

By John H. Niles, Douglass E. Owen, Mel A. Kuntz, Richard H. Lefebvre, Duane E. Champion, Allison C. Barnes, Cooper Brossy, Benjamin R. Brulet, Steven M. Chemtob, Rachel P. Clennon, Nichole Hansen, Shaina M. Keane, Rachel M. Kohler, Brina L. Mocsny, Tiffany A. Rivera, Emerald K. Shirley, Kimberly E. Truitt, Andrew J. Tveter, and Kathryn A. Wetherell

This figure is a comprehensive geological map of the Snake River Plain and surrounding areas in Idaho, USA, showing the distribution of various volcanic units and their relationships. The map includes a detailed legend, a correlation chart, and a series of photographs illustrating specific geological features.

DESCRIPTION OF MAP UNITS

Note regarding unit symbols: Units beginning with a lower case letter are Quaternary units; the "Q" designation has little or no space considerations. The first letter of the label for all volcanic units refers to the type of deposit (e.g., flow deposit, cinder deposit, ash deposit). The second letter refers to the eruptive period (e.g., a=eruptive period A). The number in the label designates the relative stratigraphic position of the deposit within a given eruptive period (e.g., 1 is younger than 2, etc.). The final letter refers to the type of flow deposit or flow associated deposit (a=a flow, p=pahoehoe flow, ss=slabby pahoehoe flow, r=rattled blocks, z=squeeze-out flow).

SURFICIAL DEPOSITS

Qca Colluvium and alluvium (Holocene & Pleistocene)—Colluvium found at base of steep slopes and alluvium in stream drainages (in lower reach of Little Cottonwood Creek it is as much as 27 m thick).

SNAKE RIVER GROUP (HOLOCENE AND PLEISTOCENE)

Lava flows of eruptive period A

Broken Top flow and related vent and ash deposits (Holocene)

fa1p Pahoehoe basalt flow—Broken Top flow is surface-fed from vents, fissures, cracks, and a few small spatter vents on the east and southeast flanks of Broken Top cinder cone. Flow is characterized by hummocky, rough lava with polygonal joints, numerous inflation pits, pressure plateaus, and zones of shelly pahoehoe. This flow has buried portions of the Blue Dragon flow (fa2) and is, therefore, at least slightly younger than the Blue Dragon flow.

ca1 Broken Top cinder cone—The bulk of Broken Top cinder cone is thought to have formed during eruptions from the fissure on the west side of the cone, possibly corral with the Trench Mortar Flat eruptions. West side of cone was actively slumping during formation and displays numerous gravelly faults with ~1 m offset. Cone is cut by fissures associated with the Trench Mortar Flat event. See expanded interpretation of events in the Broken Top Area at right of unit descriptions.

aa1 Volcanic ash deposits—Ash and spatter erupted from vent on west side of Broken Top cinder cone, generally less than 1 m thick.

Blue Dragon flow and related vent deposits (Holocene)

fa2p Pahoehoe basalt-hawaiite flow—Dominantly tube-fed and characterized by dark and light-blue glassy, vesiculated surfaces. The flow is comprised of two lobes that came from fissure-controlled vents at the Spatter Cones (ca2) and the southern part of Big Craters cinder cone (ca5). This flow is generally 1-2 m thick.

fa2s Slabby pahoehoe—Highly viscous lava that was erupted late in the eruptive sequence, or traversed rough topography or flowed down relatively steep slopes.

ca2 Spatter Cones—Composed of agglutinated spatter and cinders that formed around central vents at the southern end of Big Craters cinder cone (ca5). Southern end of fissure system is marked by spatter ramps and pit craters. Fissure system is source for most of the Blue Dragon flow.

Trench Mortar Flat flow and related vent and ash deposits (Holocene)

fa3p Pahoehoe basalt-hawaiite flow with volcanic ash deposits—Trench Mortar Flat flow is a thin, surface-fed flow erupted from the northern part of Trench Mortar Flat eruptive fissure system SE of Big Cinder Butte. Also surface-fed, thin, shelly flows erupted from southern set of fissures northwest of the Watchman cinder cone (ca3). Ash and fine lapilli associated with the Trench Mortar Flat eruptive events are generally <1 m thick.

fa3s Slabby pahoehoe flow—Slabby pahoehoe formed where the Trench Mortar Flat pahoehoe flow continued to flow after its crust had congealed. Slabby pahoehoe also formed from degassed lava erupted directly from the southeast Watchman flank vent.

ca3 The Watchman cinder cone and other cinder mounds—Cinder mounds form on either side of the fissure sets associated with the Great Rift along Trench Mortar Flat. These mounds consist of cinder soils, agglutinated spatter deposits, and occasional volcanic bombs. The Watchman cinder cone, the largest of these deposits, is approximately 140 m high and 750 m in diameter.

