

Safety bulletin

Mines Inspectorate

Safety bulletin no. 95 (Version 1)
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Mobile equipment contact with overhead powerlines

Six reported incidents over the last twelve months have involved mine mobile equipment contacting energised overhead power line infrastructure:

- A rigid body road truck was tipping on a stockpile located under an 11kV overhead power line. When the operator raised the truck body and drove forward, the raised body caught the underslung earth wire, snapping it. Power was not lost, however the integrity of the earthing system was compromised.
- A rear dump truck, driving from a stockpile tip with the body still slightly raised, snagged and broke a power pole stay wire. The power pole was pulled over and the 11kV power line fell to the ground, causing a grass fire and power loss to the local community, as well as the mine.
- An excavator tramming along a haul road during relocation operations contacted and pulled down 415V power lines. The operator was unaware of this until notified by 2 way radio after leaving the area.
- A maintenance worker, preparing to clean the underbody of a rear dump truck, parked the vehicle beside a workshop. When he raised the body it contacted an 11kV overhead power line running beside the workshop. An offsider, standing near the truck waiting to insert the locking pins, saw smoke coming from the front tyre and alerted the operator, who climbed down and walked away from the truck. By this stage, power to both the mine and the local town had been tripped.
- While being driven to a workshop, the elevated mast of a truck mounted exploration drill rig pulled down 440V overhead power lines.
- The operator of a long reach excavator tramming through a quarry raised the boom to improve his vision to avoid possible collision with quarry vehicles, and in doing so contacted and pulled down 11kV overhead power lines.

Fortunately, due to effective earth leakage protection and/or sensitive earth fault detection, these incidents only resulted in equipment damage and inconvenience from power outages. Any one of these events could have resulted in operators being killed or seriously burnt.

Contributing Factors

Some contributing factors common to these incidents include:

1. Inadequate mine layout, with mine infrastructure such as stockpiles, wash down bays, workshops and haul roads located beneath or close to overhead power lines.
2. Poor operating practices related to retracting mobile equipment attachments:
 - Driving a rear dump truck from a dump point before the truck body was fully lowered.
 - Tramming an excavator with the boom raised
 - Relocating a drill rig from a work site while the mast was elevated.
 Moving equipment with raised booms, masts, or tubs/trays is potentially unstable, as well as risking contact with overhead power lines.
3. Workers were not trained in:
 - the hazards associated with operating mobile equipment near overhead power lines, and
 - location of the overhead power lines on the mine.
4. Power lines were not adequately sign posted and/or delineated.

Comments

Similar incidents of mobile equipment contacting overhead power lines in the past ten years has seen the Queensland Mines Inspectorate issue Safety alerts [37](#) and [174](#), Significant incident report [44](#) and Safety bulletins [47](#) and [55](#).

Actions to reduce risk of mobile equipment contacting overhead power lines

Conduct a risk assessment to determine whether risks associated with the hazard of equipment contacting overhead power line installations is at an acceptable level and as low as reasonably achievable.

Consider the hierarchy of control when evaluating the variety of risk controls that can be implemented to effectively reduce the risk, in particular:

1. Elimination

Bury the power lines where proximity to mining operations is unavoidable, and implement appropriate controls to reduce the risk of accidentally digging up the cables. Such controls could include placing marker tape above the cable installation, surveying the cable route and marking it on site plans, and marking the surface to indicate the cable presence, route directions and change of direction. A permit to dig process should also be implemented, including consideration of using the “dial before you dig” service.

2. Substitution

- Reticulate power through the site at a lower voltage.
- Utilise alternative electrical energy sources eg solar energy.

3. Separation

- Locate overhead power lines away from haul roads, work areas, parking areas, workshops and storage areas or alternately locate the haul roads etc away from existing overhead power lines.
- Locate stockpiles and tailings dams well clear of overhead power lines to allow for safe clearances.
- Prevent mobile equipment accessing or working under or in the vicinity of overhead power lines, other than at designated locations, by use of a physical barrier such as berms running parallel to the power lines at an appropriate stand-off distance.
- Where power lines have to pass over a road, work area, parking area or storage area, position (raise) the conductors so that the clearances listed below are always maintained between the conductors and the maximum height of any mobile equipment and its extensions expected to pass underneath (taking into consideration any possible power line sag):

*Minimum clearances for the movement of vehicles and machinery under and in the vicinity of overhead lines	
Nominal voltages (phase to phase) KV, r.m.s	Minimum clearance (mm)
≤1.1	1000
>1.1 ≤33	2300
>33 ≤ 66	2500
>66 ≤ 110	3000
>110 ≤ 220	4000

* Source: AS3007.5 - 2004 *Electrical installations - Surface mines and associated processing plant Part 5: Operating requirements*

4. Engineering

- Install body up alarms/indicators on rear dump trucks, to warn when the body is still raised when leaving a dump point

- Install overhead proximity detection devices on cranes, excavators, elevated work platforms and drill rigs.
- Where overhead power lines cross designated traffic routes, install sacrificial warning barriers (dingle - dangles) at appropriate distances either side any approach to the overhead lines.

5. Administration

- Install and maintain signs at appropriate locations to warn workers in mobile equipment that they are approaching overhead power lines. Position the signs so the worker has sufficient time to respond appropriately to the warning. The signs should state the voltage and the maximum height of any vehicle that can travel under the overhead power lines (refer to AS 1319-1994 Safety signs for the occupational environment, for detailed information).
- Install appropriate markers on overhead power lines crossing designated traffic routes to make them more conspicuous.
- Record the location of any overhead power lines on the site plan.
- Workers' inductions and operator's mobile equipment training must include:
 - awareness of the location of overhead power lines on the mine,
 - the hazards associated with working near overhead power lines and
 - the controls implemented on the mine to reduce the risk of contact.
- Conduct a task specific risk assessment for any work with a risk that the mobile equipment used might breach the minimum safe clearances. In such cases, adopt isolation or removal of the overhead power line as a risk control.
- Risk assess any mobile equipment brought to site (newly purchased, contractor's, etc) to determine whether risks of equipment contacting overhead power line installations is at an acceptable level and as low as reasonably achievable.

Actions to reduce risk of harm from mobile equipment contacting overhead power lines.

Conduct risk assessments on foreseeable emergency situations that might result from mobile equipment contacting overhead power lines, including:

- Contact with power lines and the power trips
- Contact with power lines and the power doesn't trip
- A fire starting on the mobile equipment
- A tyre catching fire and/or tyre pyrolysis leading to a tyre explosion (refer Safety bulletin [47](#))
- A combination of the above

From these assessments, develop an emergency response plan that will reduce the risk of harm to the mobile equipment operator and any worker involved in responding to the emergency.

Workers' inductions and operator's mobile equipment training must include awareness of this emergency response plan. Conduct practice drills at appropriate intervals to maintain awareness of how to respond.

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Please ensure all relevant people in your organisation receive a copy of this Safety bulletin. Any such advice supplied to site should reach those who require it, and it should also be placed on the mine notice boards.

See more Safety alerts and Safety bulletins at
www.dme.qld.gov.au/mines/safety_information___bulletins.cfm