SURFICIAL GEOLOGIC MAP OF THE DIETRICH BUTTE QUADRANGLE, LINCOLN COUNTY, IDAHO

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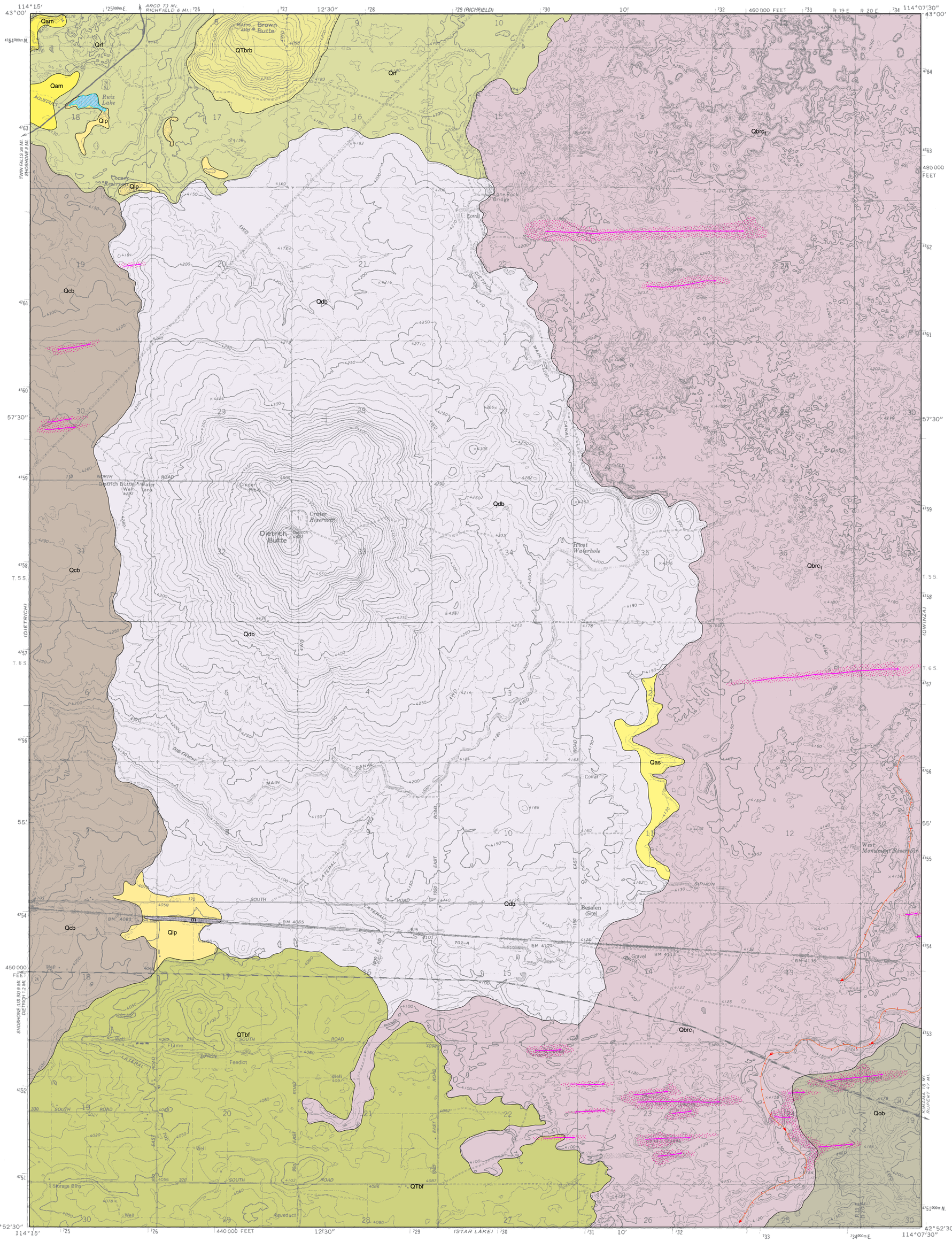


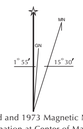
Base map from USGS digital raster graphic base, 1992.

Topography by photogrammetric methods from aerial photographs taken 1969. Updated from aerial photographs taken 1987. Field checked 1987. Map edited 1992.

Transverse Mercator. 1927 North American Datum.

10,000-foot grid ticks based on Idaho coordinate system, west zone.

1000-meter Universal Transverse Mercator grid ticks, zone 11.



