Morenci Safe Production Standard	Standard 3.8		
	OHSAS 18001:2007	4.4.6	
	Revision #	03	
Mahila Cranas	Revision Date	06/24/2013	
wobile Cralles	Effective Date	11/1/2012	
	Document Owner	Maintenance Services	
Approvals:			
Senior VP Morenci Operations: 8/8/2012	Safety Steering Committee: 7/27/2012		

- **1.0 PURPOSE:** The purpose of this standard is to minimize risks to workers who are directly involved or performing tasks in the vicinity of a mobile crane and to mandate specific safe work practices for operating such machinery.
- **2.0 SCOPE:** This standard applies to all FMMO employees and contractor involved in the operation, maintenance, and inspection of mobile cranes (boom trucks, lattice boom cranes, and hydraulic telescoping boom cranes). The standard applies to all mobile cranes with a rated capacity of 5 tons or more. Mobile cranes less than 5 tons must still meet the inspection requirements outlined within this standard.

Formal Mobile Crane training requirements prescribed in section 8 apply to operators who utilize mobile cranes equipped with outriggers or stabilizing devices. Other mobile crane operators shall receive hands on training by an experienced and competent employee.

#### **3.0 TERMS, DEFINITIONS AND ABBREVIATIONS**

- 3.1 **Attachment:** A device mounted permanently or removable on the elevating mechanism for handling the load. Popular types of attachment for mobile cranes are rotating devices, side shifters, load stabilizers, rams and booms.
- 3.2 **Auxiliary Hoist:** Supplemental hoisting unit of lighter capacity and usually higher speed than the main hoist.
- 3.3 **Boom (Crane):** A member hinged to the rotating superstructure and used for supporting the hoisting tackle.
- 3.4 **Boom Line:** A wire rope for supporting or operating the boom on a mobile crane.
- 3.5 **Brake:** A device used for slowing or stopping motion by friction or electromagnetic means.
- 3.6 **Cab:** The operator's compartment.
- 3.7 **Certified Crane Operator (CCO):** An individual who has demonstrated the ability and competence, through an accredited training program, to perform activities involving the operation of mobile cranes.
- 3.8 **Clearance:** The distance by which one object clears another, or the clear space between them.

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Page **1** of **11** 

- 3.9 **Competent Person:** One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.
- 3.10 **Critical Item:** As used in this standard, refers to items that, if damaged or defective, could pose immediate danger to the operator of the crane or personnel working in close proximity to the crane activity.
- 3.11 **Designated**: Selected or assigned by the employer or the employer's representative as being qualified to perform specific duties.
- 3.12 **Dynamic Braking:** A method of controlling crane motor speeds when in the overhauling condition to provide a retarding force.
- 3.13 **Equalizer:** A device used to compensate for unequal length or stretch of a hoist rope.
- 3.14 **Hoist Drum Brake:** The main friction type braking system used to keep a load suspended and hold it in place.
- 3.15 **Lift:** The process of hoisting a load, or the maximum safe vertical distance through which a load may travel when attached to the hook or below-the-hook lifting device.
- 3.16 **Lift Director:** A qualified individual that is responsible for directly overseeing the work being performed by a mobile crane and the associated rigging crew.
- 3.17 **Lift Plan:** The pre-planning identification of hazards, implementation of control measures, and documentation completed prior to the lift taking place.
- 3.18 **Load:** The total weight superimposed on the lifting mechanism(s), load block, hook and/or lifting device.
- 3.19 **Main Hoist:** The hoist mechanism provided for lifting the maximum-rated load.
- 3.20 **Mobile Crane:** A track or wheel mounted vehicle containing apparatuses designed for lifting and lowering a load vertically and moving it horizontally, and that has a hoisting mechanism as an integral part of it.
- 3.21 **Proximity Alarm:** A device that provides a warning of proximity to a power line and that has been listed, labeled, or accepted by a Nationally Recognized Testing Laboratory.
- 3.22 **Qualified Person:** A person who, by possession of a recognized degree, certificate, or professional standing, or who, by extensive knowledge, training, and experience, has successfully demonstrated an ability and competence to perform duties related to the subject matter at work.
- 3.23 **Rated Capacity:** The maximum working load permitted by the manufacturer under specified working conditions. Such working conditions typically include a specific combination of factors such as equipment configuration, radius, boom length, and other parameters of use.
- 3.24 **Reeving:** A system in which a rope travels around drums or sheaves.
- 3.25 **Reverse Bend:** Reeving of a wire rope over sheaves and drums so that it bends in opposite directions.
- 3.26 **Safe Working Load:** The maximum load which may be applied to a crane, hoist, rope, chain or sling for particular conditions and use.
- 3.27 **Shall:** A word indicating that an action is mandatory.
- 3.28 **Sheave:** A grooved wheel or pulley used with a rope to change direction and point of application of a pulling force.

