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HIGH-VOLTAGE OVERHEAD LINE & DEDICATED SPOTTER

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Mosaic Mineral's Mobile Equipment High Voltage Overhead Line Procedure (the 30-10-10 Foot Rule)

Warning
Aerial power lines are to be presumed energized and high voltage

This lesson is intended for Minerals (Mine) site employees and contractors

Objective and Standards of Behavior

Training Objective:

Participants will accurately apply the HVOL Procedures to improve safety.

Samples of Behavior

After training, participants will be able to:

1. Describe key elements of the new procedure
2. Demonstrate operation of the Suparule Cable height meter
3. Accurately complete the HVOL Permit to include calculations
4. Discuss the marking requirements for the safe zone.
5. Recall relevant spotter responsibilities.

Applicability

Location/Applicability: Mosaic Minerals Locations (MINES)

***Coverage:** Equipment operation and travel near high voltage overhead lines (HVOL)

Activities included (but not limited to):

Excavation
Earth moving
Loading/Unloading Equipment
Staging/Storage of Equipment
Electrical Permitting Requirement
Reclamation
Demolition
New Equipment Installation
Transporting of Equipment/Materials
Equipment Traveling

Exceptions:

Line Crew: Requires a documented risk assessment and adherence to other governing procedures

Equipment which does not extend vertically and not in the 10 foot radial zone (example: Graders)

Terminology

Encroachment is where any part of the equipment, load, including rigging and lifting accessories breaches a minimum clearance distance from the radial zone.

HVOL means High Voltage Overhead Line

Equipment Affected

- Loaders
- Excavators
- Tractor Trailers
- Mobile Cranes
- Aerial Lifts
- Forklifts
- Ditchers
- Dump Trucks
- Dedicated Pile Drivers
- Any equipment that has the ability to extend into the 10-foot radial zone

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Equipment Exempted

- Graders
- Dozers
- Pick up Trucks
- Golf Carts
- Any equipment which does not extend vertically and cannot reach the 10-foot radial zone.

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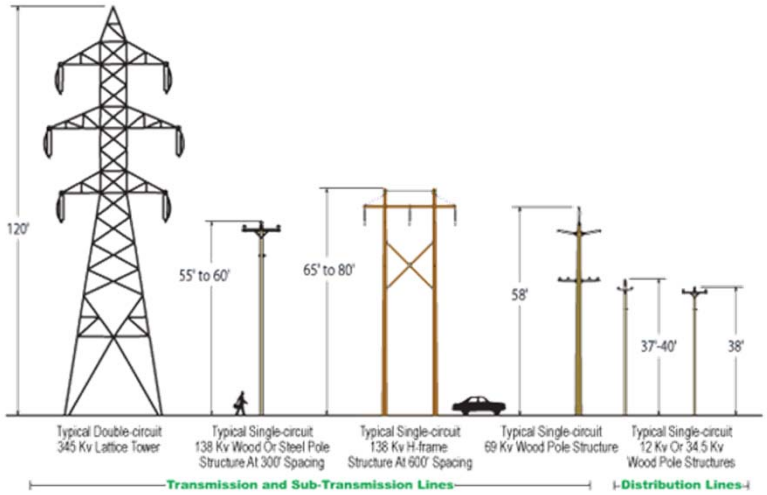
Power Line Vertical Heights



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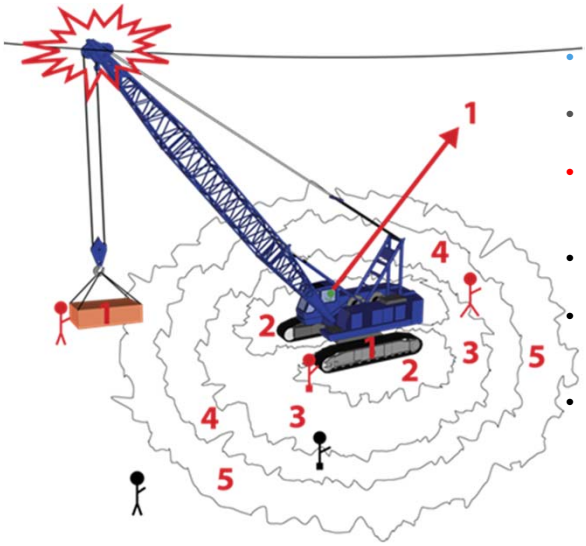
Why is this important to you?



- Operator is usually okay within the cab.
- Personnel in black okay if they hold position
- Personnel in red in danger of serious injury or death

- Only use non-conductive tag lines inside MCD
- Signal persons/spotters must resist urge to attempt rescue

- If someone suddenly collapses in this environment, stay still and look up. Power line contact is usually silent.

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Graphic courtesy of Crane Tech Recall Step and Touch Potentials

Why is this important to you?

An electrical hazard can be defined as a serious workplace hazard that exposes workers to the following:

- Burns
- Electrocution
- Shock
- Arcing
- Fire
- Explosions

Important to note: The covering on an overhead power line is primarily for weather protection; therefore, workers need to know that if they touch a power line, covered or bare, death is probable.

Our World: Four Corners Crane Boom came in Contact With Power Line

Immediate and Basic Causes

1) No work standard to ensure 10ft clearance between equipment and overhead power lines
2) Material stored directly under power line
3) No PJRA available
4) No visual warning signs
5) **Both spotter and crane operator did not see hazard (overhead power lines)**

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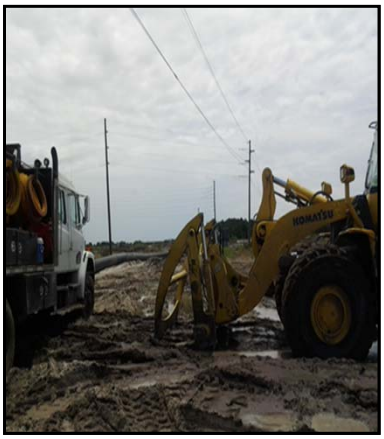
Our World: Wingate Incident
Rubber Tire Loader Attachment Contacts Power Line



Immediate and Basic Causes

- No work standard to ensure 10ft clearance between equipment and overhead power lines
- No PJRA available
- Operator stated he was aware of overhead power line, but lost awareness when focusing on task
  - With clamp in raised position, he backed loader up and his clamp contacted the overhead power line
- **No spotter provided**

Causal Factors and Corrective Actions

Key Incident(s) Causal Factors	Corrective Actions
1. No work standard to ensure 10ft clearance between equipment and overhead power lines	Develop a work standard (Mosaic High Voltage Line Right of Way Procedure) for Mine Planning, mobile equipment to work safely in the vicinity of overhead power lines. Include a safe work permit process for this activity
2. No spotter provided	Develop high voltage line right of way procedure and electrical permit document which include providing a competent dedicated spotter if work can potentially violate the 10 ft. barrier.

Causal Factors and Corrective Actions

Key Incident(s) Causal Factors	Corrective Actions
3. Lack of hazard recognition / awareness when heavy mobile equipment working around power lines	Develop high voltage line right of way procedure which stipulate training in the recognition of electrical hazards, use of spotter and permit by equipment operators.
4. Storage of materials under the power line	Develop high voltage line right of way procedure which prohibit the storage, loading or unloading of materials, equipment or structures under high voltage lines.