North Crater flow and related vent and ash deposits (Holocene)

fa4p North Crater pahoehoe basalt-hawaiite flow—Highly vesiculated surface-fed flow with blue glassy crust; flow contains xenoliths of gneissic, rhyolitic, and pumaceous rocks.

ca4 North Crater cinder cone—North Crater cinder cone was the source for North Crater flow (fa4) and is about 130 m high. Crater is open to the north on northwest side of the cone and the missing wall fragments have been granulated. North Crater has the greatest diversity of xenoliths (e.g., granite, Challis volcanics, andesite, and pumice) of any cone in the park. Ash and fine lapilli are discontinuous and less than 1 m thick.

ca4sh South Highway cinder cone—South Highway cinder cone is corral with North Crater. Most of the cone was destroyed as it was rafted away by trachyandesite flows or swallowed by the collapse back into magma chamber that produced the Highway Fault. Only a sliver of the cone remains on north flank of North Crater. A few prominent remnants of the east side of the cone are left near the North Crater Flow trail parking lot (ca4sh on map). The monoliths on the North Crater Flow Trail are believed to be volcanic necks that fed the cone.

Big Craters flow and related vent and ash deposits (Holocene)

fa5p Pahoehoe Hawaiite flow—Surface-fed flow from eruptive fissures and cinder mantled vents at the north end of Big Craters cinder cone (ca5).

fa5s Slabby pahoehoe flow—Slabby pahoehoe formed where partially congealed lava flowed across a rough surface or on a steep slope.

ca5 Big Craters cinder cone and ash deposits—Big Craters cinder cone has a complex of at least nine nested craters/events suggesting a complex eruptive history. Fissure on northern flank sourced Big Craters flows (fa5 and fa5p). Non-eruptive fissures on western flank are parallel to, but offset from main eruptive fissures. Accumulations of ash on the east flank of Big Craters and the west flank of Inferno cone (c1) are <1 m thick.

Serrate flow (Holocene)

fa6p Block-a'a trachyandesite flow—Surface-fed block-a'a flow with steep flow fronts as high as 5 m; nearly identical to Devils Orchard and Highway flows based on chemistry, petrology and field characteristics.

fa6s Squeeze-out flows—Extensive lobes at the base of steep margins of Serrate block-a'a flow.

fa6r Rattled blocks—These rattled blocks of crater walls as large as 300 m long and 30 m high most likely came from North Crater and South Highway cones.

Devils Orchard flow (Holocene)

fa7b Block-a'a trachyandesite flow—Similar to the Serrate flow (fa6), this flow and the Serrate flow are likely responsible for tearing apart South Highway and North Crater cinder cones. Age relations between this flow and the Serrate and Devils Orchard flows are not known.

fa7r Rattled blocks—Broken wall blocks of a shattered cinder cone, probably North Crater and South Highway cinder cones (ca4 and ca4sh). Rattled blocks are as long as 300 m and as high as 20 m.

Highway flow and related vent deposits (Holocene)

fa8b Block-a'a trachyandesite flow—Highway flow was surface-fed from a vent area between Grass and Sunset cinder cones (ce1 and cg1); flow fronts are as high as 15 m.

fa8p Pahoehoe trachyandesite flow—Surface-fed glassy flow found in the campground area. Unit consists of slab lava locally.

fa8r Rattled Blocks—Source of rattled blocks are most likely North Crater (ca4) and South Highway (ca4sh) cinder cones.

ca8 Cinder Mounds—Irregular-shaped mounds less than 8 m high and 100 m in diameter. Origin is unknown but may be related to eruptions associated with North Crater cinder cone (ca4) or South Highway cinder cone (ca4sh) or associated fissures.

Lava flows of eruptive period C

Indian Wells North flow (Holocene)

fc1a A'a trachyandesite flow—Steep sided a'a flow with numerous lobes. Flow ridges, furrows, and cracks suggest a source vent near the NW side of Big Cinder Butte (cc3).

fc1r Rattled blocks—These rattled blocks of crater walls are as large as 300 m long and 20 m high most likely came from Big Cinder Butte cinder cone (cc3).

fc1z Squeeze-out flows—These squeeze-out flows of pahoehoe form bulbous masses at the base of the steep margins of the Indian Wells North a'a flow.

Sawtooth flow and related vent and ash deposits (Holocene)

fc3a A'a trachyandesite flow—Sawtooth flow is a surface-fed, steep sided flow that contains numerous lobes with steep fronts. Flow is mantled with as much as 2 m of unmaped ash.

fc3s Slabby Pahoehoe—Tumbled, rattled slabs and crusts of pahoehoe. Most of these ash-covered flows occur as late-stage flows of lava that is between major lobes of the Sawtooth a'a flow. Some of the slabby pahoehoe flows appear to be remobilized regions of the Sawtooth a'a flow.

fc3r Rattled blocks—Broken wall blocks derived from Big Cinder Butte (cc3).

fc3z Squeeze-out flows—Bulbous masses of pahoehoe form bulbous from rootless vents at base of steep margins of the Indian Sawtooth a'a flow.