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Page **2** of **11** 

- 3.29 **Shock Load:** Additional stress imposed on a wire rope due to decreasing the load velocity. This practice may compromise vital crane components and is prohibited.
- 3.30 **Should:** A word indicating a recommended action, the advisability of which depends on the facts in each situation.
- 3.31 **Side Pull:** That portion of a hoist pull acting horizontally when the hoist lines are not operated vertically. This practice may compromise vital crane components, should be avoided and not a dominant practice.
- 3.32 **Signal Person:** An individual who has been designated, and who has received task training on the correct use and communication of hand and verbal signals directly related to hoisting and lowering a load suspended by a crane.
- 3.33 **Spotter:** An individual who has been designated to ensure a suspended load remains at a safe distance from equipment, personnel, or overhead power lines. Generally, this position is assigned when the work area is restricted, or hazards are present that cannot feasibly be controlled any other way. The spotter may or may not be the signal person.
- 3.34 **Two-Blocking:** The act of continued hoisting in which the load-block and head-block assemblies are brought into physical contact, thereby preventing further movement of the load block and creating shock loads to the rope and reeving system.
- 3.35 **Upper Works:** The revolving frame of equipment on which the operating machinery (and many cases the engine) are mounted along with the operator's cab.

# 4.0 RESPONSIBILITIES:

- 4.1 **Supervisors** will ensure that their employees understand and follow this standard, including receiving training on the safe operation and maintenance of mobile cranes. They will ensure this standard is implemented in their area of responsibility. This includes:
  - a. Ensuring that inspections and testing are conducted and appropriately documented in accordance with this standard.
  - b. Correcting unsafe conditions/practices when witnessed.
  - c. Ensuring that damages/defects to mobile cranes are addressed and the crane is taken out of service if required because of a critical item and only placed back into service when the critical item is repaired or replaced.

# 4.2 **Mobile Crane Operators** will follow this standard and notify the area supervisor of any situations that do not comply with this standard. This includes:

- a. Ensuring all mobile cranes used have proper OEM manuals, load charts, and known capacities.
- b. Understanding the limits and hazards of the mobile cranes and what the appropriate loads are to lift.
- c. Verifying that proper rigging is used for the lift, and that good crane hoisting and lowering techniques are facilitated.
- d. Visually inspecting all critical crane components and lifting attachments before use and ensuring that no obvious defects exist that would affect safety. Any defects

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Page **3** of **11** 



affecting safety should be documented and reported to the supervisor immediately, and the device damaged should be tagged out of service.

- e. Visually inspecting the areas affected by the mobile crane activities and, as far as feasible, eliminating or controlling all hazards identified.
- 4.3 **Management** will provide resources and training for supervisors and employees to comply with this standard.
- 4.4 **Health and Safety Manager** will evaluate safety in relation to crane activities, and will audit in accordance with this standard.
- 4.5 **Training Department** will provide adequate training for mobile crane operation in accordance with the "Training & Qualifications" section of this document.
- 4.6 **Project Managers** will ensure that contractors and employees are informed of this standard and understand the requirements needed to comply with the standard. In addition they shall be responsible for the overall implementation of this standard as it relates to special projects under their immediate control.