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Causal Factors and Corrective Actions

Key Incident(s) Causal Factors	Corrective Actions
5. No visual warning signs	Develop high voltage line right of way procedure which calls for the installation of warning signs for grandfathered installation which falls within the right of way or crossings under high voltage power lines.
6. The risk of mobile equipment contact with power lines exists across Phosphates	Assemble a small team to evaluate how to best (sustainably) reapply these corrective actions across Phosphates. If needs be, tailor the actions based on local site needs and place them into AON

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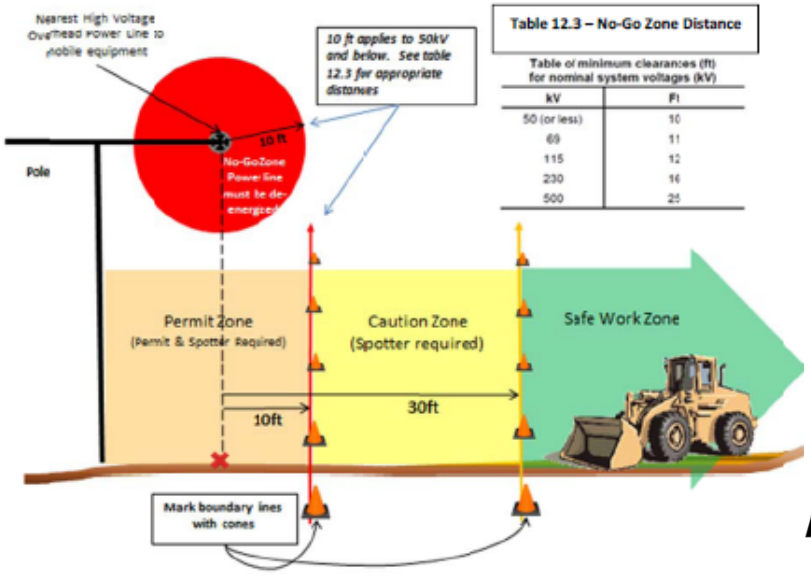
Zones

- **Safe work zone**
- **Caution zone**
- **Permit zone**
- **No-Go zone**

The 30-10-10 Foot Rule for Mobile Equipment



The 30-10-10 Foot Rule for Mobile Equipment

Step 1: Determine the voltage of each power line! Where do you get that information?

To encroach the No-Go zone requires de-energizing and grounding of the HVOL. No one has authority to disregard this rule!

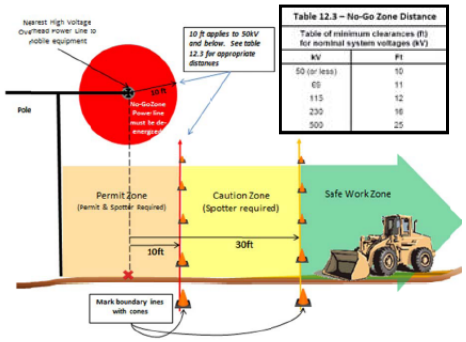


Table 12.3 – No-Go Zone Distance

Table of minimum clearances (ft) for nominal system voltages (kV)

kV	Ft
50 (or less)	10
69	11
115	12
230	16
500	25

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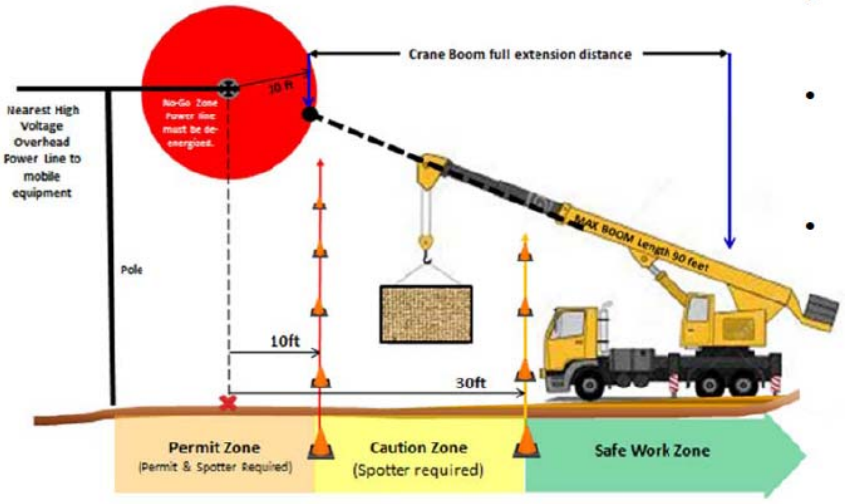
The 30-10-10 Foot Rule – Maximum Extension



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The 30-10-10 Foot Rule - Example

If the minimum clearance is 20 feet then the caution zone remains at 20 feet for a total distance of 40 feet.

It is like having a 40-20-20 rule for this high voltage.

You would mark the area at 20' parallel with the power lines.

NOTE: When you know the power line is high voltage you must Stop, Assess and Plan

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The 30-10-10 Foot Rule for Mobile Equipment

Use Table 12.3 to determine minimum clearance:

Table 12.3 – No-Go Zone Distance

Table of minimum clearances (ft) for nominal system voltages (kV)

kV	Ft
50 (or less)	10
69	11
115	12
230	16
500	25

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Traveling

Equipment Traveling: Equipment is considered to be traveling if the equipment is moving from one location to another, with or without load.

WARNING: Effect of speed and terrain on equipment movement must be considered to ensure a breach in minimum clearance does not occur. (boom, mast, bucket, attachments)

Travel in poor visibility and at night: Use spotter, illuminate lines, identify and use safe path.

Applying 30-10-10 Ft Rule: When Traveling

Traveling Parallel to HVOL

Follow this table for traveling parallel to high voltage overhead lines.

If equipment...	And...	THEN...
Is empty or is carrying any load	• Equip and load is **outside** 30 horizontal ft. to HVOL	• No requirement
Is empty or is carrying a load that protrudes no more than 4 feet on either side	• Equipment and load are **inside** 30 horizontal ft. but **outside** 10 horizontal ft to HVOL	• Evaluate risk prior to travel and along intended route • No Spotter required
Load protrudes beyond 4 feet either side	• Equip or load are **inside** 30 horizontal ft. but **outside** 10 horizontal ft. to HVOL	• Evaluate risk prior to travel and along intended route • Spotter required
Is empty or is carrying any load	• Equipment or load are **inside** 10 horizontal ft.	• Permit and spotter required

Applying 30-10-10 Ft Rule: When Traveling

Crossing Under HVOL

Follow this table for crossing under high voltage overhead lines.

If equipment...	And...	Then...
Is empty or is carrying a load that protrudes no more than 4 feet on either side.	• HVOL is 24ft high and clearly marked • Have required Line Clearance Distance	• Evaluate risks prior to travel and along intended route • No spotter or permit required
Load protrudes beyond 4 feet of either side.	• HVOL is 24ft high and clearly marked	• Permit and Spotter required
Is greater than 14 ft. in height including any vertical load (e.g. tall item on Lowboy)	• HVOL is 24ft high and clearly marked	• Permit and Spotter required
Traveling empty or with any load	• Height of HVOL is not marked	• Stop • Measure height of HVOL • Determine line clearace distance to apply the 30-10-10 Rule

Using the Suparule Device to Measure Height

To Make a Cable Height Measurement

- Select measurement units (set switch on back to Imperial)
- Set the Measurement Mode switch to WIRE
- Press the ON key to power on
- Allow the temperature reading to stabilize
- Press the MEASURE key (distance is to lowest cable)
- Press the READ key (distance to lowest cable, then differences keeping in mind that the lowest point may be in the center between poles due to sagging of the line)

Normally good to .5%

For 50', 3" accuracy

Best Practice
Align to wire, holding at waist
Press and hold Measure to lock on
Lower to ground
Press Measure button 3 times
If they agree, you can feel confident in your reading.

