

Safety bulletin

Mines

Mines Inspectorate

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Severe weather preparedness

Longer term weather predictions suggest Queensland may be facing its worst storm season in years. Recent unseasonal storms, floods, and operational mine stoppages across the state in the 2007/08 storm season, are stark reminders of the unpredictability and destructive power of such events. They serve as a timely warning to hasten preparation for severe weather events on and off site.

This safety bulletin is a reminder to all mine operators, site senior executives, contractors and service providers to consider hazards created by severe weather events, and resulting disruptions while attempting to restore operations. These issues are not restricted to the site, but also apply to nearby communities and district infrastructure.

What can go wrong?

Typical 'severe weather' events may involve high velocity destructive winds, lightning strikes, and heavy rain and hail causing flash flooding. They can affect surface structures and people in unsafe open or enclosed areas. Anyone in the vicinity of charged blast holes may be exposed to premature detonation of the explosives in case of a lightning strike.

Underground mine operations may be inundated by flash flooding, and lightning strikes may disrupt computer-based control and communication systems, as well as transfer electrical energy to underground workings.

Severe weather events may last from minutes to days. Because of this unpredictability, a mine's response system must be able to cater for the type, severity and duration of severe weather events.

Preparation for severe weather events

Queensland mining safety and health legislation requires a risk assessment to identify potential emergency situations caused by severe weather events. The site senior executive (SSE) must ensure the mine's risk management process caters for such foreseeable emergency situations.

In short, the SSE must ensure adequate resources, facilities and procedures are available to implement and maintain an effective management program before, during and after a storm event. Risks from severe weather events must be maintained at an acceptable level. Typical actions could include:

- Clean-up and housekeeping to remove loose 'flying object' debris.
- Prepare park-up areas for mining equipment above the 'high-water mark'.
- Prepare shutdown and tie-down procedures for conveyor belts, crib huts, temporary structures and other plant and equipment exposed to the weather.
- Inspect and clean out nominated storm shelters.
- Clean out sumps and environmental traps (oil, grease, fuel) to eliminate or minimise ground contamination should the trap / sump overflow.

- Check the integrity of mine communication and power systems.
- Check back up power systems for availability in case of mains blackout.
- List post-storm clean-up equipment e.g. front-end loaders, bobcats, lighting plants, pumps etc.
- Park-up of post-storm clean-up equipment in a safe location.
- Check on-site emergency response equipment including medical facilities and vehicles.
- Check containment dams, levies and weirs to avoid accidental breaches.
- Check for areas of potential ponding, particularly on top of waste dumps, to avoid subsequent slope stability issues.

Are people at risk?

A mine's Safety and Health Management System (SHMS) must provide a process for identifying and warning anyone potentially affected by severe weather events, a system for evacuation or moving people to a 'place of safety', and what action is to be taken where risk is outside acceptable limits.

Severe weather event warning and evacuation of persons

A mine must be able to monitor, identify and evaluate, in a timely manner, the onset of any severe weather event that could adversely impact the site and cause an unacceptable level of risk.

When such an event is considered likely, a system must be in place to allow for safe evacuation of anyone potentially exposed to a designated 'place/s of safety'. Such places should be identified through risk assessment as maintaining the risk of injury at an acceptable level.

Mines, quarries or exploration projects should consider developing a Trigger Action Response Plan (TARP) based on warnings and observations, to assess and communicate the onset of severe weather events to anyone potentially affected, and ensure their timely evacuation to a 'place of safety'.

Structures

A system must be in place to ensure that temporary and semi-permanent relocatable structures located on a mine are adequately designed, sited, constructed and anchored. For instance, to prevent movement during a storm, single or multi-modular semi-permanent (or permanent) units (mobile dongas, offices, cribsrooms or ablution blocks) must be mounted and anchored to pre-established concrete/steel pedestals and/or other specifically designed anchoring points. This must be in line with building standards. Precautions should also be considered for other structures, such as tanks, conveyor belts or mobile equipment such as cranes, vulnerable to the effects of strong wind.

Emergency response and aided rescue

An adequate emergency response and aided rescue system must be in place in case a severe weather event causes injury, entrapment or damage to infrastructure.

Communication

While severe weather events are often localised and fortunately infrequent, this does not provide a real margin of safety. It is therefore important that everyone on site, including contractors, are made aware of the site's emergency response plan, and their individual responsibilities and expectations, so storms do not expose people to potential harm. Sites should also check their communication protocols with offsite resources. Procedures covering lightning strike to rubber-tyred vehicles should also be reiterated to all mine employees.

