Geologic Map of the Shoshone SW Quadrangle, Jerome and Lincoln Counties, Idaho

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2005

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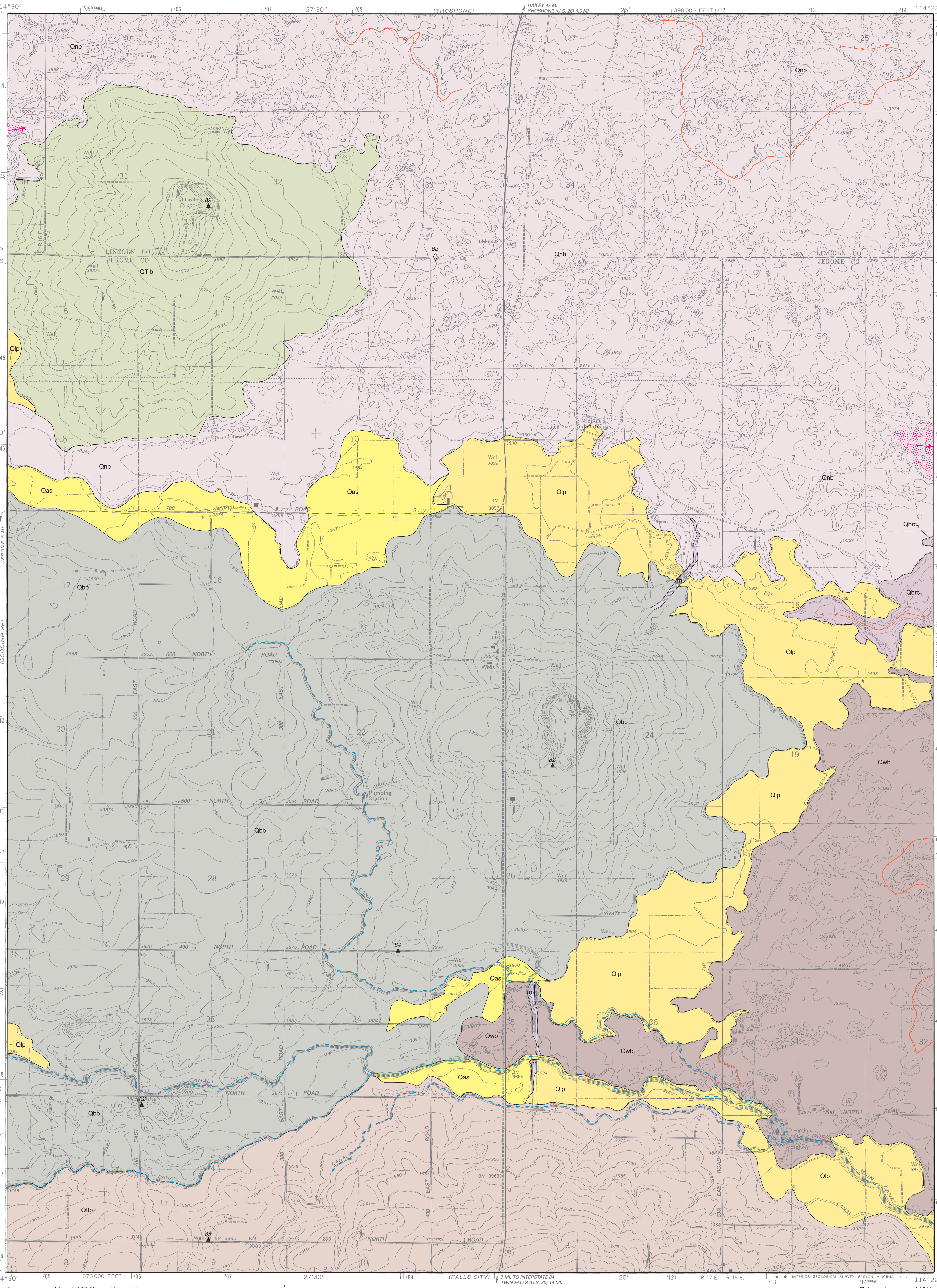


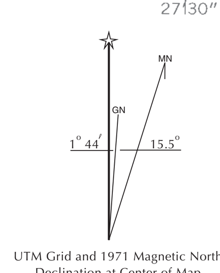
Base map scanned from USGS film positive, 1992.

Topography by photogrammetric methods from aerial photographs taken 1969. Updated from aerial photographs taken 1987 and field checked. Map edited 1992. Conflicts may exist between some updated features and previously mapped contours.

Polyconic projection. 1927 North American Datum.

10,000-food grid ticks based on Idaho coordinate system, central zone.

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



UTM Grid and 1971 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

Contour interval 10 feet.

QUADRANGLE LOCATION

Field work conducted 2003.

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 11-29-2005.