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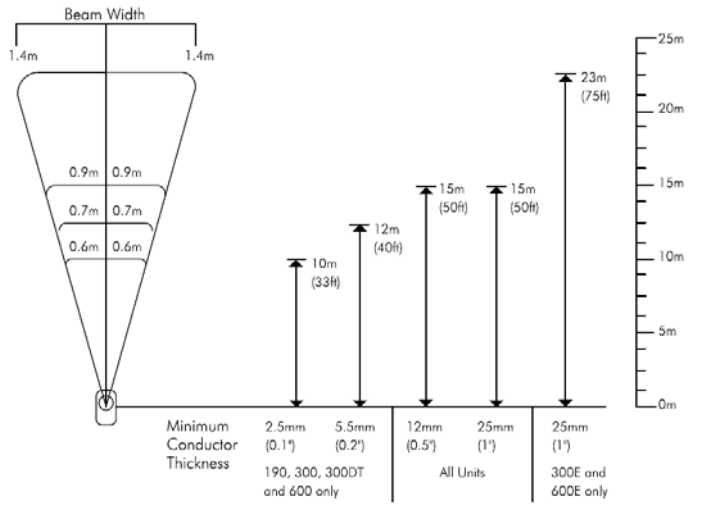
Using the Suparule Device to Measure Height



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Using the Suparule Device to Measure Height

Precautions and indicators

Excess exposure to water and moisture can cause the sensor to malfunction. If water does get into the cone, leave it face down in a dry, warm area.

If the display shows ---.---, this indicates a “poor target” and normally happens when the cables are moving due to wind, etc. wait until the wind dies down to get an accurate reading.

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Mobile Equipment HVOL Permit

Mobile Equipment High Voltage Overhead Line Permit

A permit is required when mobile equipment is working within 10 feet (Horizontal/Vertical/Radial) from the nearest high voltage overhead line. The permit must be completed by the equipment operator and dedicated spotter.

Section 1- Work Identification

Permit Issued To:	☐ Maintenance	☐ Float Crew	☐ Contractor/Other
Location:	Date:	Start Time:	End Time:
Type of mobile equipment:			
Job/ Task Description:			
*Crew must review permit every 4 hours and upon personnel/scope change (permit valid for 1 shift – 12hrs max)			
Permit review times:		Reviewed by:	

All sections must be completed

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Mobile Equipment HVOL Permit

Section 2 – Line Clearance Calculation

Height of lowest power line:	35-feet
Subtract	- (minus)
Maximum reach of mobile equipment: (Maximum reach equals maximum height or maximum radius)	23-feet
Equals	= (equals)
Line Clearance Distance:	12-feet

If Line Clearance Distance is **greater than 10 feet**, proceed to section 4 (PJRA) before work.

If Line Clearance Distance is **less than 10 feet**, complete section 3 (prevention controls) before work.

First: determine the line height = 35 feet

Next: determine the maximum reach, or work radius = 23 feet

Last: calculate 35 – 23 = Line clearance distance of 12 feet

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Mobile Equipment HVOL Permit

Section 3 – Prevention Control - Must choose one of the following:

- ☐ Select an alternate piece of equipment that will not breach the 10 foot "No-go zone" (recalculate Line Clearance Distance for selected equipment)
- ☐ Functional high voltage proximity sensors are installed on the selected equipment to warn operator when approaching HVOL
- ☐ Crane specific – Functional electronic locks that limit the boom angle, boom length and swing degrees to prevent breaching the 10 foot "No-go zone"
- ☐ Line crew install HVOL insulation jackets on line

If none of the above options can be used then,

- ☐ De-energize power line

10 feet no-go zone based on 50kV HVOL. Refer to table 12.3 for required clearance distance

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Mobile Equipment HVOL Permit

Section 4 – Risk Controls

Complete a PJRA and attach to permit

Section 5 – Permit Approval

I have verified that all precautions have been completed as listed on this permit

Authorized Mosaic Supervisor or Designee	Area Superintendent/Manager	
Print Name:	Print Name:	
Signature:	Signature:	
	☐ Verbal	☐ In person

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Mobile Equipment HVOL Permit

Section 6 - Persons Performing Work

I have reviewed this permit and understand all precautions required

Title	Print Name	Initial	Department
Equipment Operator			
Dedicated Spotter			
Other person performing work			
Other person performing work			
Other person performing work			
Other person performing work			

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The 30-10-10 Foot Rule for Mobile Equipment

230 KV Example…

Line height = 35 feet

Equipment max reach = 23 feet

Section 2 – Line Clearance Calculation

Height of lowest power line:	
Subtract	- (minus)
Maximum reach of mobile equipment: (Maximum reach equals maximum height or maximum radius)	
Equals	= (equals)
Line Clearance Distance:	

If Line Clearance Distance is **greater than 10 feet**, proceed to section 4 (PJRA) before work.

If Line Clearance Distance is **less than 10 feet**, complete section 3 (prevention controls) before work.

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The 30-10-10 Foot Rule for Mobile Equipment

230 KV Example…

Line height = 35 feet

Equipment max reach = 23 feet

Section 2 – Line Clearance Calculation

Height of lowest power line:	35
Subtract	- (minus)
Maximum reach of mobile equipment: (Maximum reach equals maximum height or maximum radius)	23
Equals	= (equals)
Line Clearance Distance:	12

If Line Clearance Distance is **greater than 10 feet**, proceed to section 4 (PJRA) before work.

If Line Clearance Distance is **less than 10 feet**, complete section 3 (prevention controls) before work.

Note: 230 KV requires 16 foot minimum clearance distance vice the 10 foot minimum for the 50 KV line

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Dedicated Spotter Requirements

- A spotter's sole responsibility is to watch the separation between the power line and the equipment.
- Caution Zone - Ensure no part of the equipment, attachments, and/or load will breach the 10 ft. horizontal zone.
- Permit Zone - Ensure no part of the equipment, attachments, and/or load will breach the No-Go zone.
- Provide timely warning to the equipment operator.
- A Signal Person is required to signal crane operations.
- All other applications will utilize specially trained spotters.

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Summary

You learned how to:

- Secure power line voltage information
- Determine appropriate minimum clearance distance (Table 12.3)
- Secure equipment maximum reach (or radius) information
- Secure lowest overhead line height using the **SUPARULE Cable Height Meter**
- Calculate line distance clearance

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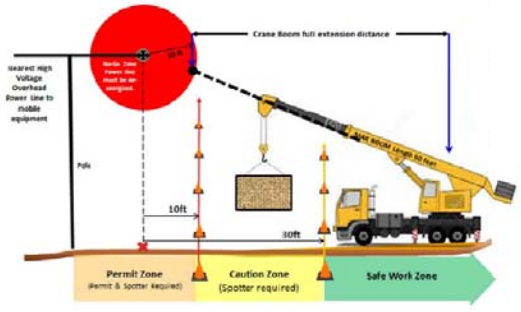
Questions and Discussion



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Mosaic Mineral's Mobile Equipment Dedicated Spotter Procedure

Warning
Aerial power lines are to be presumed energized and high voltage

This lesson is intended for Minerals (Mine) site employees and contractors

What is HVOL?