‘Mopping up’ and recovery from a severe weather event

Appropriate risk management practises should be applied to all activities associated with flood recovery. In particular, the following hazards should be addressed:

- Increased likelihood of some form of pit wall instability due to ingress of water and lubrication of joint/fault planes, and undercutting as surrounding areas are soaked and ground water tables are recharged, possibly at some distance from the operation.
- Ramp and road (in)stability: In rebuilding mine roads and other infrastructure, mobile equipment hazards, including damaged bunds, undercutting, wash-outs, loss of traction and soft edges, must be effectively addressed. These issues also extend to pedestrian traffic.
- Stability of waste dumps, stockpiling areas, sedimentation ponds and dams must be established prior to reopening and use.
- Re-establishing water management infrastructure, pumping and working near the water’s edge.
- Personnel and equipment hazards when using mobile equipment in and around water must be identified and effectively addressed. This work might include setting up pumping stations, ‘righting’ of pumps, reinstating drains, sumps, suction and discharge lines, pontoons, restoring fuel and electrical supplies etc. Potential drowning hazards must be managed, and hazards in handling mud must be considered.
- In towing or recovery of equipment and procedures, safe working loads of recovery equipment, including attachment points, must be reliably established prior to recovery. The only recovery points to be used are those approved by the original equipment manufacturer; so called ‘vehicle tie down points’ must not be used as they can fail.
- Hazards due to water ingress into mobile equipment, including into braking, electrical systems, and vehicle batteries, must be addressed.
- Electrical work to reinstate infrastructure and systems must address hazards including water ingress into switchgear, degradation of materials, mechanical damage due to submersion, residue on contacts, damage or destruction of drawings and plans, and possible damage to fire and other alarms.

‘Sample’ check sheets covering the issues above are provided at the end of this safety bulletin. Please note these lists are not able to cover your site specific severe weather hazards.

Additional information to assist in the management of severe weather issues can be obtained from:

- ‘Weather forecasting - Bureau of Meteorology’ at www.bom.gov.au/qld/
- Queensland Mines Inspectorate, Safety bulletin 78 Flood Recovery In Mines, 12 February 2008 www.dme.qld.gov.au/zone_files/mines_safety-health/safety_bulletin78.pdf
- Queensland Mines Inspectorate, Safety Alert 177 Mobile Crib Hut Blown Over During Storm, 7 November 2007 www.minerals.org.au/_data/assets/pdf_file/0017/25019/safety_alert177.pdf

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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

Severe Weather Event Preparation – Sample Checklist

Issue	Site Status
1. Have all potential emergency situations been identified?	
2. Are adequate resources, facilities and procedures in place to implement and maintain an effective management program before, during and after a storm?	
3. Has a cleanup and housekeeping to remove loose 'flying object' debris been conducted?	
4. Are there park-up areas for mining equipment above the 'high-water mark'? Have they been communicated?	
5. Has the site prepared shutdown and tie-down procedures for conveyor belts, crib huts, temporary structures and other plant and equipment exposed to the elements? Is all necessary hardware – tie-downs, ropes etc available?	
6. Have all nominated storm shelters been inspected and cleaned?	
7. Have sumps and environmental traps (oil, grease, fuel) been cleaned out to eliminate or minimise ground contamination should the trap/sump overflow?	
8. Has the integrity of mine communication and power systems been checked?	
9. Has the site's power back up system been checked for ready operation in case of mains blackout?	
10. Is there a list of post-storm clean-up equipment e.g.. front-end loaders, bobcats, lighting plants, pumps and hoses fuel tanks etc?	
11. Has the on-site emergency response equipment, including medical facilities and vehicles, been checked for readiness?	
12. Have containment dams, levies and weirs been checked to avoid accidental breaches?	
13. Have areas of potential ponding e.g. on top of waste dumps been identified and made to drain freely to avoid subsequent slope stability issues?	
14. Are effective systems including TARPS in place to identify and warn potentially affected persons of the onset of severe weather?	
15. Is there an effective system of evacuation or moving people to a designated 'place of safety'?	
16. Is there an effective system that monitors, analyses, identifies and evaluates, in a timely manner, the onset of any severe weather and what actions are required?	
17. Is there an effective system in place to ensure that temporary and semi-permanent relocatable structures located on a mine are adequately designed, sited, constructed and anchored?	
18. Is there an effective system in place to ensure tanks, conveyor belts or mobile equipment such as cranes, vulnerable to the effects of strong wind, are safe during severe weather?	
19. Is there an effective adequate emergency response and aided rescue system in place in case severe weather causes injury, entrapment or damage to infrastructure?	
20. Has everyone on site, including contractors, been made aware of the site's emergency response plan and individual responsibilities and expected actions to ensure storms do not expose people to potential harm?	
21. Have the procedures covering lightning strike to rubber-tyred vehicles been reiterated to all mine employees?	

Following a Severe Weather Event – Sample Checklist

Issue	Site Status
1. Has pit wall instability and slope undercutting been assessed and considered?	
2. Have ramps, roads and safety bunds been checked for damage, undercutting, wash-outs, soft edges or loss of traction? Have they been reinstated to a safe standard?	
3. Have pedestrian traffic areas been checked and reinstated to a safe standard?	
4. Has the stability of waste dumps, stockpiling areas, sedimentation ponds and dams been checked for their integrity and safety?	
5. Have all personnel and equipment hazards from working in and around water with mobile equipment been identified and effectively addressed before work re-starts? In particular, water management infrastructure, pumping and working near the water's edge.	
6. Are drowning hazards effectively controlled?	
7. Are hazards in handling mud effectively controlled?	
8. Have equipment recovery and equipment towing hazards been effectively addressed?	
9. Are hazards from water ingress into machinery effectively controlled?	