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1. INTRODUCTION

This procedure has been developed to provide guidance on how to safely manage risk during extreme weather events across all Wesfarmers Chemical Energy and Fertilisers sites. These extreme weather events include but are not limited to electrical storms and cyclonic conditions.

2. EXTREME WIND PROTOCOLS

Extreme winds are defined as:

- Average wind speeds are greater than or equal to 72 km/h (20 m/s or 39 knots)
- Wind gusts are greater than or equal to 90 km/h (25 m/s or 48 knots)

To reduce the risk of exposure to dropped objects during extreme winds, all non critical outdoor activities shall be postponed whilst the above criteria are met. Wind speed to be obtained from the closest available Bureau of Meteorology weather station, other relevant weather stations can be used to pre-empt impending weather events. Weather forecasting should be incorporated into the scheduling of outdoor activities.

Where an activity is deemed critical and is to be completed during extreme wind conditions the following must be completed:

- The activity must be deemed as critical by a Supervisor
- A risk assessment must be completed and reviewed by the relevant Supervisor

3. ELECTRICAL STORM ACTIVITY

3.1 ANTICIPATING A THUNDERSTORM

Where possible, seek the Bureau of Meteorology weather forecast for the location on the day (<http://www.bom.gov.au/>). If a thunderstorm warning is issued for the area, be vigilant.

Keep a constant lookout for thunderstorm clouds in the region. They can develop in as little as 15 minutes. If thunder is heard and intra-cloud /cloud to ground lightning can be seen, you are already in a higher risk situation.

Once thunder can be heard, keep estimating the distance to the lightning activity by using the '30/30' rule.

3.2 THE 30/30 RULE

The 30/30 Rule states:

When you see lightning, count the time until you hear the associated thunder, and if this time delay is 30 seconds or less, go immediately to a SAFE shelter described below.

If you cannot see the lightning, just hearing the thunder means you are most likely to already be within striking range, and it is time to seek whatever appropriate shelter is available.

After the storm conditions have apparently dissipated or moved on, wait a further 30 minutes, after hearing the last thunder before leaving the safe area location. Should thunder be heard within this period, recount from the last thunder heard.

The '30/30' rule is best suited for existing thunderstorms moving into the area. However, it cannot predict or protect against a first lightning strike. Thunderstorms can develop overhead where there will be no prior notice that a storm is incoming. Be alert to changes in sky conditions portending thunderstorm development directly overhead.

When lightning threatens, go immediately to a SAFE location. Do not hesitate.

The following table is a guide to following the '30/30' rule.

Condition	Actions
Where the delay between observing lightning flash and hearing thunder is greater than 30 seconds	<p>Task supervisor or delegate is to risk assess current operations in relation to lightning impacts considering:</p> <ul style="list-style-type: none"> • Possible suspension of crane operations and booms lowered where the crane design allows; • Possible suspension of EWP and scissor lift activities; • Possible suspension of confined spaces entries; and • Possible suspension of hazardous activities and relocation of personnel to SAFE shelter. <p>Familiarise yourself with the requirements of future lightning alert stages.</p> <p>Prepare to take further action.</p>
Where the delay between seeing a lightning flash and hearing the thunder is 30 seconds or less	<p>All personnel immediately seek SAFE shelter.</p> <p>Remove yourself from hazardous areas and cease hazardous activities.</p> <p>Task supervisor or delegate to monitor lightning activity.</p>
No lightning activity detected within in the last 30 minutes, or lightning storm visibly dissipated (confirmed by task supervisor or their delegate)	<p>Return to outdoor activities with caution.</p>

3.3 USE OF PERSONAL LIGHTNING DETECTORS (PLD)

A PLD is a device that detects lightning produced by thunderstorms.

PLDs function by detecting the electromagnetic pulse (EMP) emitted by a lightning strike. By measuring the strength of the detected EMP, the device can then estimate how far away the detected strike was.

A lightning strike has a distinct waveform that can be processed and analysed by detector hardware and software. Through the application of electronics and software, PLDs detect lightning activity within roughly 60km of your location.

Although PLDs do function well regarding their ability to detect nearby lightning, they are quite basic in functionality when compared to professional lightning detectors.

