



Mining problems caused by the presence of underground water in a mining site and possible solutions: An example from Iran

A. Kamkar-Rouhani

Shahrood University of Technology, Iran (kamkarr@yahoo.com / Fax: +98 273-3334419 / Phone: +98 273-3335509)

Presence of underground water in mining activities is one of the main problems, which reduces the production efficiency. In addition to its economical and environmental impacts on the mining area, design of drilling and blasting patterns would be more complicated in such conditions. The problems due to the presence of groundwater in a mining site can be divided into technical and operational problems. Reduction of slope stability of the mine walls is one of the most important technical problems, which may necessitate lower slope angles for the mine walls in the case of open-pit mines. The technical problems lead eventually to operational problems such as drilling, explosion, exploitation and transportation problems as well as environmental problems, which will result in increasing the mining costs. Reduction of ore recovery to avoid slope stability problems in the mine walls is also an operational problem, which reduces mining profit. Reduction of the efficiency of mining equipment and increase in maintenance costs can be mentioned as other important operational problems.

Such problems caused by the entry of groundwater to the main mining site of Gol-e-Gohar iron ore mine, in the south of Iran, have almost stopped the mining operations in the site. These problems have made mining experts seek proper solutions. Since the presence of groundwater leading to the above problems has not been taken seriously into account when designing and performing the mining operations, any solution will only decrease the intensity of the above-mentioned problems. As mining continues in higher depths, the problems, because of an increase in the amount of groundwater to the mining site, are also intensified.

A solution for the case is to make a suitable drainage system for leading the mine

waters to an area outside of the mine limits. However, the groundwater situation and geological structures such as active faults present in the mining area should be, first, recognized and then considered carefully for designing an optimal drainage system. Geophysical electric sounding and profiling methods using various electrode configurations and spacings were applied to determine the groundwater table and its variation along with the thicknesses of water-bearing formations and overlying subsurface layers, and also to map subsurface geological features especially active faults and major fractures.

Considering near future developments in mining and also in mineral processing plant established in the vicinity of the mine, the needs to unpolluted or fresh water are increasing. On the other hand, the limitations of available fresh water resources in the area caused the mine managers to investigate different choices such as drilling new water wells supplying fresh water in the area, fresh water transport from near or distant areas, and mine waste water treatment for recovery of good quality water to use for the development projects. The last alternative, having considerable relative advantages over other choices, was selected as the best solution. This solution, in addition to its environmental friendly process, causes a relative dryness in the mining site, which removes or reduces the influence of the above-mentioned technical and operational problems and thus reduces mining costs and increase profit.