

MINE SAFETY INVESTIGATION UNIT

INFORMATION RELEASE

High potential incident

Date	18 November 2013
Event	D11 dozer slides into an unmarked test hole on a bench
Location	Bengalla mine, Upper Hunter Valley NSW

At a glance

A 113 tonne dozer slid into an unmarked test hole full of water. The test hole had been dug two days earlier into a 5 metre thick overburden bench in an active mining area to determine the depth to coal. Heavy rain occurred on the previous shift and continued on the day of the incident, which filled the test hole. The dozer driver escaped the flooded cabin by leveraging the door handle with his foot.



Dozer submerged in the test hole.

Photograph by NSW Mine Safety

The mine

Bengalla mine is four kilometres south west of Muswellbrook in the Upper Hunter Valley of NSW.

Bengalla mine is an open cut coal mine using dragline, truck and shovel equipment. Mining equipment includes seven tracked dozers and one rubber tyred dozer. The mine produced 6.74Mt of raw coal in 2010-11.¹

The test hole

Two days before the incident an excavator was used to prepare the bench for a dozer to push the pre-strip material off the bench and expose the coal. The excavator dug a drainage trench along the west side low wall of the bench to allow the flow of water from a higher level to drain. The excavator operator also dug a test hole at the north end of the bench in the end of the drainage trench to check the depth to coal.

There was a windrow on the southern side of the test hole. The excavator operator placed spoil material from the test hole on the east side between the test hole and the bench edge to complete the barrier around the open hole. While there was a windrow and spoil material around the test hole, there were no other physical means of identifying it or safeguards for the open hole such as guideposts, marking devices, GPS logging and recording, lighting tower or warning signs.

Contributing events

As with most incidents there were events that contributed to the cause of the incident. Those significant events centre around the digging of the test hole and the four 12-hour shifts in the two days leading up to the incident.

The mine had an inspection program that included mining supervisors inspecting the area where mining operations were conducted. Over the five shifts there were three supervisors whose roles included the inspection and reporting of safety conditions in the mining area. The following events set out the contributing factors:

Shift 1 (Saturday 7am – 7pm) – the test hole was dug. Spoil material and windrows were put in place around the test hole. The supervisor was not told about the digging of the test hole. The supervisor did not identify that the hole was dug. Consequently no action was taken to record or safeguard the exposed hole.

Shift 2 (Saturday 7pm – 7am)– the test hole and windrow remained in place. The supervisor did not identify the test hole and therefore was not aware of the hazard or risks posed.

Shift 3 (Sunday 7am -7pm) - the test hole and windrow remained in place. The supervisor did not identify the test hole and hazard.

Shift 4 (Sunday 7pm -7am)– rain started with several heavy falls and continued throughout the day. Water filled the test hole, the drainage trench and ponded on the bench. The test hole windrow was removed to help the water drain from the trench. The night-shift dozer driver did not inspect behind the windrow and did not know about the test hole.

The night-shift supervisor and oncoming day-shift supervisor conducted a handover inspection of the area together. Neither supervisor had knowledge of the test hole or suspected that there may have been deep water in the trench.

¹ NSW Trade & Investment, 2013 *Coal Industry Profile*, pages 47, 204.

The incident

Shift 5 (Monday 7am – 7pm) – at the shift prestart meeting the day-shift supervisor told workers about ponding of water at several dozer locations. The supervisor and the dozer driver were not aware of the existence of the test hole hidden below the water.

At 7.15 am the dozer driver approached the pooled water on the northern end of the bench in reverse. He stopped to test the water depth using the ripper blade. As the ripper blade was lowered the ground beneath the dozer slumped and the dozer slid backwards into the deep water and test hole. Water filled the cabin to head height. The driver was able to escape the cabin by levering the right hand door handle with his foot. The following photographs highlight the serious nature of this incident and potential for harm.

The site conditions at the time of the incident were described by the dozer driver as wet and raining, with poor visibility, even though all the dozer windows had been cleaned.

The dozer driver had 16 months' experience operating dozers at the mine. The operator had received a site-based competency practical assessment on the operation of a dozer in July 2012. It was the dozer driver's first shift at the mine after having the weekend off.