- PLDs cannot predict a first strike or monitor any of the measurable conditions leading up to a first strike.
- PLDs cannot tell where a lightning strike was located or from which direction the lightning is approaching, only that lightning is in the area.
- Interference from other EMP-emitting devices (such as electronic equipment, appliances, nuclear weapons, fluorescent lights and even car engines) can sometimes result in either false alarms or missed strikes. This interference often has the additional effect of preventing personal lightning detectors from functioning properly while indoors.

Despite these limitations, PLDs are a useful aid in early detection of thunderstorm activity in the area.

Note: While working outdoors or in steel structures at the Dalgaranga Gold Project, workers are to ensure at least one PLD is in use by the working party at all times.

WesCEF recommends the use of a Sky Scan P5-3 Lightning Detector (Pictured below).



Figure 1: Sky Scan P5-3 Lightning Detector

The following table is a guide to following a Sky Scan P5-3 Lightning Detector.

Condition	Actions
Thunderstorm forming within sight or lightning detected within 30-60km	<p>All personnel are advised that lightning activity has been detected.</p> <p>Familiarise yourself with the requirements of future lightning alert stages.</p> <p>Prepare to take further action</p>
Lightning detected within 15-30km	<p>Task supervisor or delegate is to risk assess current operations in relation to lightning impacts considering:</p> <ul style="list-style-type: none"> • Possible suspension of crane operations and booms lowered where the crane design allows; • Possible suspension of EWP and scissor lift activities; • Possible suspension of bulk liquid and dangerous goods operations; • Possible suspension of confined space entries; and • Possible suspension of hazardous activities and relocation of personnel to SAFE shelter. <p>Familiarise yourself with the requirements of future lightning alert stages.</p> <p>Prepare to take further action.</p>
Lightning detected within 0-15km	<p>All personnel immediately seek SAFE shelter.</p> <p>Remove yourself from hazardous areas and cease hazardous activities.</p>
<p>All clear</p> <p>No lightning activity detected within 15km in the last 30 minutes, or lightning storm visibly dissipated (confirmed by task supervisor or their delegate)</p>	<p>Return to outdoor activities with caution.</p>

3.4 SAFE LOCATIONS

If lightning is present, do not remain outdoors. Seek shelter in one of the following locations:

- Within a dedicated SAFE shelter such as any area that is protected by a Lightning Protection System
- A substantial building with electricity or plumbing or an enclosed, metal-topped vehicle with windows up
- Inside a large building, keeping away from windows and any appliances connected to outside electrical conductors

3.5 UNSAFE LOCATIONS/ACTIVITIES

If lightning is present avoid these locations/activities if possible:

- Open roof machinery, golf carts, bicycles, motorcycles, non-metal top or open automobiles
- Areas near wire fences, clothes-lines, overhead wires, pipe-lines and railroad tracks
- Communications towers, and tall metallic masts
- Small, unprotected buildings, sheds or areas on tops of buildings
- Explosives magazines or munitions storage
- Flammable hydrocarbons and accelerants
- Standing near a lightning protection down-conductor, mast, or earthing system.
- Any use of fixed line telephones, especially corded headsets (Cordless & mobile excluded).
- Umbrellas, metal hair clips, metal clips on helmets, keys in pockets
- Open fields, sports arenas, golf courses, car parks
- Swimming pools, lakes, seashores
- Standing beneath isolated trees, or touching or standing near any tree
- Contact with metal objects and electrical appliances
- Hilltops and ridges

3.6 WHAT TO DO IF THE SAFEST ACTION IS NOT POSSIBLE

If the electrical storm is above you (“flash-to-bang” interval is < 5 seconds) and you are not able to take the action suggested above, then all you can do is minimise the risk of being struck or affected by the indirect effects of lightning. You should then try to:

- Seek a depressed area; avoid high places;
- Keep away from large isolated trees;
- If in a group, stand at least 3 metres apart.

If hopelessly isolated in an exposed area and your hair stands on end, this is indicative that the e- fields at ground level, are rising very fast, and that lightning is about to strike, therefore assume the lightning-safe position. Crouch on the ground with your weight on the balls of the feet, your feet together, your head lowered, and ears covered. Place your hands on your

forehead and your elbows on your knees to create a path for lightning to travel to the ground through your extremities rather than through your core.

