

## **Composition of the geothermal fluid at 4500 m depth in the hottest geothermal borehole in Iceland**

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The Icelandic Deep Drilling Project (IDDP) explores the economic potential of geothermal fluids at the deep roots of active geothermal systems. This includes evaluation of the feasibility of exploiting supercritical fluid for energy production and/or whether it is possible to extract economically valuable material directly from this fluid. We have studied the geothermal fluids trapped in minerals as fluid inclusions from the bottom (>4500 m) of the deepest and hottest geothermal borehole in Iceland, IDDP-2, where direct sampling of geothermal fluid is impossible. Our data suggests that the temperature of the geothermal fluid at this depth is ~600 °C, and the pressure corresponds to near-hydrostatic conditions. At these conditions the fluid is separated into a H<sub>2</sub>O-rich steam with an estimated enthalpy of 59.4 KJ/mol and a Fe-K-rich brine, which contains up to 2000 µg/g Cu, 3.5 µg/g Ag, 1.4 µg/g U and 0.14 µg/g Au. These compositions indicate that the IDDP-2 borehole not only samples high-energy steam, but also a potentially ore-forming fluid. Similar fluid(s) should be common at mid-ocean ridges worldwide and can be regarded as the source fluids of Volcanogenic Massive Sulfide (VMS) ore deposits.