GeoNote 33

Geologic History of the Snake River Canyon Near Twin Falls, Idaho

Spectacular geologic features formed by fiery volcanic eruptions and raging floodwaters record the violent processes that have shaped the canyon of the Snake River near Twin Falls, Idaho.

Geologic History

Twin Falls lies within the Snake River Plain, a region of lava plains and steep canyons extending across southern Idaho. Many geologists think the Snake River Plain formed as the North American continent migrated westward over an exceptionally hot zone, called the Yellowstone hot spot, deep inside the earth. This zone has created intense volcanism in southern Idaho for the past 15 million years and is now under Yellowstone Park.

Major volcanism started around Twin Falls 10 to 12 million years ago when this region passed over the hot spot. Basalt magma moved up from the earth's mantle into the crust, where it melted granitic crustal rocks and formed large buried pools of molten rhyolite. Hundreds of cubic miles of this hot material erupted violently in repeated explosions many times more powerful than the 1980 Mount St. Helens explosion. These eruptions spread layers of welded tuff over hundreds of square miles and excavated gaping calderas (craters many miles across) that later were filled by lava flows. Nine successive sheets of welded tuff, which together measure 1,300 feet thick, were laid down in the hills a few miles south of Twin Falls. The sheets become thinner to the south away from the plain, supporting the idea that they were erupted from the Twin Falls region. An example of the type of lava flow that filled the calderas is the Shoshone Falls rhyolite. It is several hundred feet thick and can be traced for about 6 miles along the bottom of Snake River canyon.

After the rhyolitic volcanism ended 6 to 7 million years ago, even hotter basaltic lava from deeper in the earth started to erupt onto the surface. These basalt eruptions were not explosive like the earlier rhyolite eruptions; thus, calderas were not formed. Instead, most of the basalt issued from fractures to form broad, low-profile, shield volcanoes and lava that flowed away from the shields. Such basaltic volcanism occurred episodically in the central part of the Snake River Plain up to a few thousand years ago, and may occur again. Shield volcanoes visible east and south of Twin Falls include the Skeleton, Hansen, Stricker, and Hub buttes. The flows from these volcanoes appear in the walls of Snake River canyon. Shields southwest and west of Twin Falls are Berger Butte, others farther south, and two near Castleford. Many shields are prominent north of the Snake River, including Flat Top Butte, Sonnickson Butte, Wilson Butte, and Notch Butte.

Several million years ago a broad region northwest of the Twin Falls area started sinking, as the earth's crust was stretched and thinned. This spreading depression became the western Snake River Plain, a topographic basin that extends into eastern Oregon. The basin also held Lake Idaho, which at its maximum was about the size of today's Lake Ontario. Lake Idaho was drained completely between 1 and 2 million years ago, after Hells Canyon gorge was cut. The landscape around the lake was fairly flat before it drained, since the Snake River and its tributaries had not yet eroded into the volcanic rock layers. Canyon cutting started once the lake drained. Volcanism, however, was also still in progress and produced basalt flows that dammed streams and rivers and filled the earlier canyons.

Two basalt flows which did exactly this are conspicuous along the north wall of the Snake River canyon from Twin Falls to the Thousand Springs area. The Thousand Springs basalt, most of which erupted from Flat Top Butte east of Jerome, flowed westward for more than 25 miles. It filled an earlier canyon from about Rock Creek westward. Thousands of years later, after a new canyon had eroded along the south edge of the Thousand Springs basalt, another major eruption, this time from a butte about 8 miles north of Hazelton, produced much of the Sand Springs basalt. This lava flowed southwestward into the new canyon and followed and filled it all the way to Thousand Springs, a distance of more than 36 miles.

During the last Ice Age, Lake Bonneville covered much of northern Utah. About 15,000 years ago, the lake breached a weak spot in its northern rim. The outlet was quickly cut down by an increasing torrent, and the huge lake began to drain rapidly into southeastern Idaho. The resulting deluge has been named the Bonneville Flood. It followed the course of the Portneuf River to the Snake, then down the Snake past Twin Falls and on to the Pacific Ocean. The size of this natural disaster is hard to imagine in its mega-proportions. The lake level dropped 400 feet. The flood lasted from only a few weeks to a few months. Its maximum flow was as great as 33 million cubic feet per second. This is roughly 2½ times greater than the largest flood ever observed for the world's largest river, the Amazon. One stream of the flood, the Rupert channel which had been diverted from the Snake River upstream and had flowed across the lava plain to the north, rejoined the main channel near Twin Falls. The water poured over the north canyon rim along a 6 mile stretch, eroding the rim back and leaving a series of rapids and waterfalls in the main channel. Altogether, the Snake River drops about 530

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feet in the 10½ mile stretch from above Twin Falls to the mouth of Rock Creek.

