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GEOLOGY OF HOT SPRING SYSTEMS NEAR SHOUP, LEMHI COUNTY, IDAHO  
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Detailed mapping and chemical analyses of thermal water were carried out in three hot spring areas near Shoup, Lemhi County, Idaho: Big Creek (BCHS), Owl Creek (OCHS) and Horse Creek (HCHS). Source temperatures, based on geochemical thermometry, and depth of equilibration were estimated to be 181°C at 3.4 km and 127°C at 2.4 km for BCHS and OCHS respectively. Two vent systems are present at HCHS, 40°C at 0.5 km and 70°C at 1.0 km. Slightly above normal geothermal gradients are probably due to elevated radioactivity levels in nearby epizonal Eocene plutons.

The vents at BCHS and OCHS occur within active, NW-trending fracture zones in a Precambrian terrain which has a strong linear-planar fabric imprinted by at least three deformational episodes. At BCHS vents occur where fracture zones intersect structurally isotropic rock causing these zones to widen and fracture density to decrease. At OCHS vents are controlled by a minor reverse fault in a shear zone located at the corner of a fault block.

The vent system at HCHS is located in a NW-trending cataclastic border zone between the Eocene Painted Rocks Lake pluton and the Precambrian terrain. The higher temperature vents are adjacent to a cross-cutting plug of quartz latite porphyry while the lower temperature vents are controlled by a minor strike-slip fault that dilates fractures increasing permeability.

The BCHS geothermal system has the potential for generation of electricity but its distance from population centers precludes development at present.