

*Drilling at the Summit of Kilauea Volcano* 199

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A borehole has been drilled to a depth of 1262 m beneath the summit of Kilauea Volcano on the island of Hawaii. The purposes were two-fold: to obtain engineering information related to the possible occurrence of geothermal energy in a basaltic volcano and to obtain scientific information about the internal nature and workings of Kilauea Volcano. Because the location of the borehole is within Hawaii Volcanoes National Park, the drilling could not have the production of steam as its objective. Accordingly, the drilling program was carried out in a manner intended to minimize the chance of a steam eruption and maximize the chances of gathering scientific information. The fact that the borehole was drilled without encountering any significant difficulties is in itself a measure of success. It was found that the interior of the volcano was not nearly as inhospitable an environment as some people anticipated. In fact, the only difficulties met in drilling were related to the remoteness of the location from normal sources of supply. Although there are numerous occurrences of very hot surface rocks close to the drillsite, the borehole penetrated only cool rocks until the water table was entered at a depth of 490 meters. From this level to nearly sea level, at a depth of 1102 m, a complicated temperature profile was observed, with temperatures varying between 60°C and 90°C. The groundwater in this zone appears to have a salinity roughly equal to that of sea water. It is thought that a convection system exists over this interval. At greater depths, the permeability of the rock is markedly reduced, though the porosity and water content remain high, in the range from 20 to 25 percent. The bottomhole temperature is 137°C, and the gradient over the last 100 m of hole is about 400°C per kilometer. If the hole were located in an area where production of geothermal energy could be undertaken, it is possible that production of commercial-quality