
**DEPARTMENT OF MINERAL AND
PETROLEUM RESOURCES**

WESTERN AUSTRALIA

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SAFETY BULLETIN NO: 64

SAFETY ISSUES ASSOCIATED WITH HYDRAULIC BACKFILL

The State Coroner has concluded an inquest into the deaths during June 2000 of three underground employees at a gold mine in the northern Goldfields of Western Australia. The men died when they were engulfed by an inrush of hydraulic fill which escaped from a stope.

As part of his finding, which was delivered on 30 July 2001, the Coroner drew attention to the following safety issues, which were, in his view, relevant to this particular case.

“ ...

1. *It is clear that where hydraulic fill is being placed in a void, it is necessary to be able to check for ponding of water on top of fill and to ensure that water is adequately draining into the fill.*
2. *If there are problems associated with monitoring drainage of hydraulic backfill, a safety measure which can be readily implemented is simply the stopping of placing of fill so excess water can drain through the barricade walls until minimal flow levels are achieved. This process will relieve pressures on barricade walls and provide information as to the amount of time required to drain the fill.*
3. *Backfill and rest cycles should be calculated to ensure that adequate drainage takes place and should be reviewed from time to time. These cycles should not be based on any simple arbitrary formula but should be structured to apply to the stope in question.*
4. *Care should be taken in the design of barricade walls in each case so as to ensure that they permit free drainage of excess transport water from the slurry, but are strong enough to withstand substantial pressures. Consideration should be given to the use of curved as against straight walls and care should be taken to ensure that any unusual shapes of wall do not lead to points of weakness being formed.*



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5. *The entire backfill process at a mine should be properly engineered and structured as part of the activities at the mine. The backfilling process should not be treated as an add-on activity separate from the normal activities of the mine. The backfill process should be an integral part of the overall mine design and should receive adequate attention.*
6. *All mine staff with responsibilities in relation to backfill activities should receive adequate training, particularly so they are able to identify potential hazards. This training should be structured for the particular mine in question.*
7. *In my view this area of mining activity would benefit from further research. It has been difficult to determine the reasons for the barricade wall failure in this case because there has been limited real world testing of barricade walls. While numerical modelling studies are helpful in understanding problems associated with barricade failure, in order to ensure that all factors are adequately taken into consideration, it is important to conduct practical tests which will identify potential problems which might not necessarily be identified by numeric modelling.*
8. *The use of a device to measure pressures on the barricade walls in this case was helpful and has provided useful data in relation to the circumstances which led to the barricade wall collapse. In my view consideration should be given as to whether the use of such pressure recording devices should be universal for all such barricade walls by the Department of Minerals and Energy and the industry.*
9. *The use of a V-notch weir or a similar instrument to measure water flow is also a potentially useful instrument. While a V-notch weir may not give accurate readings, at least it does give some indication as to the way in which water is flowing through the fill and can assist in drainage assessment. Consideration should be given to the extensive use of similar devices to measure water flow throughout the industry. “*

The attention of mine managers and those involved in backfill operations is drawn to the Coroner's remarks and they are strongly urged to critically review their own current or planned operations in the light of the particular matters raised.

Backfill operations have the potential to become hazardous if not carried out in a planned and carefully monitored fashion according to a well-considered and comprehensive design covering all aspects of the mining-filling cycle. While the Coroner's remarks, in this instance, have application to a particular case, some of their implications are relevant to all backfill, and, indeed, other mining operations.

Further information which may assist in the development of an appreciation of the important issues involved in hydraulic backfilling may be found in Safety Bulletin No. 55, issued by the Department on 29 June 2000.

M J Knee
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