The Snake River Canyon

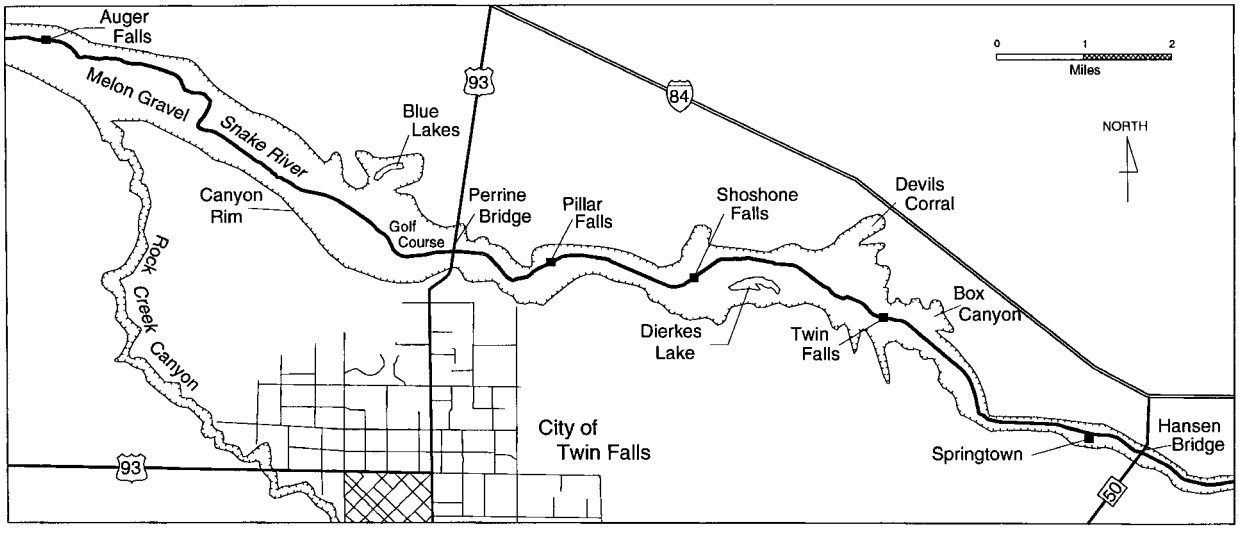
In the canyon north of Twin Falls the lowest volcanic layer exposed is a thick rhyolite lava flow, the reddish brown Shoshone Falls rhyolite. It is several hundred feet thick, but only the upper part is exposed. Several darker basalt flows that erupted from volcanoes farther east and north of the canyon lie on this rhyolite flow. The largest of several short side canyons north of the river are Blue Lakes Alcove, Devils Corral, and Box Canyon. These side canyons were eroded back from the main rim during the Bonneville Flood and mark the downstream end of the Rupert channel. Blue Lakes, like several other lakes in the canyon, is fed by large springs and occupies a deep pool eroded during the flood.

At Hansen Bridge the canyon is 350 feet deep and 700 feet across. Two hundred feet of the basalt visible here was erupted from Hansen Butte, and the top flows north of the canyon are from Skeleton Butte. In the 1870s gold was mined at Springtown in the bottom of the canyon half a mile downstream from the bridge. The placer gold deposits at Springtown, as well as those at several other places along the Snake River, formed during the Bonneville Flood.

At Perrine Bridge the canyon is 485 feet deep and nearly 1,500 feet across. The Shoshone Falls rhyolite is the lowest visible volcanic unit here and is well-exposed downstream where it forms the large bench that is the setting of the Blue Lakes golf course. The 150-foot-high cliff at the river's edge, a quarter mile downstream from the bridge, clearly reveals the interior of this gigantic rhyolite lava flow. At Perrine Bridge the basalt is from Hansen Butte and older sources; the top flow on the north side of the canyon is the Sand Springs basalt.

Shoshone Falls is a magnificent waterfall. This 212-foot-high "Niagara of the West" was carved into the massive rhyolite lava flow. The first white man to see it was William Price Hunt in 1811; it was named by Major Osborne Cross in 1849. At least three people — Harry Wilson in 1905, Al Faussett in 1929, and Tom Rauckhorst in 1974 — have deliberately dived over Shoshone Falls and lived to tell about it. The Twin Falls waterfall originally was a 180-foot drop distributed in two channels, but the south fall was blocked in 1935 by the power plant. At the fall the water goes over a very thick basalt flow, the oldest in this part of the canyon.

Other smaller waterfalls on the river that are relics from the Bonneville Flood include Pillar Falls, which is carved in the Shoshone Falls rhyolite, and Auger Falls, which is carved in basalt. Accumulations of large basalt boulders litter much of the floor of the canyon downstream from the Blue Lakes area. These rocks were ripped from the canyon rims and deposited in gigantic gravel bars during the flood. The boulder deposits have been whimsically named the Melon Gravel after similar boulder deposits near Hagerman that resemble fields of watermelons.



Places of geologic interest in the Snake River canyon.

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