- HVOL stands for High Voltage Overhead Lines
- Contact or close proximity to HVOL is dangerous and must be avoided.

Why is this important to you?

- May 19, 2000
- Ybor City

Graphic courtesy of Crane Tech Recall Step and Touch Potentials

Why is this important to you?

- Major fire and property damage caused by a telescopic boom forklift making contact with HVOL.

Graphic courtesy of Crane Tech Recall Step and Touch Potentials

Why is this important to you?

- Operator was driving with boom raised and extended.
- No Spotter.
- No HVOL policy.

Graphic courtesy of Crane Tech Recall Step and Touch Potentials

Why is this important to you?

- No one was injured.
- But the possibility for injuries or death was there.

Graphic courtesy of Crane Tech Recall Step and Touch Potentials

Heavy Equipment Danger Zone

- Ensure no one enters the danger zone while the equipment is in operation
- Stay at least 10’ away from all sides of machinery
- Always verify adequate clearance from obstructions and minimum clearance distances from HVOL

If You Are Working Near Moving Equipment

- Stay alert
- Don’t get distracted
- Maintain safe distance from equipment
- Stay off the equipment unless the operator stops and gives you authorization to approach
- Watch out for raised loads, they may shift or fall

Spotter Responsibilities

- Obtain overall height and reach dimensions from the equipment operator to calculate required clearance distances
- Understand operational characteristics of equipment
- Give operator timely warning on the two-way radio when any part of the equipment or load is approaching the No-Go zone

Equipment Affected

- Loaders
- Excavators
- Tractor Trailers
- Mobile Cranes
- Aerial Lifts
- Forklifts
- Ditchers
- Dump Trucks
- Dedicated Pile Drivers
- Any equipment that has the ability to extend into the 10-foot radial zone

Loaders

- Observe height of bucket including load with respect to proximity of HVOL

Loaders

- Be aware of pinch points, many loaders articulate when steering

Excavators

- Due to the length of the boom base section ensure boom is properly stowed for travel

Tractor Trailers

- Obtain the overall height of the tractor, trailer and load to calculate clearance requirements

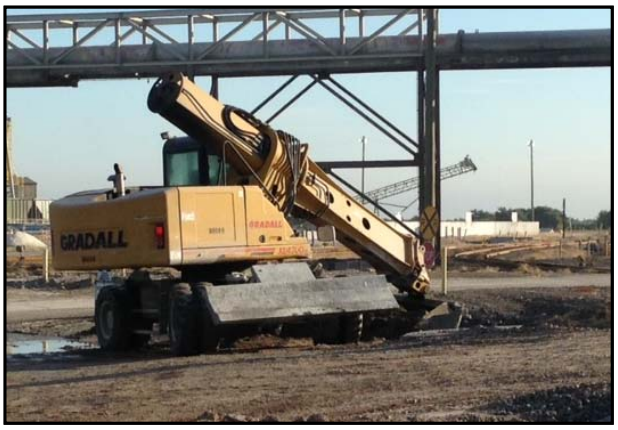
Aerial Lifts

- Aerial Lifts DO NOT have insulted booms and platforms.
- Be aware of articulating boom lifts as their boom configuration arcs in an unusual way.

Forklifts

- Be aware of the reach capability of forklifts.
- Telescopic boom forklift forks have the ability to dump the load – stand clear.

Ditchers



- The spotter must be aware of all possible motion of the equipment and maintain a safe distance from moving equipment

Dump Trucks

- The spotter must ensure proper clearances when the bed/dumper is being raised or the truck is to travel with the bed/dumper raised.

Dedicated Pile Drivers

- Be aware of the directional drilling capability and the angle of the boom.

Dedicated Spotter Requirements

- A spotter's sole responsibility is to watch the separation between the power line and the equipment.
- Caution Zone - Ensure no part of the equipment, attachments, and/or load will breach the 10 ft. horizontal zone.
- Permit Zone - Ensure no part of the equipment, attachments, and/or load will breach the No-Go zone.
- Provide timely warning to the equipment operator.
- A Signal Person is required to signal crane operations.
- All other applications will utilize specially trained spotters.

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Radio Signals

- Radio communication only.
- If radio fails, the operation must stop until radio communication is re-established.
- If this occurs Spotter must ONLY use the following 3 hand signals:
  - Stop
  - Emergency Stop
  - Dog everything

When using hand signals the standard method must be used

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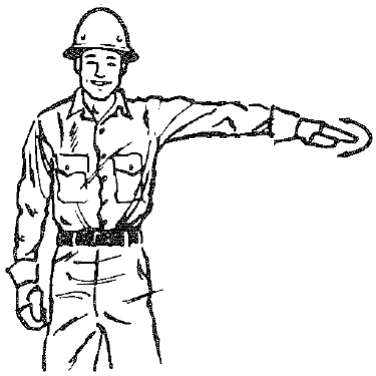
Hand Signals

Stop: Arm extended, palm down, move arm back and forth horizontally.



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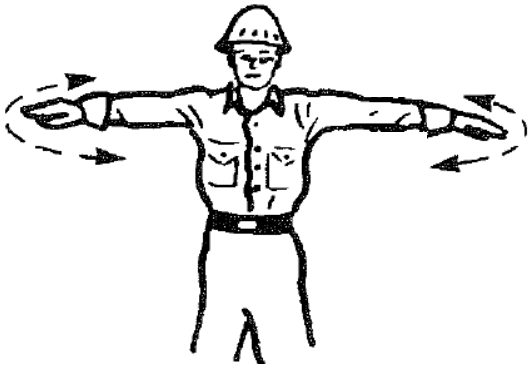
Hand Signals

Emergency Stop: Both arms extended, palms down, move arms back and forth horizontally.



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Hand Signals

Dog Everything: Clasp hands in front of body.

- After giving the dog everything signal, do not approach equipment until given authorization from the operator

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Signals in General

- Anyone who becomes aware of a safety problem must alert the operator or spotter by giving the stop or emergency stop signal.
- Equipment operators are required to obey a stop or emergency stop signal regardless of who gives it.
- All travel directions given to the operator by the spotter must be given from the operator's direction perspective.

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Radio Signals

- Signal transmission must be through a dedicated channel.
- The device(s) used to transmit signals must be tested on site before beginning operations to ensure that the signal transmission is effective, clear, and reliable.
- Ensure radio has sufficient battery power. A back-up battery on-site is strongly recommended.

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Radio Signals

- The operator's reception of signals should be by a hands-free system.
- The spotter should periodically contact the equipment operator to verify radio communication is live.

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Radio Signals

- Prior to beginning operations, the operator, spotter and site director (if there is one), must contact each other and agree on the voice signals that will be used.
- Use voice signals as agreed upon.
- If any change in situation or workers, regroup and coordinate signals.

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Radio Signals

Each voice signal must contain the following three elements, given in the following order:

- function (travel, turn, etc.), direction;
- distance and/or speed;
- function, stop command.

