

PLANNING FOR MITIGATION OF THE GEOTHERMAL SYSTEM TO ALLOW DEVELOPMENT OF THE LIHIR GOLD PROJECT, LIHIR ISLAND, PAPUA NEW GUINEA

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ABSTRACT

The Lihir Island orebody is located at an elevation just above sea level within the Quaternary-age Luise Caldera of Lihir Island, Papua New Guinea. The caldera is breached by the sea on its northeast side. Hot fluids rising from a still-active geothermal system are believed to have deposited gold in brecciated rocks of the caldera. The orebody is to be mined in a 2 x 1.5. km open pit that ultimately will reach a depth of about 220 m below sea level. Within the caldera, there is intense surface geothermal activity in the form of steaming ground, fumaroles, boiling springs and gas seeps. At the floor of the proposed mine, rock temperatures are as high as 170° C and immediately adjacent to the proposed western margin of the mine, temperatures reach 240° C at a depth of about 300 m.

To provide a design that will allow mining to proceed safely, GeothermEx, Inc. and Kennecott Corporation (a subsidiary of RTZ Corporation) performed extensive field investigations, conceptual modeling of the field and numerical simulation of the impact of excavation on the hydrological system. The dewatering and geothermal mitigation plan, which is based on the results of the numerical simulation studies, involves a combination of pumped wells, geothermal discharge wells, and pressure relief wells to dewater the pit, prevent hydrothermal eruptions, and prevent inflows of both hot geothermal fluids and seawater. Pumping will typically total about 1.25 m³/s; geothermal discharge will average about 200 kg/s; and together these are anticipated to draw the water table down to about 220 m below sea level during the planned 15-year mine life.

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