UTM Grid and 1973 Magnetic North Declination at Center of Map

SCALE 1:24,000

1 0.5 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0.5 0 1 KILOMETER

QUADRANGLE LOCATION

Field work conducted 2004.

This geologic map was funded in part by the USGS National Cooperative Geologic Mapping Program.

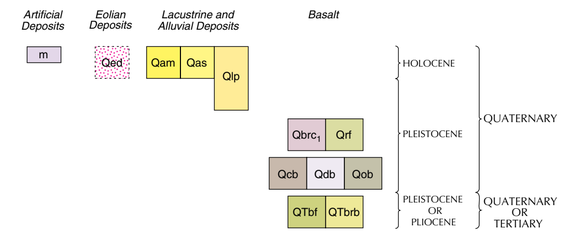
Digital cartography by Jane S. Freed at the Idaho Geological Survey's Digital Mapping Lab.

Map version 9-6-2006.

Note on printing: The map is reproduced at a high resolution of 600 dots per inch. The inks are resistant to run and fading but will deteriorate with long-term exposure to light.

PDF map (Acrobat Reader) may be viewed at www.idahogeology.org.

CORRELATION OF MAP UNITS



INTRODUCTION

The geologic map of the Dietrich Butte quadrangle identifies both the bedrock and surficial geologic units. It shows the geographic distribution of rock types at the surface and in the shallow subsurface. The Dietrich Butte quadrangle lies near the center of the Snake River Plain, a large arcuate, lava-filled depression crossing southern Idaho. Pleistocene basalt flows from shield volcanoes, such as Dietrich Butte, form the land surface. The older basalt flows are mantled with alluvium and wind-blown sand and silt which form the soils that are cultivated. The youngest basalt flow from Black Ridge Crater to the northeast forms the rugged lava land on the east side of the quadrangle. The geologic units in the area control soil development, groundwater movement and recharge, and geotechnical factors important in construction design and waste management. Land uses in the area include grazing, irrigated agriculture, and dairy farms with confined animal feeding operations. The Snake River Plain aquifer underlies the area and discharges to the southwest of the Dietrich Butte quadrangle as springs in the Snake River Canyon.

Modern geologic mapping of the Dietrich Butte quadrangle was started through the U.S. Geological Survey EDMAP program, which supported work by Cooke (1999) and Shervais and Cooke (2004). With support from the U.S. Geological Survey's STATEMAP program, additional field investigations by the Idaho Geological Survey of both bedrock and surficial geology completed the mapping. Earlier geologic mapping was by Malde and others (1963). Exposures of the geology were examined in the field and selectively sampled. Cooke (1999) provides results and interpretation of basalt-sample chemical analysis. Aerial photographs were studied to aid in identifying boundaries between map units through photogeologic mapping of landforms. Soil series information is from Johnson (2002). The information depicted at this scale furnishes a useful overview of the area's geology but is not a substitute for site-specific evaluations.

DESCRIPTION OF MAP UNITS

ARTIFICIAL DEPOSITS

m — **Made ground (Holocene)**—Artificial fills composed of excavated, transported, and emplaced construction materials typically derived locally. Primarily areas modified for railroad beds.

ALLUVIAL DEPOSITS

Qam — **Alluvium of mainstreams (Holocene)**—Channel and flood-plain deposits of the Little Wood River. Channel deposits primarily stratified sand and gravel. Flood-plain deposits primarily silt. Basalt outcrop is common in channels during low water. Thickness 1-20 feet.

Qas — **Alluvium of side-streams (Holocene)**—Primarily fine sand and silt sheet-wash deposits in the drainage between Dietrich Butte and basalt flows of Black Ridge Crater.

MIXED LACUSTRINE AND ALLUVIAL DEPOSITS

Qlp — **Playa deposits (Holocene and Pleistocene)**—Fine sand, silt, and clay sorted into thin beds and laminae. Sediments largely derived from erosion of loess from surrounding basalt surfaces and washed into areas of internal drainage or nearly flat slopes. Form flat to gently sloping fills in shallow depressions primarily between basalt flows. Deposited during periodic floods, especially during periods of heavy rains and times of rapid snow melt. These conditions were probably more prevalent during the Pleistocene, therefore the deposits are mostly relict.

EOLIAN DEPOSITS

Qed — **Dune sand (Holocene)**—Stratified fine sand of stabilized wind dunes. Shown only where identified on aerial photographs (1972 NASA false-color infrared; 1992 NAPP black and white).