Example of Voice Signal Command Elements

Travel reverse, 30-ft, 20-ft, 10-ft, 5-ft, Travel Stop

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Radio Signals

- The operator, spotter and site director (if there is one), must be able to effectively communicate in the language used.

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Questions and Discussion

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Procedure: Mobile Equipment High Voltage Overhead Line (HVOL) 30-10-10 Ft Rule

Location/Applicability: Minerals Locations			Document Identifier:
Document Owner: Director Phosphates Health and Safety		SME: Wayne Pilliner	
Effective Date: 12/30/2015	Review Date: 12/30/2016	Originating Department: Phosphates Health and Safety	

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Introduction

Purpose

This procedure was written to provide Mosaic employees/contractors with safe work practices when working near high voltage overhead lines (HVOL). Following the HVOL procedure helps prevent incidental contact with power lines resulting in shock or electrocution.

Scope

This procedure applies to equipment working and equipment traveling near HVOLs on Mosaic mine properties (Minerals). Activities include, but are not limited to, the following:

- Excavation
- Reclamation
- Earth moving
- Demolition
- Loading/unloading equipment
- New equipment installation
- Staging/Storing equipment
- Transporting equipment/material
- Electrical Permitting Requirement
- Equipment Traveling

Exceptions to Scope:

- E/I Line Crew: Require a documented risk assessment when in close proximity to HVOLs and adherence to other applicable governing procedures.
- Equipment that does not extend vertically and does not breach the 10 foot "No-go zone"
  (e.g., roadway graders)

Continued on next page

Introduction, Continued

Responsibilities

The following table contains a list of responsibilities for specific groups /titles as required by this procedure.

Group/Title	Responsibilities
Affected Persons	• Adheres to the applicable requirements and procedural steps outlined in this document including required initial, refresher, and task training.
Location Management	• Ensures requirements outlined in this document are implemented and sustained by employees/contractors • Ensures training is provided as applicable.
Production, Mechanical Maintenance, and EI&A Departments	• Conducts annual line height assessment of power lines (using an approved ultrasonic measuring device) above designated road crossings. **This ensures 24 ft. minimum height is maintained to ground level.** • Ensures equipment specific energy isolation procedures are available when de-energizing high voltage overhead power lines**.**
Mobile Equipment Operators	• Assess surroundings for location of any HVOLs to include parking areas, work areas and travel routes to job site. • Recognizes situations that trigger the 30-10-10 ft. rule. • Uses 30-10-10 ft. rule when mobile equipment is near HVOL • Adheres to warnings and direction provided by designated spotter. • Conducts hazard assessments for work to be performed prior to starting equipment.
Dedicated Spotter	• Assess surroundings for location of any HVOLs to include parking areas, work areas and travel routes to job site. • Recognizes situations that trigger the 30-10-10 ft. rule. • Uses 30-10-10 ft. rule when mobile equipment is near HVOL • Monitors the separation between power lines and equipment. • Communicates clearly with the operator when mobile equipment approaches designated barriers around HVOL • Maintains continuous contact with the operator via a dedicated two way radio.

Continued on next page

Introduction, Continued

References

These documents are referenced in this procedure.

Document Title	Unique Identifier	Location
Mosaic Phosphate Safety Lockout Tagout Program	NA	Livelink
MSHA 30 CFR 56.12071	NA	NA
US Bureau of Reclamation Section 12	NA	NA
National Electric Code NFPA 70E	NA	NA
American Society of Mechanical Engineers Standards (ASME) B30.5	NA	NA
Mobile Equipment High Voltage Line Permit	NA	Livelink

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Introduction, Continued

Definitions

Key terms used in this procedure are defined below.

Term	Definition
Dedicated Spotter	Individual whose sole responsibility is to watch the separation between the HVOL and equipment/ load (including rigging, lifting accessories, load line and attachments). ***Reference:*** Spotter requirements pg. 18
Designated Road Crossings	Any established roadway that crosses under a HVOL and is regularly traveled by equipment which falls under the scope of this procedure.
Encroachment	When any part of mobile equipment, load line or load (including lifting and rigging accessories) breaches a minimum line clearance distance stated in the procedure. (10 feet for 50 kV lines)
HVOL Assessments	An evaluation of the HVOL in proximity to travel/work area to determine if the 30-10-10 rule applies.
High Voltage Overhead Lines (HVOL)	Aerial power lines above 1,000 volts AC phase-to-phase.
Signal Person	One who successfully completes a Mosaic approved classroom training and proficiency evaluation. Meets the requirements for ASME B30.5
Mobile Equipment Operator	Person who successfully completed all the equipment and safety training related to the operation of assigned mobile equipment.

Continued on next page

Introduction, Continued

Definitions,(continued)

Term	Definition
30-10-10 Ft Rule	Control methods required when mobile equipment is operated in close proximity to high voltage overhead lines (HVOL) while traveling or working. ***Warning:*** The "No-go zone" of 10 ft. (minimum) around the power line and must be adjusted for voltages greater than 50kV. ***Reference:*** See Appendix A: Minimum Clearance Distances: No-Go Zones.
No-Go Zone (Minimum Clearance Distance)	Radius around the power line, into which no part of a person, equipment, or load may encroach without first de-energizing the line. ***Warning:*** No-Go Zones must be calculated based on line voltage. Reference: See Appendix A: Minimum Clearance Distances: No-Go Zones.
Equipment Traveling	Qualifying equipment is considered to be traveling if the equipment is moving from one location to another with or without a load and the boom or vertical extensions in appropriate position for travel.
Equipment Working	Qualifying equipment is considered to be performing work if operator engages in any activity other than described in equipment traveling.
Task Training	Training directed at performing specific task(s).
Maximum Radius	The vertical or horizontal distance of equipment to the furthest point of extension to include load and rigging.
Line Clearance Distance	Distance from the mobile equipment to the actual HVOL.

Continued on next page

Introduction, Continued

Training requirements

Any person whose work is governed by this document must receive the following training:

- Initial training on this procedure
- Use of the Suparule line height measuring device
- Refresher training (same as initial) is required every three (3) years.
- New job assignments (including temporary assignments) require initial training.

Mobile Equipment (HVOL) Requirements

General requirements

The following requirements apply to operation (working and traveling) of mobile equipment in proximity to HVOLs.

Item	Requirement
Energized and high voltage presumption	All aerial power lines are to be presumed energized and high voltage. ***Warning:*** Line Crew must authorize work to Mobile Equipment Operator(s) when there is a need for lines to be de-energized. ***Reference:*** Phosphates Lock Out Program (LOTO)
HVOL Assessment	Must be conducted prior to loading/unloading, travel or work.
30-10-10 ft. rule Sticker	A warning sticker indicating the 30-10-10 ft. rule must be posted in all Mosaic mobile equipment and aerial lifts capable of reaching or extending into HVOLs.
30-10-10 ft. rule Placard	Mosaic and Contractor mobile equipment must have a warning placard indicating the 30-10-10 ft. rule in the cab (for reference) of all mobile equipment and aerial lifts capable of reaching or extending into HVOLs for the duration of the job.
Equipment and material storage	Prohibited from being stored or staged under high voltage lines and must be stored at a minimum distance of 30 linear feet from HVOLs
Lifting loads over lines	Loads are prohibited from being lifted over energized HVOLs.
Transporting 50-100 ft. pipe	If the use of a trailer is not possible, then conduct HVOL assessment to determine if the 30-10-10 ft. rule applies. ***Warning:*** Effects of speed and terrain on equipment movement (boom/mast/bucket/attachments) must be considered to ensure a breach in minimum clearance does not occur.