3.7 FIRST AID TREATMENT

Contrary to popular belief and urban mythology, there is no danger in touching a person who has been struck by lightning. First aid is required urgently and should be started without delay. Breathing can be restored using EAR and blood circulation by CPR. These procedures must be continued until breathing/circulation is restored, or it can be medically confirmed that the patient is dead.

Lightning victims are sometimes thrown violently against an object, or are hit by flying fragments (e.g., a shattered tree), so first aid may have to include treatment for traumatic injury.

4. CYCLONIC CONDITIONS

A tropical cyclone is defined as a non-frontal low-pressure system of synoptic scale developing over warm waters having organised convection and a maximum mean wind speed of 34 knots or greater extending more than half-way around near the centre and persisting for at least six hours. Every cyclone is unique varying according to a number of factors including life cycle, intensity, movement, size and impact (wind, storm surge and flooding).

The Australian cyclone season officially runs from November to April, although very few have occurred in November. The northwest of Western Australia between Broome and Exmouth is the most cyclone prone part of Australia's coastline.

Although the considerable majority of cyclone impacts are located in the tropics, occasionally a cyclone affects areas further south down the east or west coast. It is not uncommon for a southward moving tropical cyclone to cause heavy rain over areas well to the south, even if it weakens below cyclone intensity. Between 1910 and 2004 a total of 14 cyclones have impacted Perth, equating to one every seven years on average. Some of these such as the 1937 and 1978 (Alby) caused destructive winds in Perth while others such as 1955 caused heavy rain and some flooding.

4.1 TROPICAL CYCLONE WARNINGS

The Bureau of Meteorology is responsible for issuing cyclone advisory messages between 90 and 160°E. Australia has three Tropical Cyclone Warning Centres, in Perth, Darwin and Brisbane.

Tropical cyclone advisory messages are available through a range of media including the internet (<http://www.bom.gov.au/cyclone/>), radio and television also broadcast details of tropical cyclones, especially when the cyclone nears the coast.

4.1.1 Cyclone Warning System

A tropical cyclone or depression that does not threaten any coastal community will be monitored only in the Bureau's weather notes and in advice to shipping and aviation. When life or property may be endangered, the public warning system is activated.

4.1.2 Tropical Cyclone Watch

A tropical cyclone watch is issued for coastal communities when the onset of gales is expected within 48 hours, but not within 24 hours. The message contains a brief estimate of the cyclone location, intensity and movement. Watch messages are renewed every six hours.

When a tropical cyclone watch is issued for your area the following preparations shall take place:

- Check all buildings for any loose material and tie down (or fill with water) all large, relatively light items such as boats and rubbish bins.
- Fill vehicle fuel tanks. Check your emergency kit and fill water containers.
- Clear the site of loose articles which could become missiles
- Restrain ramp cylinders with webbing straps
- Tune to your local radio/TV for further information and warnings.
- Check that neighbours are aware of the situation and are preparing.
- Ensure all personnel are aware of the cyclone watch

4.1.3 Tropical Cyclone Warning

A tropical cyclone warning is issued for coastal communities when the onset of gales is expected within 24 hours, or are already occurring. It identifies the communities and coastal areas being threatened and contains the cyclones name, location, intensity (including maximum wind gusts), its movement, forecast of heavy rainfall, flooding and abnormally high tides are included when necessary. Cyclone warnings will be broadcast on all regional radio and television stations.

When a tropical cyclone warning is issues for your area the following shall take place:

- Cease all operations prior to weather conditions setting in
- Ensure all personnel are accounted for and aware of the cyclone warning
- Park vehicles under solid shelter (hand brake on and in gear) where possible.
- Put wooden or plastic outdoor furniture inside with other loose items.
- Close shutters or board-up or heavily tape all windows. Draw curtains and lock doors.
- Clean work area of unwanted materials and rubbish.
- Trees of excess height and growth should be trimmed to withstand high winds.
- Clear storm water drains of rubbish or obstructions.
- Have on hand a stock of emergency supplies including first aid kit, torches, batteries for your portable radio, container of drinking water, etc.
- Determine location and establish cyclone tie down areas for trailers, cylinders, etc.