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

CORRELATION OF MAP UNITS

Artificial Deposits	Eolian Deposits	Mixed Lacustrian and Alluvial Deposits	Volcanic Units	Epoch	Period
m	Qed	Qas, Qlp		HOLOCENE	QUATERNARY
		Qlp	Qbrc1, Qnb, Qwb, Qbb, Qftb (0.33 Ma[1], 0.395 Ma[2])	PLEISTOCENE	QUATERNARY
			QTlb	PLEISTOCENE OR PLIOCENE	

Sources of age determination:
[1] Ar^{40}/Ar^{39} weighted mean age, Esser (2005).
[2] Ar^{40}/Ar^{39} weighted mean av erage plateau age, Tauxe and others (2004).

INTRODUCTION

The geologic map of the Shoshone SW 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 Shoshone SW 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 Bacon Butte in the center of the quadrangle, 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 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 irrigated agriculture, rural and urban residential development, industrial and commercial enterprises, and dairy farms with confined animal feeding operations. The Snake River Plain aquifer underlies the area and discharges to the southwest of the Shoshone SW quadrangle as springs in the Snake River Canyon.

Earlier geologic mapping by Malde and others (1963) was reviewed, and field checking of their map was combined with new field investigations in 2003-2004 of both bedrock and surficial geology. Exposures of the geology were examined and selectively sampled. Aerial photographs were studied to aid in identifying boundaries between map units through photogeologic mapping of landforms. 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 remnants of earthen dams used when Bacon Reservoir was used for storage of irrigation water. Dams were built from excavated silt and clay from nearby playa and loess deposits. Dams are being removed over time. Remnants shown are based on 1992 aerial photography.

ALLUVIAL DEPOSITS

Qas **Alluvium of side-streams (Holocene)**—Silt and sand flood-plain and sheet-wash deposits in the drainage systems formed between older and younger basalt units.

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 and active wind dunes. Deposits are thin and primarily accumulated between basalt pressure ridges.

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 Shoshone SW 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 development support a wide variety irrigated crops and grazing pastures.

$Qbrc_1$ **Basalt of Black Ridge Crater, unit 1 (Pleistocene)**—Fine-grained, dark gray basalt with scattered small olivine phenocrysts ranging up to about 1 mm in diameter. Remanent magnetic polarity not determined. Occurs only as small finger extending onto the east edge of the quadrangle, and probably represents the terminus of a flow lobe. A lava channel in this lobe can be traced on aerial photographs approximately 30 miles northeastward to the lava field of Black Ridge Crater. The vent is located approximately 10 miles east-southeast of Richfield. Equivalent to basalt of Notch Butte Basin of Matthews (2000) and basalt of Black Ridge Crater of Cooke (1999).

Qnb **Basalt of Notch Butte (Pleistocene)**—Fine-grained, dark gray basalt. Several flows or flow units with varying characteristics. Some units have common to abundant olivine as grains and clots 1-2 mm and abundant small plagioclase crystals 0.5-1 mm that give the basalt a sparkly character in sunlight; others have a few scattered clusters of plagioclase and olivine 2-3 mm, and scattered plagioclase phenocrysts 1-2 mm; and still others contain glomerocrysts of plagioclase and olivine intergrowths 3-7 mm. Moderately to very vesicular and diktytaxitic. Remanent magnetic polarity is normal, as determined in the field and through laboratory analysis. Erupted from the Notch Butte shield volcano located 3 miles south of Shoshone. Equivalent to Wendell Grade Basalt of Malde and others (1963). Many lava-flow features, like pressure ridges, are exposed and 30-75 percent of the surface is outcrop except south of Lincoln Butte where soil has been added and spread to increase farmable area. Stream drainage is not developed to poorly developed. Discontinuous loess (silt and fine sand) is thin and primarily accumulated in swales and depressions. Soil caliche (duripan) is generally limited to thin soil horizons and coatings on the basalt surface at the base of the soil, but may be thicker in some low areas. Vegetation characterized by sagebrush and grasses, or rarely farmed on flatter, soil-covered areas.

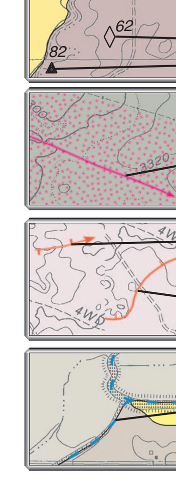
Qwb **Basalt of Wilson Butte (Pleistocene)**—Dark gray to black, fine-grained basalt with common to abundant plagioclase phenocrysts 1-3 mm, fairly common olivine grains up to 1 mm in diameter, and some plagioclase-olivine intergrowths. Remanent magnetic polarity is normal, as determined in the field and through laboratory analysis. Source is Wilson Butte, located about 8 miles east of the quadrangle. Similar to *Qnb* only typically more phyric. Surface also similar to *Qnb* with pressure ridges and little or no drainage development. Vegetation mostly sagebrush and grasses. Age relation with *Qnb* uncertain, but may be slightly older. Gruhn (1961) reports a radiocarbon date of 15,000 years on tooled camel bones found inside a lava tube from Wilson Butte, constraining the eruption of the lava to before that time (Matthews, 2000).