Continued on next page

Mobile Equipment (HVOL) Requirements, Continued

General requirements

The following requirements apply to operation (working and traveling) of mobile equipment in proximity to HVOLs.

Item	Requirement
Mobile equipment HVOL Permit	Required when equipment, equipment extensions, or load are within 10ft (based on voltage) vertical or horizontal distance of the HVOL
Mobile Equipment Height	Must be posted in cab • Travel height • Maximum extention height
Night/Poor visibility	• Use a spotter to guide movement • Illuminate HVOL or identify HVOL location by another means • Identify and use a safe path.
Signage	• Required at every crossing on both sides of the road • Reflective • Minimum size 12” x 18” EXAMPLE: 

30-10-10 Ft Rule

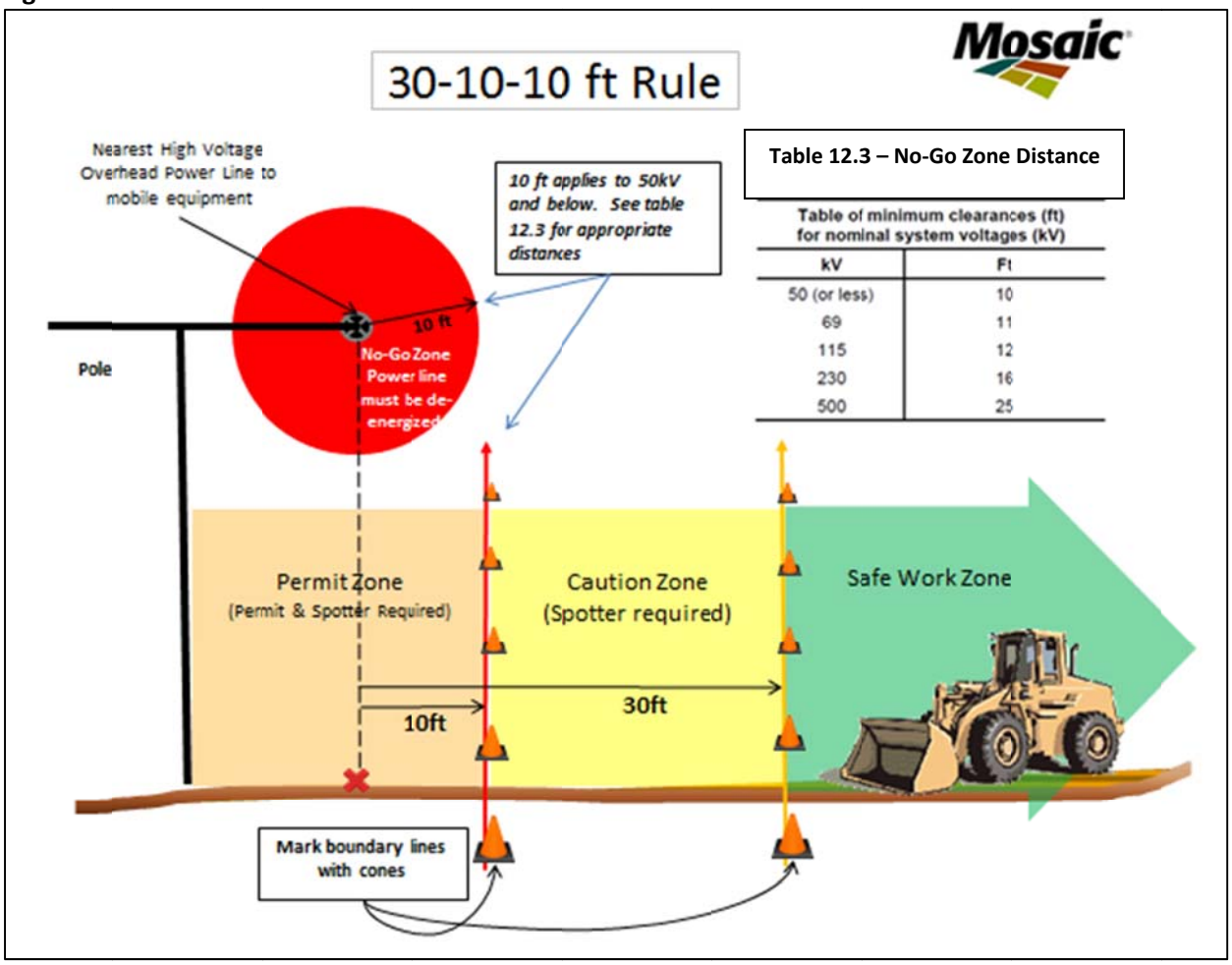
Purpose

The purpose of the 30-10-10 rule is to maintain a minimum clearance distance (10ft for 50kV lines) between HVOL and mobile equipment to prevent contact with the line.
(Working radius of equipment must include any portion of the load/rigging.)

- Figure 1 below, illustrates the vertical/horizontal/radial distance from the high voltage power line upon which the 30-10-10 ft. rule is based.

Warning: Minimum distance of 10 ft. is based on 50 kV. See table in Figure 1
Reference: Appendix A: Minimum Clearance Distances for "No Go Zones"