- Remain indoors. Stay tuned to your local radio/TV for further information.
- Become familiar with the cyclone warning system. Log on to [Current Tropical Cyclones \(bom.gov.au\)](https://www.bom.gov.au) (Bureau of Meteorology) for weather updates.

The Western Australian State Emergency Service stages cyclones as **Blue** Alert Stage, **Yellow** Alert Stage and **Red** Alert Stage. These stages are as follows: -

Note: For sites located in the Northern Territory, details regarding alert stages are located in the site-specific emergency management procedures.

Stage Blue - A cyclone has formed and may affect the area within 48 hours. Get ready for a cyclone. You need to start preparing.

- Advise management of situation.
- Discuss with manager if relief staff stay or fly out.
- Start preparation for tie down in the depot. This includes Cylinders, Kwik gas cages, 190 and 210 cylinders, Cevol cages, pallets and any loose objects that can fly around.
- Have Logistics made aware of the situation and keep them on standby. In the event of relief staff from other depots assisting on site, discuss with Region Manager if they are to stay and ride out or return on early flight.

Stage Yellow - The cyclone is moving closer to the area and may affect the area within 12 hours. Act and get ready to take shelter. You may leave the work site once tie down has been completed.

- Advise management of situation
- Contact Logistics and the CST team and advise them of the situation.
- Complete final preparation for tie down.
- Relocate company vehicles to safest part of yard.
- Shut off all valves on LPG vessels and liquid and vapour lines.
- Batten down buildings, secure doors, board or tape windows. Store loose articles inside, place documents and clothing in plastic to protect against water damage.
- Fill water containers, fuel vehicles and place under cover.
- If the cyclone is expected, arrange cylinders on filling ramp such that empty cylinders are surrounded by full cylinders and secure with ratchet straps (refer appendix 2). Secure any loose items or smaller cylinders with ratchet straps to roof supports if available or to full cylinders.
- Palletted cylinders located on the ground should be bundled together and ratchet strapped in large piles (refer appendix 2). Kwik gas cages stacked two high and strapped in piles of six. Any empty cages should be strapped with others (refer appendix 1).
- All valves to the loading bay piping are to be closed off.
- All valves to the bulk tank are to be closed off.

- It is recommended light vehicles like utilities and small trucks have a ballast loads (e.g. full Kwik gas cage) strapped securely to the tray. Consider windscreen damage when parking vehicle.

Note: Port Hedland Only: Prior to leaving site on Yellow alert, the Deluge system should be turned off at the mains with an information tag attached explaining why it has been closed. Advise local fire station of your action.

Stage Red - The cyclone is imminent.

- Take shelter immediately.
- Listen constantly to your radio for further warnings and advice.
- During the emergency phases, site fire / security alarms will not be responded to. This decision is based on personal safety. When able, company representatives will attend the site. In the event of an actual incident involving DFES response to a Kleenheat site – Kleenheat local representative attendance will be determined by staff onsite and DFES communications – subject to weather conditions.
- The Kleenheat IMT can be activated and would still be functional.

Further information on cyclones, warning procedures and precautionary action can be obtained through your State or Territory Emergency Service.

4.2 POST CYCLONE

Following a cyclone do not go outside until it is advised by the local authorities. The following should be considered:

- Listen to local radio for official warnings and advice.
- Inspect all areas for damage.
- Check for gas leaks. Inspect all LPG infrastructure and equipment for signs of fatigue or damage.
- Report building damage, injuries, broken water mains, power outages, etc. to appropriate contacts
- Don't use electric appliances if wet.
- Beware of damaged power lines, bridges, buildings, trees, and don't enter floodwaters.
- Recommence operations if safe to do so.
- Incident report entered into Cintellate.

5. REFERENCE MATERIAL

5.1 REFERENCE DOCUMENTATION

AS/NZS 1768:2007: Lightning Protection

5.2 RECORD KEEPING

RECORD IDENTIFICATION		STORAGE MEDIA	STORAGE LOCATION	INDEXING METHOD	RETENTION PERIOD	AUTHORISED DISPOSER	DISPOSAL METHOD
Form No.	Document Title						