Qbb **Basalt of Bacon Butte (Pleistocene)**—Dark gray, vesicular basalt with vuggy appearance. Contains 10%, 3-6 mm olivine phenocrysts and 3-5%, 1-2 mm plagioclase phenocrysts. Locally diktytaxitic. May exhibit abundant carbonate accumulation in vesicles and fractures. Remanent magnetic polarity is normal, as determined in the field and through laboratory analysis. Erupted from the shield volcano in the center of the quadrangle, which was named for "Bacon Ranch." Name used by Covington and Weaver (1991) who referred to the shield volcano as butte 4000 (from Twin Falls 1:125,000-scale topographic map). Included in Thousand Springs Basalt by Malde and others (1963). Mapped separately as Big Olivine Basalt by Gillerman and Schiappa (2001). Few basalt pressure ridges rise above nearly complete mantle of loess. Surface drainage is moderately developed. Loess thickness ranges 3-25 feet; commonly 3-12 feet thick. Soil caliche (duripan) is commonly well developed within the soil profile (Ames, 2003) and at the soil-basalt contact, but the thickness of caliche is highly variable. Most of the land is cultivatable.

Qftb **Basalt of Flat Top Butte (Pleistocene)**—Fine-grained, medium gray basalt with scattered to very abundant plagioclase-olivine intergrowths 4-7 mm, and olivine grains and clots 1-4 mm. Flows typically vesicular near the top and more dense in the center, but diktytaxitic throughout with abundant fine-grained plagioclase laths. Carbonate coatings and fillings common in voids but not pervasive. Remanent magnetic polarity is normal, as determined in the field and through laboratory analysis. Erupted from the Flat Top Butte shield volcano located 2 miles south of quadrangle. Equivalent to Thousand Springs Basalt of Malde and Powers (1962), Malde and others (1963), and Gillerman and Schiappa (1994, 2001). Tauxe and others (2004) report an 40Ar/39Ar weighted mean plateau age of 0.395 Ma for this unit (their sample sr09, Thousand Springs Basalt). An 40Ar/39Ar weighted mean age of 0.33±0.8 Ma was obtained on our sample 02P002B (Esser, 2005). Topography contrasts with surface of basalt of Notch Butte. Almost no basalt pressure ridges rise above a nearly complete mantle of loess. Surface drainage is moderately developed. Thickness of mantle ranges 3-25 feet; commonly 3-12 feet thick. Soil caliche (duripan) is typically well developed within the soil profile (Ames, 2003) and at the soil-basalt contact, but the thickness of caliche is highly variable. Most of the land is cultivatable.

QTlb **Basalt of Lincoln Butte (Pleistocene or Pliocene)**—Abundantly plagioclase-phyric to plagioclase-olivine glomerophyric basalt. Plagioclase laths typically 2-5 mm; glomerocrysts 4 to 7 mm. Remanent magnetic polarity uncertain. Fluxgate magnetometer gave conflicting normal and reverse polarity readings in the field and laboratory paleomagnetic analysis produced unreliable results, possibly as the result of lightening strikes. Source is unnamed butte with survey point "Lincoln" in northwest part of the quadrangle. Basalt is poorly exposed except near top of butte and at a few isolated locations west of the map area. Included in Thousand Springs Basalt by Malde and others (1963), but we interpret it to be an older shield volcano surrounded by younger flows from Bacon Butte and Notch Butte. Topography contrasts with surface of basalt of Notch Butte. No basalt pressure ridges rise above a complete mantle of loess; basalt crops out only at crest of butte and a few isolated exposures on the flanks. Relief of butte has been subdued both by erosion and accumulation of loess. Loess thickness is greater than 6 feet. Soil caliche (duripan) is typically well developed within the soil profile (Ames, 2003; Johnson, 2002) and at the soil-basalt contact, but the thickness of caliche is highly variable. Nearly all the land is cultivatable.

SYMBOLS



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

Sample site for paleomagnetic analysis.*

Sample site for chemical and paleomagnetic analyses.*

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

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.

Lava flow front: Edge of younger lava flow that erupted onto an older flow from the same source. Includes individual cooling fronts formed during the same eruption. Includes contribution by John W. Shervais (written communication, 2003).

Canal: Trace of major irrigation canal zone that includes area of excavation and side-casted fill. Zone of disturbance ranges 50-300 feet wide.

*Data available at Idaho Geological Survey, igs@uidaho.edu.

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Published and sold by the Idaho Geological Survey
University of Idaho, Moscow, Idaho 83844-3014