#### **5.0 INSPECTIONS**

- **5.1** Inspections A pre-use and yearly interval inspection process will be established for all cranes used on site.
  - a. **Pre-use Inspections**

All mobile cranes and the areas in which they will be working must be inspected prior to crane operations. The pre-use inspection list found in Appendix 11.1 will be utilized for this task. If defects on the equipment or unsafe conditions in the area are found, the appropriate corrective action must be taken. Crane defects which are critical (marked with an \*) shall be corrected prior to operation of the crane. Other defects must be evaluated to determine if they justify immediate repair of the crane, and must be documented. Area conditions must be evaluated for actual and potential safety hazards, and hazards found must be either eliminated or effectively controlled to minimize the danger prior to initiating any crane activities. Items to inspect include but are not limited

- to:
- 1. Fluid levels
- 2. Cab conditions
- 3. Functions including all operation and crane braking components
- 4. Warning systems / Safety devices
- 5. General condition of lifting accessories, crane body, lower works & upper works
- 6. 7-step air brake test
- 7. Lift route clearance (including overhead power lines)
- 8. Crane platform stability (adequate ground conditions)

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Page 4 of 11



- b. **Annual Inspection** A complete inspection of each mobile crane shall be performed on an annual basis by a qualified person. It is recommended that a detailed inspection take place at a frequency of at least three years intervals by a qualified third party.
- c. The annual mobile crane inspections for boom trucks, lattice boom cranes and telescoping boom cranes can be found in Appendix 11.2. All documented annual inspections must be conducted by a qualified individual and made available for review.
- **5.2 Crane Preparation** The areas affected by the crane must be sufficiently prepared prior to initiating crane activities in order to eliminate or reduce hazards associated with the crane setup and operation. Preparing an area for crane activity shall, at minimum, consist of the following:
  - a. Ensuring access roads are sufficient for safe crane travel.
  - b. Ensuring, when needed, that adequate space is available to safely set up and take down the crane.
  - c. Preparing outrigger pads to increase surface coverage and more effectively distribute the crane weight to a broader area.
  - d. Protecting or relocating vehicles or equipment that may be positioned in direct line with the crane lift, or close enough that a deviation or failure of the lift would cause significant damage or danger to personnel.
  - e. Determining adequate placement of cones, flags, or barricades, based on the counterweight position and lift route that will prohibit or control access to vehicles and employees.

# 6.0 OPERATIONS

# 6.1 General Requirements

- 6.1.1 When a mobile crane is traveling to and from a staging location, the headache ball and hook must be secured to the crane body, and not left in a hanging position. If rigging is used to help secure the headache ball and hook, the rigging must be in good condition with all tags and labels in place. Rigging that has suffered any kind of defect that would render it out-of- service cannot be used for this application.
- 6.1.2 All mobile cranes must have safe access to the operator cab or any other platform used for operations or maintenance. Three points of contact must be maintained while accessing these areas.
- 6.1.3 All work and access decks on a mobile crane must be free of housekeeping or tripping hazards.
- 6.1.4 All operators must wear seat belts in the operator cab while traveling or performing a lift, regardless of the lift size or configuration.

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Page **5** of **11** 

- 6.1.5 If performing work activities on an elevated crane deck which requires gross movement of the body, protection must be provided so that a loss of balance or stumbling does not lead to exposure to an unprotected edge.
- 6.1.6 If an obvious unsafe condition is identified during operation, all lifting activities must cease until the unsafe condition is controlled. Lifting operations may resume once adverse conditions are corrected or effectively mitigated.
- 6.1.7 If a safety concern is raised at a crane site, anyone (crane operator, affected personnel, or observers) may have the job stopped until the concern is resolved.
- 6.1.8 Critical lifts may require additional precautions. All affected employees actively involved in tasks associated with critical lifts must review and sign the critical lift permit (Refer to the *Rigging, Equipment Handling and Hoisting* Safe Production Standard for critical lift procedures and the critical lift permit).
- 6.1.9 If adjacent activities could affect a lift, or vice versa, appropriate coordination must take place between relevant parties to ensure the lift is done safely.
- 6.1.10 Prior to performing a lift, considering the crane boom and line arrangement, rigging configuration used, and load weight, the operator must verify that the crane is capable of safely completing a pick.
- 6.1.11 If rigging configurations require the equalizing of a load, the load must be balanced and a test performed prior to completing the lift. The test shall be completed by raising the load a few inches off the ground and allowing sufficient time for it to equalize.
- 6.1.12 If shock loading occurs at any time during a lift such that there is a reasonable probability of damage or excessive wear to critical components, the crane operator must stop using the equipment and a qualified person must inspect the equipment for structural damage to determine if the equipment can continue to be used safely.
- 6.1.13 While in the motion of lowering a load, dynamic braking should be utilized. Hoist drum braking should only be used to hold a load in place.
- 6.1.14 Mobile cranes shall not be operated at wind speeds exceeding limits established by the crane manufacturer. Each mobile crane shall be equipped with shall be fitted with an operable wind-indicating device or another method established which will inform the crane operator of wind conditions which could affect crane stability.
- 6.1.15 Auxiliary hoists shall not be used in conjunction with main hoists unless the following conditions are met:
  - a. The total weight of the load cannot overload the auxiliary hoist and
  - b. The lift is approved by management using a critical lift permit.

