

Morenci Safe Production Standard	Standard 2.10	
Lightning Monitoring and Notification	ISO 9001:2015	
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	Document Owner	Morenci H&S - Admin
Approvals:		
 <i>Senior VP Morenci Operations:</i>		

1.0 PURPOSE:

This standard applies administrative controls for the protection of personnel from greater than normal hazards due to lightning activity and is designed to establish regularity for lightning monitoring and communication.

2.0 SCOPE:

This standard applies to all Freeport-McMoRan employees and contractors working within mining, processing, and town site operations.

3.0 TERMS, DEFINITIONS AND ABBREVIATIONS

Affected Individual: Anyone working or conducting an activity in an area evaluated as high risk for lightning.

Competent Individual: An individual with the technical knowledge, training, and/or experience required to monitor the sites lightning detection system.

Dispatcher: The individual communicating the presence of lightning to the workforce when in Green, Yellow, and Red Alert conditions.

High Risk Area: Morenci Operations has determined that high risk lightning areas include but are not limited to: active blasting zones, outdoor line crew activities, confined spaces on outside tanks and structures, conveyor towers, rooftops, work in elevated mining locations, outside elevated working platforms (catwalks, scaffolding), leach stockpiles, substations, storage areas for flammable/combustible material, and work involving cranes/mobile personnel platforms, trenching operations, walking on a tailing dam and center line, any location that makes the person the highest point in the area.

Lightning Detection System: The Contrail/Earth Networks Monitoring System utilizes both satellite imagery and localized monitoring to detect lightning produced by thunderstorms or lightning potential in the atmosphere. The system is capable of identifying how far activity is from an established central location. The Contrail site displays a map of defined zones as well as lightning activity and must be monitored by a dispatcher 24/7.

Lightning Notification

- Sferic Sirens: Devices that display a warning strobe light and sound a siren to those working in the area to indicate Red Alert lightning status.
- Email/Text Alerts: Affected individuals can be added to lightning notification distribution lists to receive automated notifications when lightning is detected within specific alert zones.
- Radio Announcements: Dispatchers will communicate alert status via radio channels.

Zone Alerts

Green Alert: In general, the system is in green state when the lightning activities are outside the 15 miles radius from the center point of the system.

- It is safe for individuals to perform work in all areas when lightning is in the Green Alert phase.
- Communication of lightning activity in the Green Alert phase begins when lightning leaves the 15-mile radius.

Yellow Alert: In general, lightning is identified as striking in a 6-to-15-mile radius from an established reference point in the Mine or Processing areas. Caution is strongly advised when working in identified High Risk Lightning Areas when in a Yellow Alert.

- Sufficient preparation must be made in a Yellow Alert to allow immediate evacuation of High-Risk Lightning Areas when the property goes into a Red Alert.
- Some areas may require removing workers from exposure when lightning is still in the Yellow Alert phase so as not to have any workers present/exposed when advancing to a Red Alert. Refer to specific division requirements as defined in High-Risk Lightning Area.

Red Alert: In general, lightning is striking within a 0-to-6-mile radius from an established reference point in the Mine or Processing areas. Work is prohibited in high-risk areas when in a Red Alert.

4.0 STANDARDS OF PERFORMANCE

4.1 Lightning Detection Equipment Inspection Requirements

- a. The functionality of the Lightning Detection System software shall be tested by the competent individual at the beginning of each shift.
- b. If defects are found with the contrail software, Sferic Sirens or other means of notification, help desk ticket must be submitted in a timely manner.
- c. When the Lightning Detection System remains in an out-of-order condition, all groups affected will exercise reasonable judgment to ensure their safety in the event of lightning activity.
- d. At least once a month, the notification system and strobe lights must be tested for functionality by the MIS Department.

4.2 Monitoring and Communication

Initial monitoring of the lightning detection system can only be conducted by someone who has received appropriate task training and who is familiar with the system. If any component of the lightning detection system shows that lightning is present, or there is an obvious potential for lightning to exist in the atmosphere the following actions must take place:

- a. An alert shall be broadcast in a manner that provides communication of the lightning status to all affected working groups.
 1. The mine's 402 dispatcher will communicate the presence of lightning to all mine personnel via radio. The mine's 402 dispatcher will communicate the presence of lightning to Security dispatch.
 2. The 662-security dispatcher will communicate the presence of lightning to all processing personnel via radio. The 662 Security Dispatcher will communicate the presence of lightning in any area to all personnel.
 3. A Powerhouse dispatcher will physically monitor the Lightning Detection System for Processing and will relay information to the Security 662 dispatcher and to pertinent processing control rooms for communication.

