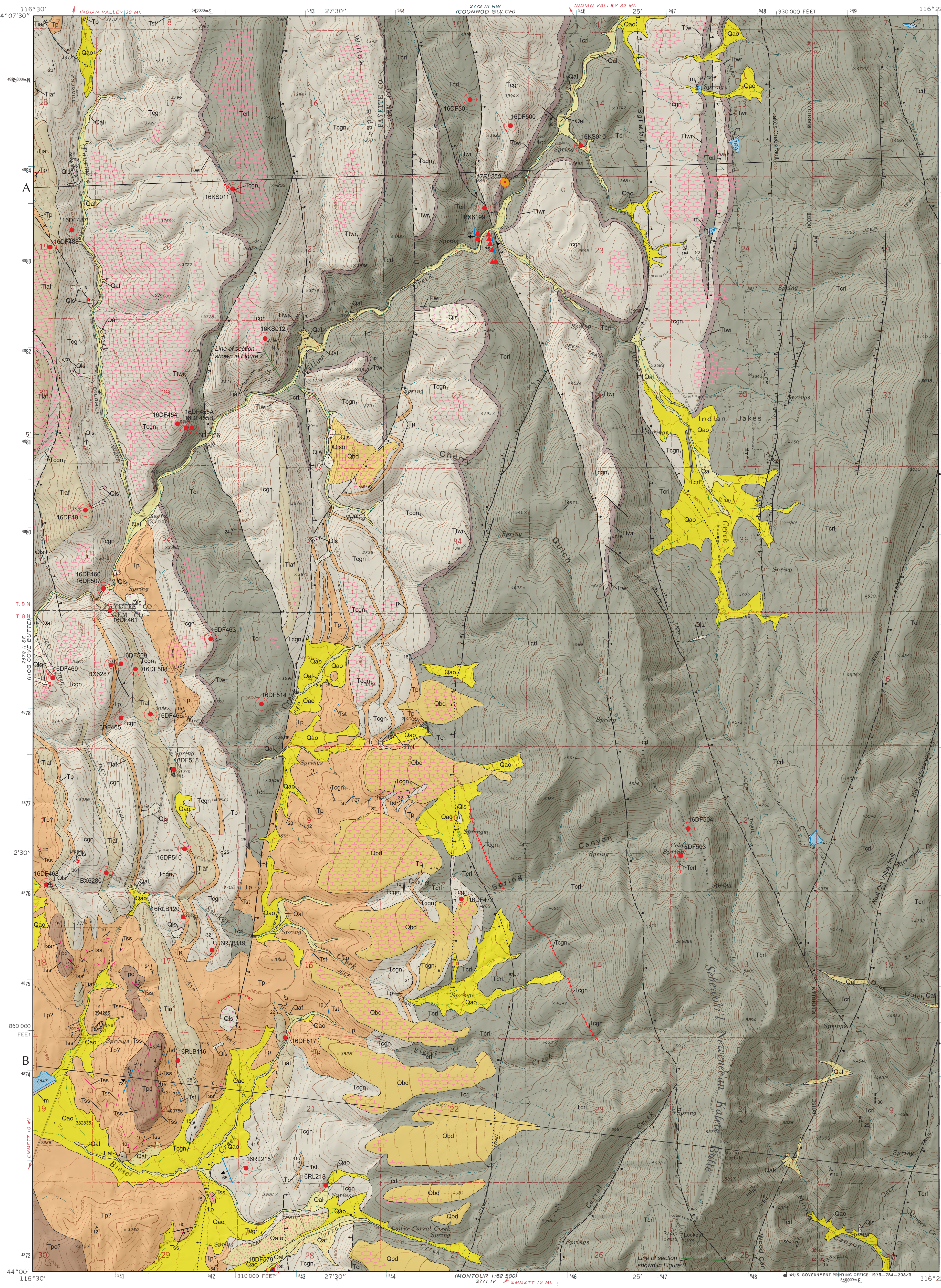
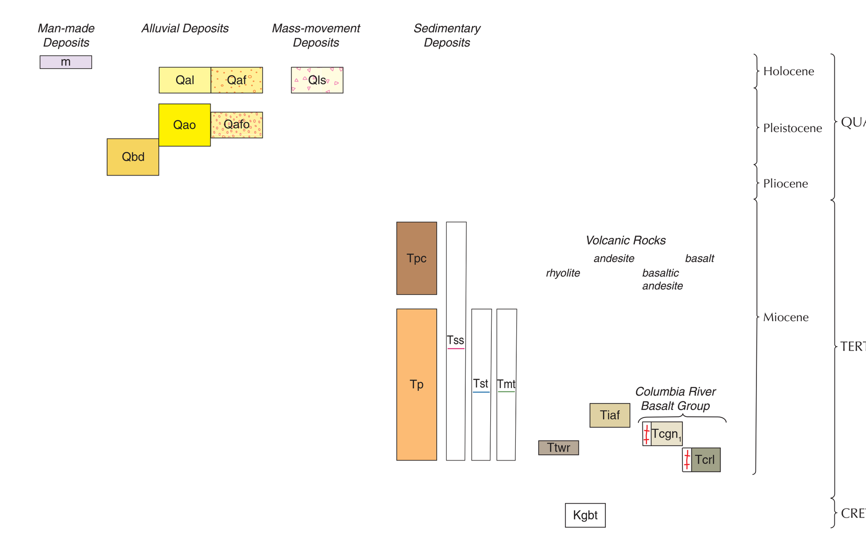
2023