# 6.2 Signaling and Spotting

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Page **6** of **11** 



- 6.2.1 A competent signal person, whether using hand or verbal signals, shall be designated for each lift. The signal person will:
  - a. Be proficient in the use of hand or verbal signals associated with crane activities.
  - b. Be assigned to the position in the pre-lift meeting.
  - c. Be the only individual designated to communicate operational signals to the crane operator during the lift.
  - Have documented task training on signaling for crane operations (completion of an approved rigging training course is considered compliant to this requirement).
- 6.2.2 Cranes shall not travel within 10ft of un-insulated energized power lines unless isolation of the energy source is impractical and a designated spotter or equivalent proximity warning device is used. This same precaution must also be met when working or traveling in close proximity to critical communication lines. A spotter may also be assigned at any other time if determined necessary by the crane operator and workgroup.

#### 6.3 Working Near Overhead Lines

- 6.3.1 If mobile crane activities have the potential of getting within 10 feet of an overhead power line (greater distances may be needed as outlined in the chart below) the line should be appropriately de-energized by qualified electrical personnel and the crane operator and rigger(s) locked out at the energy source. Spotters and other personnel that are working within 20ft of crane components shall also be locked out.
- 6.3.2 If it is not feasible to de-energized or properly insulate the overhead power line(s) a critical lift permit shall be completed and the following controls used:
  - a. A spotter must be designated and staged at a location where he/she can clearly see the lift and provide clear guidance to the crane operator, or
  - b. The crane must be equipped with a proximity alarm to detect when it is getting close to an overhead power line.

#### Minimum Clearance Distance When Working near Overhead Power lines (OSHA Website)

Voltage	Minimum clearance distance
(nominal, kV, alternating current)	(feet)
up to 50	10
over 50 to 200	15
over 200 to 350	20
over 350 to 500	25

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Page 7 of 11



Note: The value that follows "to" is up to and includes that value. For example, over 50 to 200 means up to and including 200kV.

**7.0 MAINTENANCE** – Maintenance will be conducted in accordance with the crane manufacturer's manual, <u>OSHA 29CFR 1926 Subpart CC</u>, and the *Control of Hazardous Energy during Service, Repair, and Maintenance of Equipment* Standard.

#### 8.0 TRAINING & QUALIFICATIONS

8.7

- 8.1 All mobile crane training must be conducted by certified instructors and in accordance with industry standards.
- 8.2 Proof of course completion must be provided to the operator's division before any individual is allowed to operate a mobile crane. For contract crane operators, proof of certification must be provided and retained by the Contract Management department.
- 8.3 Initial task training candidates or operators who have not practiced within the last 12 months must:
  - a. Attend 3 day basic crane training
    - I. Operators must satisfactorily complete both written and practical examination in accordance with appendix 8.4.
    - II. Training and testing will comply with OSHA 29CFR 1926 Subpart CC Standards.
  - b. Have all task training completed and kept on file, and consist of:
    - I. Basic Skills
    - II. Safety Features
    - III. Operations
    - IV. Knowledge of Hazards
    - V. Log Book Entry (site specific)
    - VI. Documented Pre-Lift Meeting/Plan
    - VII. Pre-Operation Inspection Procedures
    - VIII. Critical components for ware, gross damage, or functionality
    - IX. Fluid levels
    - X. Electrical and instrumentation components
- 8.4 Refresher training shall be provided every three years
- 8.5 Mentorship training must be conducted for those operators who have had no previous experience operating mobile cranes.
- 8.6 The training process will include documentation of operating proficiency.
  - The following applies to a PM5, Master Mobile Crane Operators:
    - a. Must complete a CCO training program.
    - b. Must show competence in operating 150 ton cranes or larger.
    - c. Must pass a written and hands-on practical skill evaluation.