Big Cinder Butte cinder cone—Big Cinder Butte cinder cone has a large

South Echo flow related vent deposits (Holocene)

fc4p Pahoehoe basalt flow—This surface-fed flow that was erupted from fissures between Echo Crater and The Sentinel cinder cones; almost entirely covered by cinders, fine lapilli, and vegetation.

cc4 Spatter ramp deposits—Spatter ramps flank eruptive fissures between The Sentinel and Echo Crater cinder cones; though they are mostly covered with cinders and vegetation, some reach a height of 10 m.

The Sentinel flow (Holocene)

fc7p Pahoehoe basalt flow—Surface-fed flow erupted from craters and flank vents of The Sentinel cinder cone (cc7). The flow is almost entirely covered by cinders and thick sagebrush, but there are periodic linear outcroppings of rough pahoehoe lava 1-2 m high, possibly corresponding to old pressure/flow ridges.

cc7 The Sentinel cinder cone—About 110 m high and has at least five crater vents suggesting a complex eruptive history. Agglutinated cinder layers lit away from some craters forming cliffs up to 3 m high. The series of craters roughly parallels the Great Rift.

Lava flows of eruptive period D

Silent Cone flow (Holocene)

fd1p Pahoehoe trachyandesite flow—Silent Cone pahoehoe flow is buried proximal to Silent Cone by Big Craters (fa5) and Blue Dragon (fa2) flows; distal portions show numerous distributary lobes.

fd1a A'a flow—Silent Cone a'a flow is found in the distal portion of the Silent Cone pahoehoe flow (fd1p) and contains bulbous lobes.

fd1r Rattled blocks—Broken wall blocks derived from Silent Cone (cd1).

cd1 Silent Cone cinder cone—Consists of three nested vents that suggests a complex history; cone is 150 m high, faulted, and open to northwest.

Little Laidlaw Park flow (Holocene)

fd4a A'a hawaiite flow—A'a flow with steep bulbous flow fronts as high as 10 m.

Lava flows of eruptive period E

Grassy Cone flow and related vent and ash deposits (Holocene to Pleistocene)

fe1p Pahoehoe Basalt flow—Surface and tube-fed pahoehoe flow from source vents at Grassy Cone (ce1). Inflation pits, pressure ridges, and inflation cliffs are dominant features of the flow. This is on the opposite side of the cone (ca5) from where the slope of the surface was steepened.

fe1a Pahoehoe Basalt flow—Grassy Cone flow is a surface and tube-fed pahoehoe flow from source vents at Grassy Cone (ce1). Inflation pits, pressure ridges, and inflation cliffs are dominant features of this flow.

ce1 Grassy Cone cinder cone and ash deposit—Consists of 5 nested craters that suggests a complicated eruptive history and is about 110 m high. Ash deposits (ae1) are well bedded ash and lapilli from vents at Grassy Cone and are as much as 1 m thick near the cone.

Lava flows of eruptive period G

Sunset flows and related vent and ash deposits (Latest Pleistocene)

fg1p Pahoehoe basalt-hawaiite flow—Sunset flows are surface and possibly tube-fed flows from the Sunset Cone cinder cone (cg1). Sunset NW flow erupted from obscure vents now represented by lava mounds deeply mantled by cinders and ash, that are just NW of Sunset Cone.

cg1 Sunset Cone cinder cone and ash deposit—A complex of eight nested craters, which indicates a complicated eruptive history; cone is 140 m high. Well-bedded ash and lapilli are east flank of Sunset Cone (cg1) up to 2 m thick.

Carey flow (latest Pleistocene)

fg2p Pahoehoe basalt-hawaiite flows—Flow is believed to have originated from Sunset Cone and flowed 50 km to the southwest.

fg2a A'a flow—Carey flow a'a has steep flow fronts as high as 5 m and appears to have formed where Carey flows flowed over steep slopes.

Lava flows of eruptive period H

Crescent Butte flow and related vent deposits (Latest Pleistocene)

fh1p Pahoehoe basalt flow—Surface-fed, pahoehoe flow that issued from Crescent Butte cinder cone (ch1); majority of flow is vegetated and covered by a thin deposit of colluvium.

ch1 Crescent Butte cinder cone—Crescent Butte cinder cone is believed to be the oldest cone in the Craters of the Moon Lava Field. The western side of the cone is covered in ash from Trench Mort