4.3 Divisional Responsibilities

- a. Those workgroups that may become affected by lightning must have the ability to monitor the radio and receive appropriate communication if lightning enters prescribed zones or if lightning has potential to exist in the atmosphere.
- b. All respective workgroups within Morenci are responsible for establishing their own list of high-risk activities where the presence of lightning will require those activities to stop.
- c. Additionally, all workgroups who may be affected by lightning must understand the specific risks in their areas when lightning is present.
- d. Personnel should be diligently aware of potential thunderstorms that may form during scheduled shutdown, outdoor maintenance activities and other planned events.
- e. The Morenci Health and Safety Department shall be responsible for the administration of lightning protocols observed in Morenci Operations including the maintenance of this policy.
- f. The Morenci Mine Information Services Department will be responsible for all testing and maintenance of the lightning detection system and software.

4.4 Evacuation Requirements When Lightning Is in the Red:

- a. When lightning readings are communicated, all affected areas must respond according to their respective plans.
- b. At minimum, appropriate shelter from hazards must be taken in High-Risk Areas when lightning in Red Alert conditions. An appropriate shelter may be as simple as removing employees from high-risk areas when lightning is present. Depending on the work being performed, it is the decision of division management to understand, communicate, and enforce specific procedures for lightning hazards associated with their areas.
- c. Workers in high-risk lightning areas will be allowed to return to normal operations when the following conditions are met:
 1. Red Alert conditions no longer exist,
 2. The area is verified as being safe by a competent individual, and
 3. Established department procedures permit re-entry into the area.
- d. If lightning activity is not detected by a lightning detection system, and lightning activity is prevalent, reasonable judgment must be made to ensure employees are safe.

4.5 Knowing Your Area:

- a. Know where the closest "safer structure or location" is to the workplace and know how long it takes to get to that location. A safer structure or location is defined as:

Any building normally occupied or frequently used by people, i.e., a building with plumbing and/or electrical wiring that acts to electrically ground the structure.

- b. Good judgment must be exercised to avoiding taking shelter in dangerous locations during a lightning storm. Small, covered shelters (Rain shelters, outdoor awnings and trees) are not safe from lightning. Even if they are properly grounded for structural safety but usually not properly grounded from the effects of lightning. They may actually increase the risk of lightning injury.
- c. Avoid using the shower or plumbing facilities and contact with electrical appliances during a thunderstorm.
- d. In the absence of a sturdy, frequently inhabited building, any vehicle with a hard metal roof (neither an ATV nor exposed equipment) with the windows shut provides a measure of safety.
- e. The hard metal frame and roof, not the rubber tires, are what protects occupants by dissipating lightning current around the vehicle and not through the occupants. It is important not to touch the metal framework of the vehicle.
- f. In the absence of safe shelters readily available to outdoor workers, leadership personnel shall make available adequate safe shelters to house all required personnel when lightning storms are reasonably likely to occur.

5.0 REFERENCE DOCUMENTS / Department SOPs

- 5.1 Mine Safety and Health Administration (MSHA) Regulation: 56.6604(a)
- 5.2 Blasting: 05A Clearing Blasting Area for Lightning
- 5.3 CLP: Processing CLP Lightning Monitoring & Notification Procedure
- 5.4 Hydromet / SX: HD0-SX-38 Lightning SOP
- 5.5 Leaching: Leach 001 - Lightning Events on MFL/ROM
- 5.6 Security: Morenci Security Lightning Policy

6.0 REVIEW AND CHANGE

All changes, modifications and/or revisions must be documented on the table below:

<i>Description of Changes to this Document</i>
Updated dispatcher communication practices due to Hydromet identified gap – BL 7/16/2013
Updated high risk area and wording in policy – AT 2/12/20
Updated equipment terminology to reflect new Earth Networks Contrail System, red alert distances, dispatcher protocols, and department responsibilities – GC 06/02/2023