GeoNote 12

Geology and Mineral Resources of the Saylor Creek Bombing Range and Eastern Owyhee County

The high desert landscape of remote eastern Owyhee County's broad plateaus and deep canyons reflects a turbulent geologic history. The region's complex volcanism may be related to the formation of certain deposits of precious metals and industrial minerals. Such deposits are a major economic resource for the mineral industry and the nation. At present, the region is occupied by the U.S. Air Force's Saylor Creek Bombing Range and the additional land being proposed for its expansion. This proposed land needs to be evaluated for precious metals and other mineral potential before it is possibly closed to mining.

Miocene Volcanism

The pastoral desert we see today was very much different in the geologic past. About 11 million years ago during what geologists call Miocene time, the region east of Grasmere shuddered with volcanic explosions so enormous and violent that the Air Force bombs being tested on the range would seem like firecrackers by comparison. The land in the proposed expansion is underlain by the products of this volcanic activity and by the deposits from a large ancient lake created later in the Miocene when the Snake River downwarp began.

During the late Miocene volcanic explosions spewed rolling clouds of hot ash across the surface. As the ash settled and layers of thick ash cooled, the resulting deposit formed a rock geologists refer to as welded rhyolitic ash-flow tuff. Later, these ash eruptions waned, and a new type of volcanic activity began. Sticky, molten rhyolite lava at temperatures of 1,000°C rose up through the Earth's crust and flowed over the land. The huge quantity of material evacuated in these eruptions caused the land surface to sink in an elongate 60 by 35 mile depression called a caldera and identified today as the Bruneau-Jarbidge eruptive center. Following the land's subsidence, numerous arcuate faults or fractures in the ground formed on the perimeter of the caldera. Eventually, small streams and lakes evolved in the valleys along the fault zones, trapping incoming sediment and wind-blown volcanic debris in a ringlike basin or moat along the caldera's outer edge.

Over time the area's volcanism continued to change in composition and appearance. More than forty basaltic shield volcanoes arose within the eruptive center. These vents to the magma below supplied numerous thin basalt flows that now cover most of the eruptive center's interior and form the present land surface. The canyons carved by the Bruneau and Jarbidge Rivers slice through hundreds of feet of pink rhyolitic rocks capped by layers of this black basalt.

Lake Idaho

About 8 million years ago the western Snake River Plain began to founder. A Lake Ontario-sized body of water formed in a broad basin that stretched from present-day Twin Falls to Baker, Oregon. This Pliocene-Pleistocene lake is known among geologists as Lake Idaho. Thick layers of white and tan ash, clay, silt, sand, limestone, and gravel—visible today near Grand View—were deposited in the giant lake. Fossilized plants, fish, and horse bones are common in these 1 to 7 million-year-old sedimentary rocks. Lake water quenched and altered subsequent basaltic lava flows into the lake, thereby recording the locations of old shorelines for discovery by today's scientists.

Mineral Resources

Certain metallic and nonmetallic (industrial) mineral deposits, like those found in Owyhee County, are commonly associated with volcanic rocks of this period. This long-lived volcanic activity supplied the heat and perhaps the rare metals to the circulating groundwater. Epithermal deposits of gold and silver were formed by the action of hot water circulating along fractures

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in rocks near the surface. As hydrothermal minerals like quartz and pyrite precipitated in thick veins or thin hairline fractures, they were accompanied in places by deposits of precious metals.

An example of an epithermal gold-silver deposit is the DeLamar Mine in western Owyhee County. The mine is in deposits associated with 15-million-year-old rhyolite lava domes. A recently discovered deposit near Lake Owyhee in eastern Oregon contains over a million ounces of gold in veins in sandy sediments interbedded with basalt. Similar precious-metal occurrences in eastern Oregon and southwestern Idaho expose siliceous sinter, an outflow product of old hot-spring activity. Both historically and currently, epithermal and hot-spring related deposits supply a substantial portion of the U.S. production of gold and silver.

Several useful industrial minerals are also common in this region of past volcanic activity. Volcanic cinders are mined for landscaping and road material. Diatomite and zeolite in the lake sediments have commercial applications as extenders in paints and plastics and as filtering and absorbing agents. The lake environment also produced valuable deposits of limestone and sand and gravel, large quantities of which are used by the construction industry.

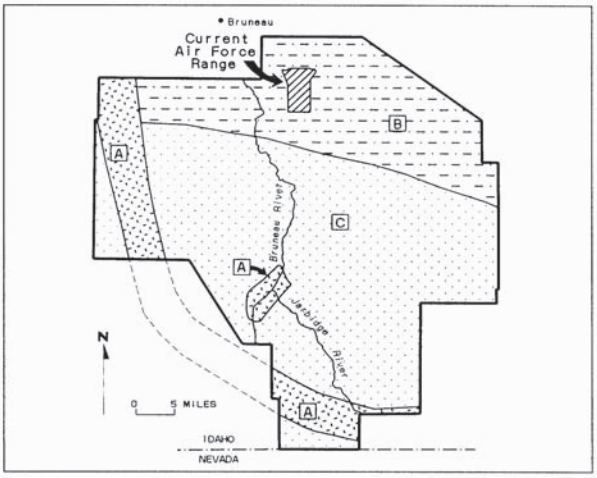
Saylor Creek Bombing Range

The accompanying map shows the outline of the originally proposed expansion of the Saylor Creek Bombing Range and three areas—A, B, and C—identified for their somewhat different geology.

Area A occupies a 5-mile-wide swath along the western and southern margin of the Bruneau-Jarbidge eruptive center. It is underlain by the moat zone—the volcanic and lake sediment-filled basin created by faulting along the perimeter of the eruptive center. Known mineralization here includes the Bruneau jasper deposit and associated alteration in the rhyolite. The area also crosses the Sheep Creek and Cat Creek drainages where poorly exposed lake sediments reportedly contain jasper, opal, locally silicified diatomite, and perhaps cinnabar.

Area B, in the northern portion of the range, is underlain by the Miocene and Pliocene lacustrine sediments of Lake Idaho. In some places the sediments are interbedded with and covered by basalt. Detailed geologic studies of the lake sediments are just starting.

Area C constitutes the bulk of the range and is underlain mostly by basaltic rocks. Some weak silicification on faults is rumored. The most likely economic nonmetallic minerals to be found are volcanic cinders, flagstone, and gravel deposits.



Three different geologic environments (areas A, B, and C) are identified within the originally proposed expansion of the Saylor Creek Bombing Range.

Conclusion

Little mineral exploration has been undertaken in the Bruneau-Jarbidge and Saylor Creek areas because of the region's remoteness and present land-use status. Nevertheless, the geology of the Saylor Creek area is similar to that in eastern Oregon where gold has recently been discovered. Furthermore, this region represents a local source of building and industrial materials, such as limestone and sand and gravel, for the expanding Boise and Twin Falls areas. This promise of mineral potential suggests that the enlarged bombing range should be thoroughly examined before decisions affecting its long-term future are made.

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