BASALT UNITS

The surface geology of the Snake River Plain north of the Snake River is primarily Pleistocene basalt flows of the Snake River Group. On the Dietrich Butte quadrangle, the basalt flows originated from several shield volcanoes within and beyond the borders of the quadrangle. Each volcano probably extruded numerous lava flows or flow lobes, although individual flows cannot easily be mapped, especially on the older surfaces now subdued by surficial deposits. Nearly all of the basalt is vesicular to extremely vesicular and most of the units are also diktytaxitic to some degree (i.e., containing voids with protruding crystals). Even units with a fine-grained groundmass have a coarse, grainy texture. Older basalt surfaces tend to be less rugged and more subdued than younger surfaces, primarily the result of greater accumulation of loess over a longer period of time. Over time, drainage patterns change from essentially no drainage on young, very rugged topography, to radial drainage on older buttes. Likewise, young basalt surfaces support little or no agriculture because of the lack of soil, while the older surfaces with thin to thick soil support a wide variety irrigated of crops and grazing pastures.

$Qbrc_1$ — **Basalt of Black Ridge Crater (Pleistocene)—**Fine-grained, dark gray basalt with scattered small olivine phenocrysts ranging up to about 1 mm in diameter. Remanent magnetic polarity not determined. The vent is located approximately miles northeast of Dietrich Butte. Equivalent to basalt of Black Ridge Crater of Cooke (1999).

Qrf — **Basalt of Richfield (Pleistocene)—**Fine-grained, aphyric to olivine-phyric basalt. Glomerocrysts of plagioclase and olivine ranging in size from 1-2 mm are present in some samples. Remanent magnetic polarity not determined. Erupted from a small unnamed shield volcano located 3 miles north of the quadrangle near the town of Richfield. Flow surface retains youthful features such as pressure ridges, flow fronts, collapsed lava tubes, and lava channels (Cooke, 1999).

Qcb — **Basalt of Crater Butte (Pleistocene)—**Fine- to medium-grained, medium to dark gray, abundantly plagioclase-phyric basalt with common to abundant olivine, some as inclusions or intergrowths in plagioclase. Plagioclase laths typically ~5 mm in length and randomly oriented, forming a coarse open texture of voids and intersecting crystals. Remanent magnetic polarity is normal, as determined in the field. Source is Crater Butte located 3 miles west of Dietrich Butte. Loess covers most of the surface. Loess thickness ranges 3-10 feet and soil caliche (duripan) is commonly well developed with the soil profile and at the soil-basalt contact , but the thickness of caliche is highly variable. Most of the land is cultivatable.

Qdb — **Basalt of Dietrich Butte (Pleistocene)**—Fine-grained, dark gray plagioclase- and olivine-phyic basalt. Plagioclase pheoncrysts are 1.25-3.0 mm in length and olivine phenocrysts are less than 1 mm in diameter. Some olivine has been oxidized to iddingsite (Cooke, 1999). Erupted from Dietrich Butte shield volcano. Surface topography is subdued by soil and eolian cover, but some outcrops occur on radial ridges and pavement outcrops are present on the flanks of the volcano (Cooke, 1999).

Qob — **Basalt of Owinza Butte (Pleistocene)**—Medium-grained, black plagioclase- and olivine-phyric basalt. Plagioclase phenocrysts are lath shaped and range from 0.8-4.0 mm in length. Olivine phenocrysts are 0.3-1.3 mm in diameter. Erupted from Owinza Butte, located 9 miles southeast of Dietrich Butte. Much of the basalt surface is covered with soil and thin eolian deposits, but some pressure ridges and collapsed lava tubes are still visible.

QTbrb — **Basalt of Brown Butte (Pleistocene or Pliocene)—**Fine-grained, black, vesicular to massive plagioclase- and olivine-phyric basalt (Cooke, 1999). Remanent magnetic polarity not determined. Very poorly exposed. A few exposures occur as pavement outcrops along the flanks of the volcano.

QTbf — **Basalt of Bowman Farm (Pleistocene or Pliocene)—**Fine-grained, black, aphyric basalt (Cooke, 1999). Remanent magnetic polarity not determined. Equivalent to Farm Butte basalt of Cook (1999) and Shervais and Cooke (2004). Name derived from land ownership map of farm located near summit of the volcano. Topography is very subdued, retaining no relict volcanic features.

SYMBOLS

Contact: Line showing the approximate boundary between one map unit and another. The location accuracy of an approximate contact is 80 feet or more on the ground.

Lava tube or channel: Relict course of lava that flowed within a relatively narrow tube. Forms a channel where the roof of the tube collapsed.

Trend of dune field. Arrow points in the downwind direction.

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