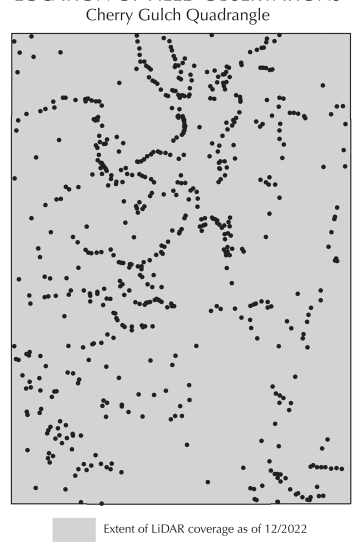
CORRELATION OF MAP UNITS



INTRODUCTION

LOCATION OF FIELD OBSERVATIONS

Cherry Gulch Quadrangle



Extent of LiDAR coverage as of 12/2022

SYMBOLS

DESCRIPTION OF MAP UNITS

MAN-MADE DEPOSITS

ALLUVIAL DEPOSITS

Qafo **Older alluvial fan deposits (Middle? Pleistocene)**—Crudely stratified, crudely sorted, highly dissected sand, silt, pebbles, and cobbles in a subdued fan shape. Cobble and pebble clasts are composed primarily of basalt. Thickness is less than 3 m (10 ft).

Qbd **Boulder deposits (Pleistocene to Pliocene)**—Boulders and cobbles of lower Columbia River basalt composition that mantle the western upland hillslopes of Sehewoki'l Newenee'an Katete Butte. An angular unconformity separates this boulder field from the underlying volcanic bedrock and Payette Formation sediments. Boulders are subrounded, primarily composed of phyric to mega-phyric lower Columbia River Basalt (*Tcrl*), and up to 1.5 m (5 ft) in diameter. Appears as a single layer of boulders less than 2 m (6.5 ft) thick.

MASS-MOVEMENT DEPOSITS

Qls **Landslide deposits (Holocene and Late Pleistocene)**—Silt- to boulder-sized debris from rotational and translational slides involving stiff dense basalt blocks over less competent, poorly consolidated sediments. Hummocky surface is evident in LiDAR-derived hillshade and aerial photography. Thickness ranges from 2 to 30 m (6 to 100 ft).