Figure 1: 30-10-10 ft Rule



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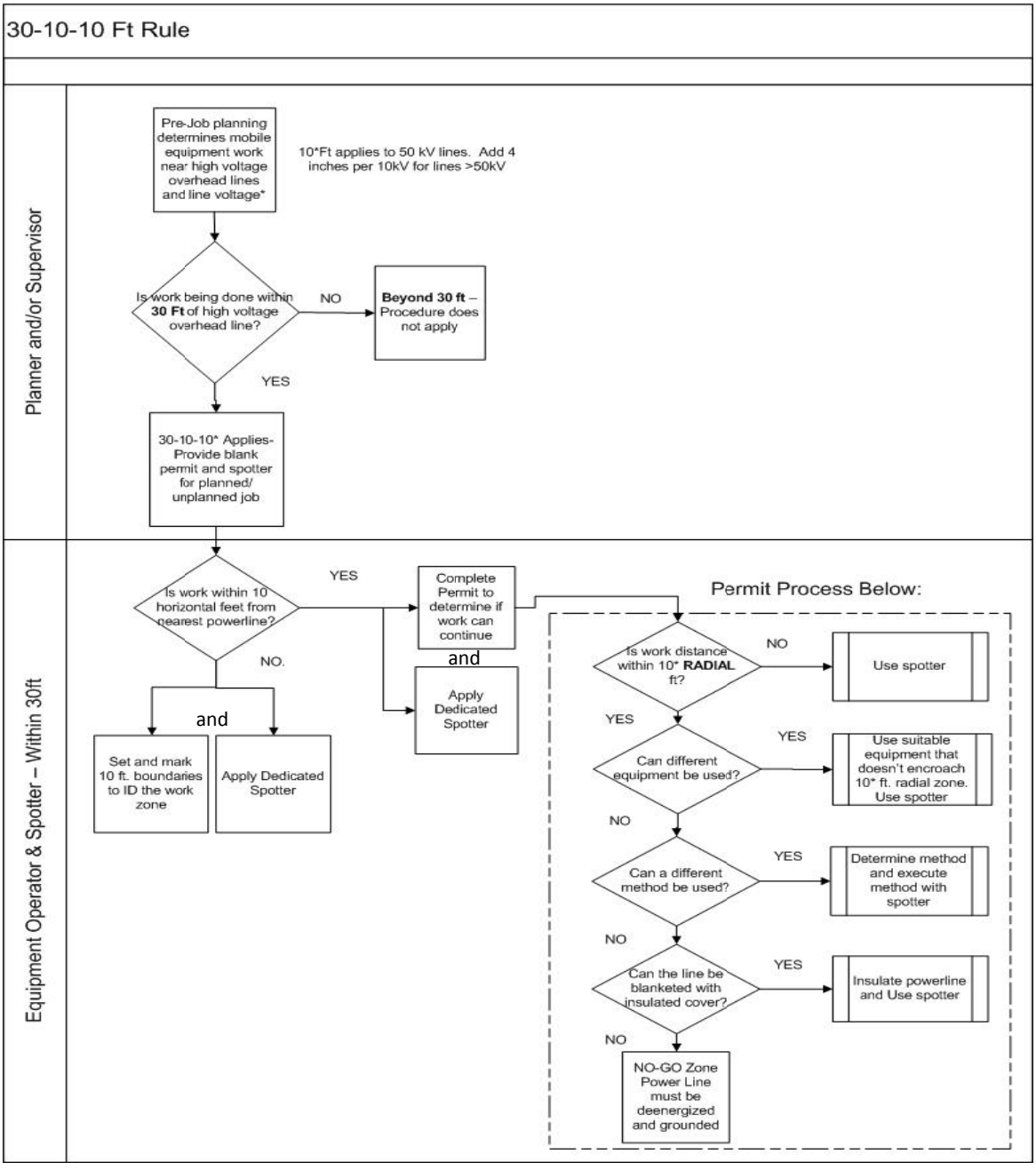
30-10-10 Ft Rule, Continued

Process flow diagram for applying 30-10-10 ft. rule

The process flow diagram below illustrates application of the 30-10-10 ft. rule.

Reminder: The hierarchy of hazard control (elimination, substitution, administrative, behavioral/procedures) is applied when within the 30 ft. zone. `

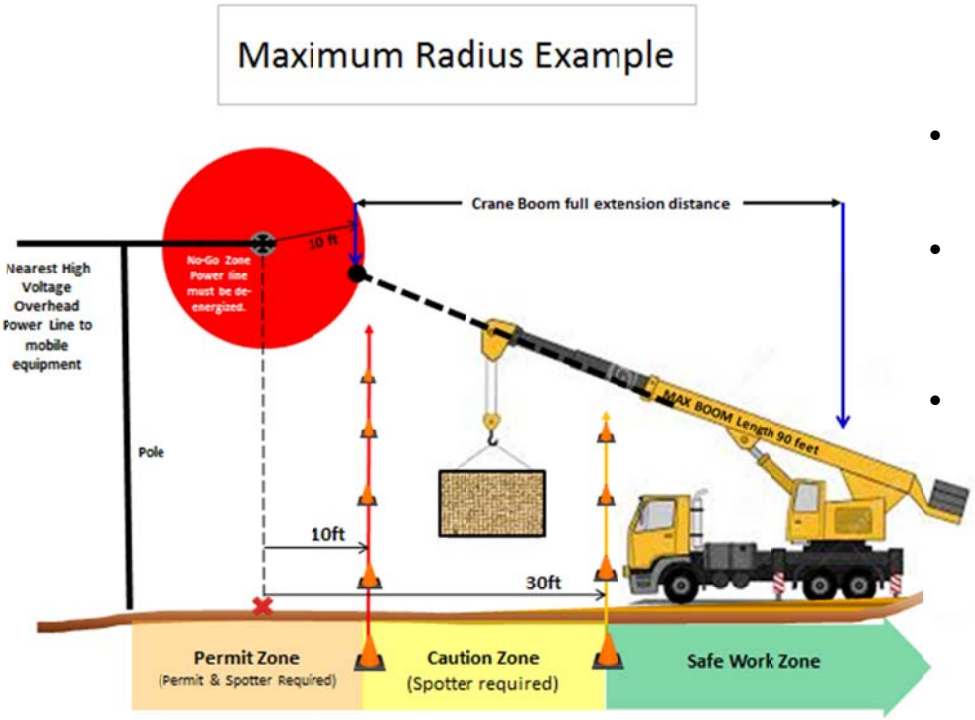


Determine if the 30-10-10 Ft Rule applies

Procedure Follow the steps below to determine if the 30-10-10 ft. rule applies.

Step	Action
1	Measure the maximum radius of the equipment. (Maximum radius = Length of equipment when fully extended plus load/rigging)
2	Using the measured maximum radius distance determine:

IF maximum radius is…	THEN…
Outside 30 horizontal feet from the nearest high voltage line	• Mark the 30 ft. boundary, and • Proceed with work.
Inside 30 horizontal feet from the nearest high voltage line	• Apply the 30-10-10 ft. rule. ***Reference:*** See "Applying 30-10-10 ft. Rule: At or Within 30 Ft from HVOL" below.



- Equipment placed in Safe Work Zone
- Maximum reach of equipment reaches No-Go Zone
- This example requires a permit

Applying 30-10-10 Ft Rule: At or Within 30 Ft from HVOL

Procedure

Follow the procedure below to apply the 30-10-10 ft. rule when equipment and/or maximum radius is at or inside 30 ft. from the closest HVOL.

Warning: Both the operator and spotter must follow this procedure.

Step	Action
1	Mark the ground at the vertical plane (directly underneath) of the nearest power line.
2	Measure a horizontal 10 ft. line from the vertical plane mark in the direction of equipment/load to identify the Permit Zone boundary.
3	Mark the Permit Zone Boundary by placing cones (or other visible markers) in a line parallel to the HVOL. ***Note:*** This creates a visible barrier for the operator and Spotter
4	Position dedicated spotter near 10 ft. line to ensure that any part of equipment or load does not cross into permit zone.
5	Maintain two way communications between dedicated spotter and operator.

Applying 30-10-10 Ft Rule: At or Within 10 Ft from HVOL

Procedure

Follow the steps below to apply the 30-10-10 ft. rule if equipment/load is at or within 10 ft. from the nearest HVOL.

Warning: Both the operator and spotter must follow this procedure.

Step	Action
1	Complete a *Mobile Equipment High Voltage Permit* to determine if work can continue.
2	Upon completing the permit determine the following:

IF the permit process…	THEN…
Determines that work cannot be conducted without encroaching within 10 ft. radial No-Go Zone	*Warning:* **Stop job**. Power lines must be de-energized and work authorized (between equipment owner and mobile equipment operator) before work can continue. Spotter is required ***Reference:*** Phosphate Lock Out Program (LOTO)
Allows for work within the horizontal 10 ft. permit zone	Spotter is required ***Reference:*** See "Spotter Requirements" in this document.

Equipment Travelling

Procedure

Consult the tables below for equipment travelling requirements

Traveling Parallel to HVOL

Follow the table below for travelling parallel to high voltage overhead lines.

