



SAFETY BULLETIN NO: 62

HAZARDS OF COLLAPSING GROUND IN MINING OPERATIONS

Recent incidents have emphasised the need to reiterate warnings on the hazard of collapse of ground and the risk of entrapment of persons in the collapse material.

- *On 27 April 2001, four persons engaged in exploration for diamonds (including the exploration manager and consultant) were standing in the bottom of an unsupported costean some 1.2m wide and 7.5m deep. One person escaped unharmed, two were partially buried, and the fourth was covered. Fortunately, none was seriously injured but all were severely shocked and one person was hospitalised for observation. This incident could have resulted in a multiple fatality.*
- *On 20 April 2001, a drill rig slid into a cavity associated with old underground workings below an open pit mine in the Goldfields. The rig was drilling probe holes to identify the location of voids below the bench floor. No significant injuries occurred as a result of the collapse.*

Over the past fifteen years there has been a considerable number of such incidents, some of which resulted in serious injury or death. Some of these are outlined as follows:

- In October 1994, a drill fitter, working in an open pit being mined through old underground workings, suffered multiple fractures, sprains and lacerations to various parts of his body when he fell into the rock fill of an old stope which had daylighted through the floor of the pit. He suffered permanent disability.
- In May 1991, a shrink stope miner was killed when a collapse of the broken ore on which he was standing occurred in the stope. Another miner was killed in March 1992 in similar circumstances. In both cases there was a collapse into a hang-up formed after ore was drawn from the shrink.
- In January 1990, a miner was trapped for several hours by a run of ore in a stope which covered him to his shoulders. After he was freed he seemed to have no serious injury, but later suffered a severe reaction from release of toxins into his bloodstream caused by the prolonged compression. He made a full recovery.
- In July 1989, a driller died when he fell into old underground stope workings that had collapsed beneath him as he set up his drill rig to bore blast-holes in an open pit gold mine in the Goldfields.



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- In October 1986, two exploration workers were buried by soil in a collapse of the walls of a costean in which they were taking samples, near Kununurra in the Kimberley Region. The costean was some 5 metres deep and the men were engaged in sampling gravels from the base of the excavation as part of a gold and diamond exploration program. One man was buried to the knees, but managed to extricate himself. The other was buried completely and was dead by the time he was recovered.

Incident Prevention

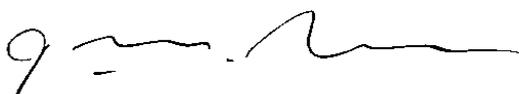
While the consequences of each of the incidents described above may be similar, preventative action may vary from case to case. For example:

- Entry into unsupported costeans where collapse of the generally unstable near-surface soils could engulf those involved should be carefully considered to determine whether it is necessary, or whether some alternative means of making a geological appraisal is viable. Any costean over about one metre in depth should be included in this category as persons often work in them in a crouched position. Where entry is required, a full risk assessment should be conducted and the necessary support provided prior to entry being undertaken. As an alternative, it may be possible to “lay back” or batter the sides of the excavation, or to bench the costean in sections to reduce the likelihood of collapse of a high face.
- Old underground workings present a critical hazard when they underlie open pit mining. Care should be taken to establish the existence and position and extent of such workings and the required procedures must be established to control the risks. The Department has produced a guideline titled “*Open Pit Mining Through Underground Workings*”, which is available from the Department’s website at –

<http://www.dme.wa.gov.au/prodserv/pub/index.html#safety>

- Constant vigilance is required to ensure that sudden collapses of unsuspected or undetected workings do not put the employees in current operations at risk, whether surface or underground.
- When ore is being drawn from a shrink stope the miner should stop other activities and observe the movement of ore in the stope from a safe vantage point. To prevent casual access by other persons “NO ENTRY” signs should be placed at entrances to the stope immediately prior to and during the period when ore is being drawn. The area affected by the draw should not be entered until the loader driver has completed drawing off the amount of ore requested by the miner and has reported this back to the miner. The miner should be satisfied that ore in the stope has moved to the extent expected, and has not ‘hung up’, before restarting work from the broken ore in the stope. Shrink stoping has inherent risks which have to be managed, and should be avoided if viable alternative stoping methods can be adopted.

In all situations, a risk management approach should be implemented to identify the hazards, assess the risks, and implement appropriate controls.



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