SEDIMENTARY DEPOSITS

Beds common to one or more sedimentary units:

Tss **Sandstone beds (Miocene)**—Moderately to well-cemented gray, yellow, and brown arkosic to arenitic sandstone in a silica-rich matrix. Typically, coarse to very coarse grained. Grains are largely quartz and feldspar. Beds form resistant ribs, and some exposures may locally be related to fluid flow along faults. Only shown on map where beds are well exposed.

Tmt **Mafic lapilli tuff beds (Miocene)**—Beds of moderately consolidated green and yellow and brown mafic tuff. Scoriaceous clasts are glassy, highly vesiculated, and brown, and typically 1 - 5 cm in diameter. Predominantly volcanic in composition, but some beds contain subordinate sand grains. Only shown on map where beds are well exposed.

Tst **Silicic ash tuff deposits (Miocene)**—Very thick- to thin-bedded, light-blue, gray, to white ash with local small (< 1 cm) pumice lapilli and fine laminae. Massive beds appvear to have been reworked. Dewatering structures, local soft-sediment deformation, and crossbedding is common. While likely more common than indicated, only shown on map where beds are well exposed.

Tpc **Poison Creek Formation (Miocene)**—Coarse- to fine-grained, well-bedded, arkosic sandstone, and weakly to non-consolidated fine bedded to massive medium- to fine-grained arkosic sandstone and siltstone, with subordinate ash deposits. Coarse sands are brown to gray and exhibit large-scale foreset beds suggesting deposition by a system of nearshore lacustrine Gilbert deltas. Coase sands well cemented with silica are mapped as *Tss* (see description above). With exception to the coarse silicified sandstone the unit is poorly exposed. Thickness approximately 50 m (160 ft).

Tp **Payette Formation (Miocene)**—Unconsolidated to weakly indurated tan, very pale orange, grayish-yellow-green, pale greenish-yellow, and off-white coarse siltstone and claystone and subordinate sandstone. Sandstone is fine grained to coarse grained, arkosic, well bedded with mm to 2 cm scale bedding, as well as cross-bedded. Well-cemented, coarse-grained sandstones are mapped as *Tss* (see description above). Generally dipping 5 to 36 degrees with local variations. Beds of blue-gray to white silicic volcanic ash fall found throughout the formation are mapped as *Tst* (see descriptions above). Also present are subordinate beds of moderately consolidated grayish-brown to yellowish-gray basaltic tuff, mapped as *Tmt* (see description above). The Payette Formation overlies the uppermost volcanic flows and is found intercalated throughout the middle Miocene volcanic flows but is most prevalent within Grande Ronde ($Tcgn_1$) and the andesite of Four Mile Road (*Tiaf*). Maximum age of the formation is approximately 17 Ma (Smiley and others, 1975; Jarboe and others, 2010). The minimum age is not well constrained but is estimated at 14 Ma based on the end of the Miocene climactic optimum and ages of regional ash deposits (Böhme, 2003; Nash and Perkins, 2012). Immature paleosols are common throughout the deposit. Unit thickness is approximately 610 m (2,000 ft), not including layers interbedded in volcanic strata.