If equipment…	And…	THEN…
Is empty or is carrying any load	• Equip and load is **outside** 30 horizontal ft. to HVOL	• No requirement
Is empty or is carrying a load that protrudes no more than 4 feet on either side	• Equipment and load are **inside** 30 horizontal ft. but **outside** 10 horizontal ft to HVOL	• Evaluate risk prior to travel and along intended route • No Spotter required
Load protrudes beyond 4 feet either side	• Equip or load are **inside** 30 horizontal ft. but **outside** 10 horizontal ft. to HVOL	• Evaluate risk prior to travel and along intended route • Spotter required
Is empty or is carrying any load	• Equipment or load are **inside** 10 horizontal ft.	• Permit and spotter required

Continued on next page

Equipment Travelling, Continued

Crossing under HVOL

Follow the table below for crossing under high voltage overhead lines.

If equipment…	And…	Then…
Is empty or is carrying a load that protrudes no more than 4 feet on either side.	• HVOL is 24ft high and clearly marked • Have required Line Clearance Distance	• Evaluate risks prior to travel and along intended route • No spotter or permit required
Load protrudes beyond 4 feet of either side.	• HVOL is 24ft high and clearly marked	• Permit and Spotter required
Is greater than 14 ft. in height including any vertical load (e.g. tall item on Lowboy)	• HVOL is 24ft high and clearly marked	• Permit and Spotter required
Traveling empty or with any load	• Height of HVOL is not marked	• Stop • Measure height of HVOL • Determine line clearace distance to apply the 30-10-10 Rule

Spotter Requirements

Requirements

A dedicated spotter must ensure the following requirements are met.

Item	Spotter Requirement
Cranes	• Must be a signal person
All other mobile equipment	• Received spotter training
Continuous contact	• Be in continuous contact with the operator via dedicated two way radio • Give timely information to the operator to maintain the line clearance distance
Position to gauge distance	• Be positioned to effectively gauge the clearance distance in accordance with 30-10-10* Ft Rule
Pole and guy wire	• Be positioned to effectively gauge clearance
Position outside working radius	• Be positioned outside the working radius of equipment being used
PPE	• Be equipped with the same level of protective equipment as the crew performing work
No other duties	• May not be assigned any other duties while acting as a spotter
Stay at post	• Do not leave post while acting as a spotter
No rescue	• Do not attempt a rescue if equipment comes in contact with energized power line.
Help from ERT	• Have a means of communicating to summon for help from facility ERT
Competence to shut down	• Be a competent person with knowledge, training, capability, and authority of shutting down the job for any reason.

Incidental Contact

Procedure

In the event contact is made with an energized overhead power line, clear the area and suspend all work within 50m (165 ft.) and assume the line is still live. Proceed according to the following table.

IF the machine is…	THEN…
Still operable	• Lower any raised parts that can be controlled from inside the cab. • Drive the machine clear of the line as long as these actions do not risk breaking the line or dragging it to the ground • Notify Supervisor
Inoperable or cannot be cleared from the line	• Stay in cab. Instruct everyone outside not to approach. • Contact utility company immediately. Do not leave machine until given the "all clear" by the utility company. • Notify Supervisor
Inoperable and there is immediate risk to the operator	• Move away from the equipment using the "shuffle method." Shuffle your feet with short steps, keeping both feet together and on the ground at all times. Alternatively, "hop" away with feet together until at least 50m (165ft) away. • Contact utility company immediately • Notify Supervisor ⚠ ***Warning:*** Never contact the equipment and ground simultaneously ("jump clear" of machine to avoid creating a path to ground).

Follow up warning

⚠ ***Warning:*** Do not return to the machine, or enter the 50m (165ft) exclusion zone, until given confirmation by utility company personnel that it is safe to do so.

Appendix A: Minimum Clearance Distances Table: No-Go Zones

No-go zone calculations

Table 12-3, US Bureau of Reclamation Section 12, is taken from NFPA 70E Electrical Safety Code and OSHA 29 CFR 1910.269.

Table 12.3 – No-Go Zone Distance

Table of minimum clearances (ft) for nominal system voltages (kV)	
kV	**Ft**
50 (or less)	10
69	11
115	12
230	16
500	25

Note: Table 12-3 shows only common Reclamation voltages and rounds them up to the nearest foot. For other voltages, use the 10-foot minimum and add 4 inches for every 10 kilovolts over 50 kilovolts. For example, 60 kilovolts would be 10 feet plus 4 inches; rounding up to the nearest foot would require an 11-foot clearance. Always round up because the clearance is usually only an estimate. It is difficult, if not impossible, to accurately measure the actual distance unless you de-energize the line and/or equipment.

Appendix B: Mobile Equipment High Voltage Overhead Line Permit

Mobile Equipment High Voltage Overhead Line Permit

A permit is required when mobile equipment is working within 10 feet* (Horizontal/Vertical/Radial) from the nearest high voltage overhead line. The permit must be completed by the equipment operator and dedicated spotter.

Section 1- Work Identification

Permit Issued To:	☐ Maintenance	☐ Float Crew	☐ Contractor/Other
Location:	Date:	Start Time:	End Time:
Type of mobile equipment:			
Job/ Task Description:			
***Crew must review permit every 4 hours and upon personnel/scope change (permit valid for 1 shift – 12hrs max)**			
Permit review times:		Reviewed by:	

Section 2 – Line Clearance Calculation

Height of lowest power line:	
Subtract	- (minus)
Maximum reach of mobile equipment: (Maximum reach equals maximum height or maximum radius)	
Equals	= (equals)
Line Clearance Distance:	

If Line Clearance Distance is **greater than 10 feet***, proceed to section 4 (PJRA) before work.

If Line Clearance Distance is **less than 10 feet***, complete section 3 (prevention controls) before work.

Section 3 – Prevention Control - Must choose one of the following:

- ☐ Select an alternate piece of equipment that will not breach the 10 foot* "No-go zone" (re-calculate Line Clearance Distance for selected equipment)
- ☐ Functional high voltage proximity sensors are installed on the selected equipment to warn operator when approaching HVOL
- ☐ Crane specific – Functional electronic locks that limit the boom angle, boom length and swing degrees to prevent breaching the 10 foot* "No-go zone"
- ☐ Line crew install HVOL insulation jackets on line

If none of the above options can be used then,

- ☐ De-energize power line

10 feet no-go zone based on 50kV HVOL. Refer to table 12.3 for required clearance distance

Appendix B , Cont.

Section 4 – Risk Controls

Complete a PJRA and attach to permit

Section 5 – Permit Approval

I have verified that all precautions have been completed as listed on this permit

Authorized Mosaic Supervisor or Designee	Area Superintendent/Manager	
Print Name:	Print Name:	
Signature:	Signature:	
	☐ Verbal	☐ In person

Section 6 - Persons Performing Work

I have reviewed this permit and understand all precautions required

Title	Print Name	Initial	Department
Equipment Operator			
Dedicated Spotter			
Other person performing work			
Other person performing work			
Other person performing work			
Other person performing work			

Revision Log

Rev. No.	Requested By	Approved By	Approved Date	Revised By
Version 1	Minerals Operations	David Huth	10/7/15	Tracy Young/Wayne Pilliner/Ed Iocco/Matt Bishop

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