DEPARTMENT OF MINERALS AND ENERGY
WESTERN AUSTRALIA

SIGNIFICANT INCIDENT REPORT NO. 71

SUDDEN COLLAPSE OF GROUND - SINKHOLE FORMATION

INCIDENT

Recently, at an underground mine in Western Australia a large-scale collapse of ground above and around a stope, resulted in the formation of a surface sinkhole and the inflow of a considerable amount of water and weathered rock material into the mine. Fortunately, the event occurred at the change of shift, and no-one was underground. Had it happened half an hour earlier or later it could have resulted in a multiple loss of life.

CONTRIBUTING FACTORS

The following factors are considered relevant to an understanding of this incident:

- largely unknown competency of the ground in the stope walls and backs;
- stoping up to the base of the surface oxidation zone;
- low rock stress environment at a depth of some 60 m below surface;
- wide stope back spans, at the base of oxidation, in the area of the stope where the failure is understood to have occurred;
- considerable stope wall strike length and height;
- incremental ore extraction occurring over a long period of time;
- long hole retreat mining method;
- top-down stoping sequence;
- leaving the stope void empty, apparently without any wall support provided by pillars and/or fill material, for a considerable period of time; and
- saturation of the ground by water in porous rock-fill placed in a natural depression on the surface above the stope.

This incident is a timely reminder to the mining industry of the requirement to understand the condition and geotechnical characteristics of the rock mass in which mining operations are conducted. Responsible mining practice demands that the selected mining method(s) be matched to the prevailing ground conditions at the mine.

PREVENTATIVE ACTION

Mine planning and design must address these large-scale mine stability concerns as well as the smaller-scale and, perhaps, more pressing day-to-day production issues. It is totally unacceptable to ignore the large-scale geotechnical considerations at underground mining operations. Regulation 10.28(3) of the Mines Safety and Inspection Regulations 1995 requires that the principal employer and manager of an underground mine ensure that, amongst other things, the appropriate stope and pillar dimensions are determined. A failure to do so would be seen as non-compliance with the Regulations and could be interpreted as a failure to exercise appropriate care.

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STATE MINING ENGINEER

2 April 1997

SAFETY AWARENESS SAVES LIVES