VOLCANIC ROCKS

Tiaf **Iron-rich andesite of Four Mile Road (Miocene)**—Dark-gray to gray-black aphyric to sugary textured iron-rich andesite. Locally fractured into platey slabs. Iron-rich andesites, called Icelandites by Carmichael (1964), are geochemically distinct by having SiO_2 content between 56 to 65 percent and FeO/MgO ratios greater than three. Unit is difficult to distinguish in field samples from Grande Ronde Basalt ($Tcgn_1$). However, if flow tops are present, stretched vesicles are more prominent in the andesite. Geochemistry indicates many flows of *Tiaf* occurred during $Tcgn_1$ time, however no attempt was made to map individual andesite flows in the main body of $Tcgn_1$. Lambert and others (1995) describe the presence of ferro-andesite in Grande Ronde units and interpret this rock be a result of crystal fractionation. It is possible that *Tiaf* is a chemical variation of Grande Ronde, however we deem its presence is significant and should be mapped where possible. The most notable appearance of *Tiaf* is above $Tcgn_1$ and within Payette Formation (*Tp*) sediments, making it the youngest volcanic flow in the map. In published mapping to the north and northwest (Indian Valley quadrangle, Garwood and others, 2010; Crane Creek Reservoir quadrangle, Feeney and Schmidt, 2019; Paddock Valley Reservoir quadrangle, Feeney and others, 2023; Hog Cove Butte quadrangle, Love and others, 2023). *Tiaf* is associated with a rhyolite flow. In the Northeast Emmett quadrangle *Tiaf* is mapped as a part of Grande Ronde (Tgn_1a, Feeney and others, 2018). There are at least five flows in the Cherry Gulch quadrangle; thickness is difficult to determine because of intercalated relationship and visual similarity to $Tcgn_1$, but some of the later flows are up to 60 m (200 ft) thick.

Ttwr **Tuff of Willow Ridge (Miocene)**—Red, gray, and white massively bedded lithic crystal dacite tuff with a gray, tan, and pink flow-banded welded lapilli rhyolite tuff and dark-gray and yellow to tan basaltic tuff. Occurs as a mappable unit between the Lower Columbia River Basalt (*Tcrl*) and younger Grande Ronde Basalt $Tcgn_1$. A U-Pb zircon TIMS date on sample 17RL250 collected in the northeast part of the map revealed an age of 16.448 ± 0.014 Ma (Figure 1, Table 3). Red-colored tuff consists of 30 percent crystals, 10 percent lithics, and 60 percent devitrified glass; crystals are 60 percent plagioclase ranging from 0.2 to 0.6 mm in size and 40 percent unrecognizable mafic minerals ranging from 0.2 to 0.5 mm in diameter; lithics range from 0.2 to 1.0 mm in diameter. Groundmass is completely devitrified and contains rare microlites. Welded lapilli tuff shows alternating lapilli-rich and ash-rich wavy bands 0.2 mm to 2 cm thick. Lapilli consists of 60 percent lithics of devitrified angular glass fragments with rare plagioclase microlites. The remaining 40 percent is devitrified glass, with abundant spherulites. Basaltic tuff occurs below, intercalated within, and above the other previous two lithologies and consists of palagonite-rich tuff containing scoria clasts and glass fragments up to several cm in diameter in massive and thinly bedded deposits. The basaltic tuff consists of 30 percent crystals and 60 percent glass that occurs as elongate globules and undulating seams between layers of crystals, and 10 percent yellowish clay that surrounds and fills in cracks within crystals and glass globules. Clay is likely to be altered glass. Crystals consist of 75 percent zoned euhedral plagioclase ranging in length from 0.3 to 4.0 mm. The remaining crystal fraction includes 15 percent olivine that is almost completely altered to iddingsite, and ranges from 0.5 to 1.5 mm in diameter, and 10 percent euhedral orthopyroxene and clinopyroxene ranging in size from 0.5 to 0.8 mm. Glass is partially devitrified and occurs in globules of two distinct colors, dark brown and light brown. Uncommon lithics are rounded to angular and consist of intricately banded glass and completely devitrified glass. Yellowish clay alteration forms an anastomosing system of seams in the rock and fills fractures in crystals and glass globules. Unit thickness varies from 3 to 15 m (10 to 50 ft).

Columbia River Basalt Group

The stratigraphic nomenclature for the Columbia River Basalt Group (CRBG) follows that of Reidel and others (2013). In Idaho, the group is divided into five formations. From oldest to youngest, these are the Steens Basalt, Imnaha Basalt, Grande Ronde Basalt, Wanapum Basalt, and Saddle Mountains Basalt (Barry and others, 2013). Work by Kasbohm and Schoene, (2018) indicate that the majority of the Columbia River Basalt (Steens, Imnaha, Grande Ronde, and Wanapum) erupted from 16.7 Ma to 15.9 Ma. Grande Ronde Basalt, from oldest to youngest, has been subdivided into the informal R_1, N_1, R_2, and N_2 magnetostratigraphic units (Swanson and others, 1979). No Wanapum or Saddle Mountains flows are exposed in the quadrangle. An interpretation of all CRBG units in Cherry Gulch quadrangle is shown in Figure 2.