The submerged dozer and the water-filled trench.

Photograph by NSW Mine Safety



The submerged dozer cabin.

Photograph by NSW Mine Safety

Observations

The investigation is ongoing. The following observations have been made during the course of the investigation:

- The inspections conducted over the four shifts before the incident did not identify the hazard of the test hole or potential for deep water when rain began.
- Three months earlier the mine created a procedure for supervisor approval, placement of barriers, delineation and reporting procedures when excavating sumps. The safeguards in this procedure did not apply to test holes and other voids.
- The safety management system did not specifically provide written instructions for the management of a test hole on a bench.
- Operators had received training in hazard awareness. However the training did not instruct operators to seek approval and instructions from a mining supervisor when they identified that water depth and ground strength may be a hazard.

Actions post incident

The mine conducted an internal investigation and has taken the following actions to prevent a recurrence of the incident. Written procedures dealing with sumps were amended to incorporate test holes and now specify that:

- test holes are to be clearly demarcated if to be left unattended or handed over to the next shift.
- guide posts are to be placed on windrows around the void. Red marking cones are to be placed between every guidepost.
- the test hole is to be reported to the supervisor for recording in the shift statutory inspection book.
- a reference beacon is placed near the test hole which alerts mining equipment of the location of the hazard.
- a tool box talk document was created by the mine to draw attention to the lessons learned and the new procedure.

Safety considerations

The incident highlights the importance of an effective risk management program concerning the excavation of test holes on benches and dozers operating in wet and unconsolidated ground conditions.

Accordingly, mine operators should pay attention to the following safety considerations:

- Develop and implement safe work procedures for the digging of voids in mining areas, such as test holes, which include; approval to dig, supervisor and operator responsibilities, safeguards for the void, and inspection, reporting and auditing requirements.
- Review the arrangements for supervision provided by the safety management system with respect to the requirements of safety legislation, in particular ensure that mining supervisors have sufficient time to effectively detect changes or features in the working environment that may indicate, or result in, a hazard to the safety and health of people.
- Review the training of supervisors and operators in hazard awareness specifically for hazards created by water and ground strength. The training should clearly define the process of re-evaluation of a changed work environment due to water being present in the work area.

Dozer incidents

Similar incidents reported to the department at other open cut coal mines highlight the need for mine operators to consider the foreseeable risks when dozers operate in wet and unconsolidated ground conditions.

- April 2011 - a dozer was cleaning up a coal floor and pushed a full blade of wet material towards the highwall to release water from the front of the coal face. When attempting to reverse the bench gave way causing the dozer to slide into a two metre deep waterhole.
- May 2011 - a dozer reversed into an unmarked sump. The dozer driver was trapped in the cabin until the cabin was nearly submerged. The department has published the investigation report into the incident, available at:
www.resourcesandenergy.nsw.gov.au/_data/assets/pdf_file/0006/470742/Mount-Thorley-report-for-publication.pdf
- December 2011 - a dozer was cleaning a V drain when the driver advanced too far and went over the coal edge into a water body.

Industry resources

The following relevant industry resources are available on the department's website:

Queensland Safety Bulletin No 122, *Drowning hazards at mines* (1 November 2012)
www.mines.industry.qld.gov.au/assets/safety-and-health/safety-bulletin-122.pdf

About this information release

The Mine Safety Investigation Unit has issued this information to draw attention to the occurrence of a serious incident in the mining industry. The investigation is ongoing. Further information may be published as it becomes available.

The information contained in this publication is based on knowledge and understanding at the time of writing. However, because of advances in knowledge, users are reminded of the need to ensure that the information upon which they rely is up to date and to check the currency of the information with the appropriate officer of the Department of Trade and Investment, Regional Infrastructure and Services or the user's independent adviser.

Information about the Investigation Unit and its publications can be found at: www.resourcesandenergy.nsw.gov.au/miners-and-explorers/safety-and-health/major-investigations

For information about health and safety regulation on mine sites contact a mines inspector at one of our local offices
www.resourcesandenergy.nsw.gov.au/miners-and-explorers/safety-and-health/mine-safety-offices

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