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Page 8 of 11



- d. Will be considered the site crane expert resource.
- e. Will be able to mentor for mobile crane apprentices and other qualifying crane operators.

#### 9.0 REFERENCE DOCUMENTS

- 9.1 OSHA 29CFR 1926 Subpart CC
- 9.2 ANSI B30.5
- 9.3 Department of Energy standard: DOE-STD-1090-2007
- 9.4 OSHA 29 CFR 1910.180, 1910.184, 1926.550
- 9.5 CMAA Standard (Crane Manufacturers Association of America)
- 9.6 Crane Institute of America, Inc.
- 9.7 30 CFR § 56.12071 Movement or operation of equipment near high-voltage power lines.

Name of the Record	Responsible for Control	Records Retention
Approved copy of this Standard	Health & Safety	Permanent
Daily Mobile Crane Inspection Form	Division / Area	10 Years
Annual Mobile Crane Inspection Form	Division / Area	Life of Equipment + 10 years
Monthly Hook and Wire Rope Inspection	Division / Area	10 Years
Mobile Crane Task Training Records	Division / Area or Training Department	Duration of employment + 10 years
Pre-Lift Meeting Form	Division / Area	10 Years

#### 10.0 RECORDS

#### 11.0 APPENDICES

- 11.1 HS-SPS-3.8-001 Pre-Operation Inspection Form (See Intranet)
- 11.2 Pre Lift Meeting Form (HS-SPS-3.8-002)

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Page **9** of **11** 

# 12.0 REVIEW AND CHANGE

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

 Description of Changes to this Document

 Modified 6.1.4 prior to approval – S. Elias Rev 00 Rev Date N/A

 Included form ID to Appendix 11.1 – S. Elias

 Included Pre-Lift Meeting Form; based on employee feedback – 9/4/2012 BL Rev 1

 Modified overhead power line clearance distance to meet MSHA requirements - 9/28/2012 BL Rev 2

 Updated records table – S. Elias 06/24/2013 Rev. 03

PRE-LIFT MEETING FORM (HS-SPS-3.8-002, Refer to Safety Form Library on Intranet for one page version)

DATE:	TASK:			
EMPLOYEES: #1		#2		
#3		#4		
CRANE OPERATOR:		SIGNAL PERSON:	:	
SUPERVISOR(S): #1		#2		
JOB LOCATION:				
CRITICAL PRE-JOB PLANNI	NG ELEMENTS:	(Indicate with checkmark)		
1. CRANE CAPACITY CARD:		YES	NO	
2. EMPLOYEES TASK TRAINED	ACCORDINAGLY:	YES	NO	
3. MAN BASKET INSPECTION	COMPLETED:	YES	NO	N/A
4. PROOF TEST COMPLETED:		YES	NO	N/A
5. TRIAL LIFT COMPLETED:		YES	NO	N/A
6. ALL WEIGHTS AND CAPACI	FIES KNOWN:	YES	NO	N/A
7. STABLE GROUND:		YES	NO	
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8. OVERHEA	D POWERLINES IDENTIFIED & CONTROLLED: YES NO
9. LIST ANY	DEFECTS:
10. LIST ANY	SPECIFIC CONTROLS REQUIRED:
10. FATAL RI	SK ASSESSMENT & CONTROL: WILL THE TASK REQUIRE AN EMPLOYEE TO BE POSITIONED UNDER
AN UNSUPPO	DRTED SUSPENDED LOAD? YES NO
10.1	IF YES HAS A SUSPENDED LOAD DETAILED RISK ASSESSMENT BEEN COMPLETED AND APPROVED
	BY THE MANAGER RESPONSIBLE FOR THE WORK – <b>Reference STD2.12 Rigging Equipment,</b>
	Material Handling & Hoisting) YES NO (If NO do not continue and
	contact supervision/safety)
10.2 1101	
10.2 HOV	WILL EMPLOYEES BE PROTECTED FROM SUSPENDED LOADS.

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Page **11** of **11**