$Tcgn_1$ **Grande Ronde Basalt N_1, flows and dikes (Miocene)**—Dark-gray and mottled olive-green to mottled light-orange, aphyric basaltic andesite. Conchoidal

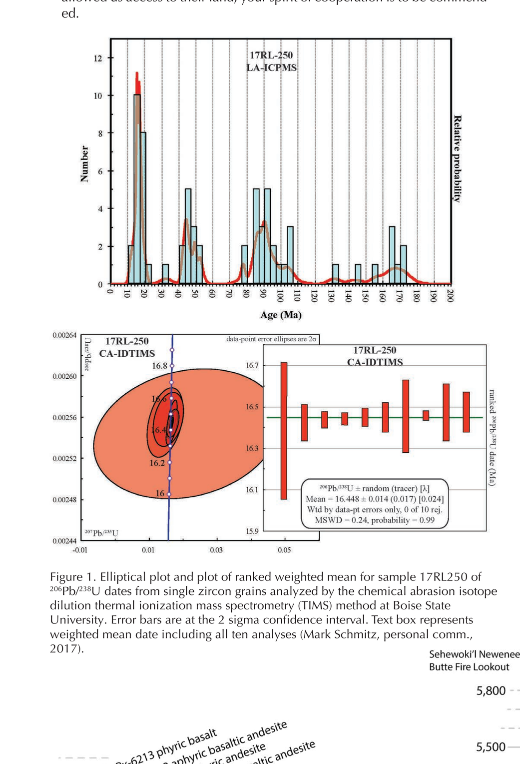
Tcrl **Lower Columbia River Basalt flows and dike (Miocene)**

