

ORIGIN AND GEOTHERMAL POTENTIAL OF ISLAND PARK, EASTERN IDAHO
Christiansen, Robert L., U.S. Geological Survey, Menlo Park, CA
94025

Island Park is a topographic basin of compound origin related to the three rhyolitic cycles of the Yellowstone Plateau volcanic field. Big Bend Ridge, the southwestern rim of Island Park, bounds a segment of the first-cycle caldera, which formed by collapse during the Huckleberry Ridge Tuff eruption 1.9 m.y. ago and which extended 90 km eastward into Yellowstone National Park. Thurmon Ridge, the northwestern rim of Island Park, bounds part of a second-cycle caldera 20 km across that formed 1.2 m.y. ago as a result of the Mesa Falls Tuff eruption and is nested within the older caldera. This collapse event reactivated caldera faults on Big Bend Ridge. The rest of the first- and second-cycle calderas are buried by the third-cycle 0.6 m.y.-old Lava Creek Tuff and younger volcanic rocks. The eastern rim of Island Park is not a caldera scarp but is formed by large rhyolite flows of the third cycle. These flows all vented on the Madison Plateau farther east.

The youngest major rhyolitic eruptions at Island Park occurred about a million years ago. Subsequent solidification of the rhyolitic magma bodies that sustained the first two cycles allowed tectonic fracturing of the resulting plutons and eruptions of mantle-derived basaltic magma through the caldera floor during the last 300,000 years. Because no major silicic magma body now lies beneath Island Park, a high-temperature geothermal system similar to Yellowstone is not likely. The granitic plutons are still cooling, however, and a lower-temperature geothermal resource might exist at moderate depth.