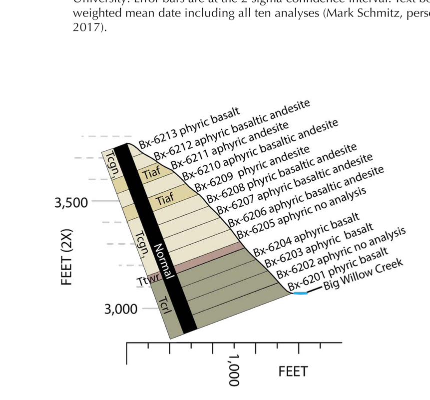
INTRUSIVE ROCKS

Kgbt **Garnet-biotite tonalite (Cretaceous)**

STRUCTURE

ACKNOWLEDGMENTS





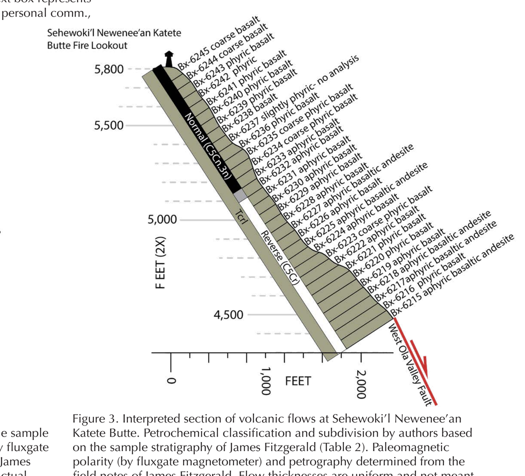
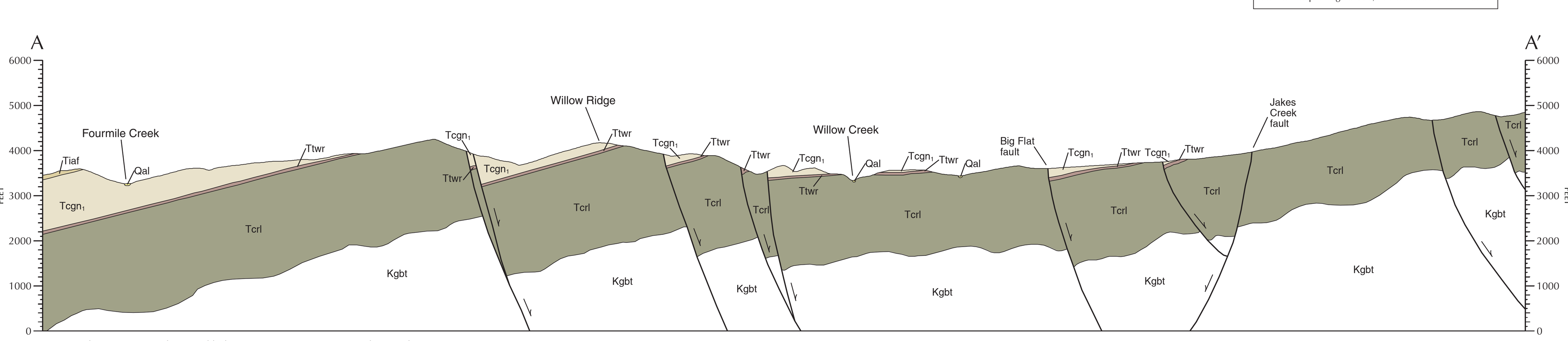


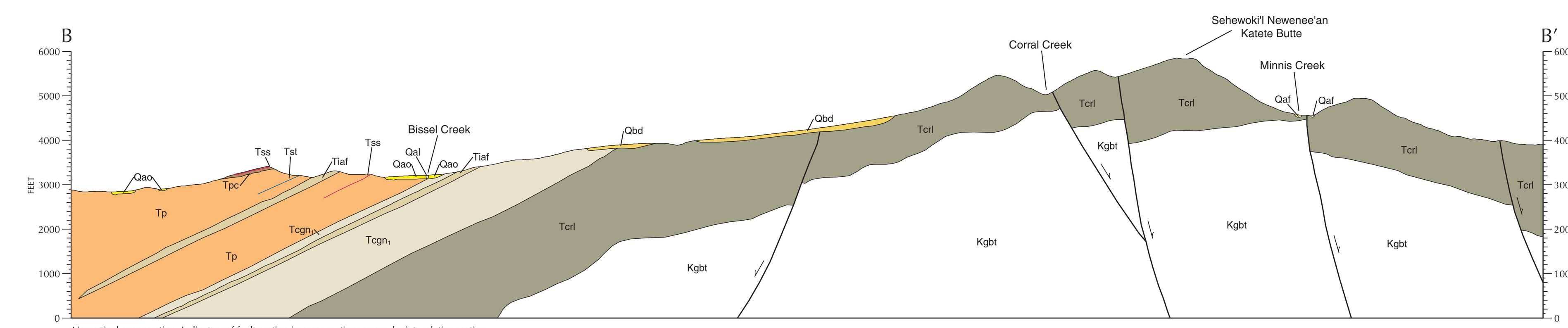
Table 1. Major-oxide and trace-element chemistry of samples collected in the Cherry Gulch quadrangle.

Table 2. Major oxide and trace element chemistry of samples collected from two sections by James Fitzgerald in the Cherry Gulch quadrangle (See Figs. 2 and 3).

Table 3. U-Pb Zircon TIMS Analyses

REFERENCES





Base Map Credit

Topographic base modified from digitally scanned 1:24,000-scale USGS paper map, compiled from aerial photographs taken in 1969. Field checked in 1970.

SCALE 1:24,000

Contour interval 40 feet

QUADRANGLE LOCATION

ADJOINING QUADRANGLES

Field work conducted in 2016.

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