Fermilab

Section Office
ES&H Section
630.840.8069 (phone)
630.840.3390 (fax)

Memorandum

February 9, 2009

To: Bruce Chrisman

From: Nancy Grossman NLG

Subject: New FESHM Chapter 5025 – Mobile Cranes

The New FESHM Chapter 5025, Mobile Cranes was created because we have a couple of mobile cranes on site. Originally, FESHM Chapter 5021, Overhead Cranes and Hoists, used to include some information on mobile cranes but the Mechanical Safety Subcommittee decided mobile and overhead cranes are so different that separate chapters are warranted.

After final approval, please return this approval page to Elizabeth Bancroft at MS119 for posting on the web.

Encl.

Recommended for Approval:

Bruce Chrisman — 2/10/09 Date

Approved:

Piermaria Oddone — 2/12/09 Date

MOBILE CRANES

INTRODUCTION

Mobile cranes pose unique hazards to the crane and hoisting industry. Improper use of material handling equipment creates a significant potential for property loss and serious injury. This chapter outlines the requirements for operating, testing, inspecting, maintenance, and documenting of mobile cranes.

It is the intent and purpose of this chapter to provide a means for governing the safety of Fermilab personnel and equipment. Mobile crane subcontractors who move materials and or equipment at Fermi National Accelerator Laboratory are governed by FESHM Chapters 7010 and 7011. The Task Manager/ Construction Coordinator is responsible for verifying that all inspections of the crane are up to date.

POLICY

Hoisting and rigging equipment and all design, installation, inspection, testing, and operations activities shall be in accordance with Fermilab Work Smart Standards (WSS). For mobile cranes these regulations (available in the library) are:

- 29 CFR 1910, Subpart N, OSHA General Industry Standards, Materials Handling and Storage.
- 29 CFR 1926, Subpart N, OSHA Construction Standards, Cranes
- ANSI/ASME B30.5 (Mobile Cranes)

DEFINITIONS

Load - The total weight superimposed on the load block or hook. This includes not only the material being lifted but also all the rigging equipment necessary to attach the load to the load block: lines, shackles, rigging, etc.

Mobile Cranes - Crawler cranes, locomotive cranes, wheel-mounted cranes, and any variation thereof that retain the same fundamental characteristics. This scope only includes the type of cranes listed that are powered by internal combustion engines or electric motors.

WARNING. This paper copy may be obsolete soon after it is printed. The current version of this FESHM Chapter is found at http://www-esh.fnal.gov/pls/default/esh_manuals.html.

Mobile Crane Contractor – A mobile crane contractor is a contractor through ownership or rental operates a business that provides mobile crane services to others.

Modified - A variation or alteration that changes the original configuration of the crane or adds other features not originally installed with the crane and impacts the crane's lifting capacity or load bearing components.

Person-in-Charge (PIC) – A Qualified Person appointed to be responsible for the safe execution of a Planned Engineered Lift or a Special Lift.

Qualified Person - a person who, by possession of a recognized degree in an applicable field or a certificate of professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter and work.

Qualified Operator - A person who has successfully completed the training requirements outlined in this chapter and has been so designated by the division/section head.

Rated Load (Capacity) - The posted maximum load designated by the manufacturer.

Special Lift - Load requires exceptional care in handling because of size, shape, close-tolerance installation, high susceptibility to damage, value, impact to operations, or other unusual factors.

ROLES AND RESPONSIBILITIES

The Division/Section Head is responsible for implementing this program. Specifically he/she is responsible for:

- Assuring, through the line management, that employees assigned to perform rigging or crane operation duties are qualified to perform the work assigned. Successful completion of crane training is necessary, but not necessarily sufficient, to deem a person qualified to perform all rigging and crane operation tasks.
- Ensuring that documentation on mobile cranes is maintained.
- Ensuring that all cranes within their areas of responsibility are inspected, tested, maintained, and repaired as required in this document.
- Assuring that service subcontractors who perform inspection, testing, maintenance and repair of cranes have adequate oversight, usually provided by Facilities Engineering Services Section.

WARNING. This paper copy may be obsolete soon after it is printed. The current version of this FESHM Chapter is found at http://www-esh.fnal.gov/pls/default/esh_manuals.html.

The Facilities Engineering Services (FESS) Section is responsible for:

- Maintaining manuals and manufacturer information and records related to testing, inspection, and repair of mobile cranes.
- Arranging contracts with qualified subcontractors to perform annual inspection, testing, maintenance and repair of cranes.
- At the request of divisions/sections, arranging for qualified subcontractors to perform annual inspection, testing, maintenance and repair of cranes. FESS will provide oversight of the subcontractor.

The ES&H Section is responsible for:

- Providing consultation services to division/section heads regarding safety of operations and training opportunities.
- Coordinating and scheduling training opportunities for newly selected and qualified operators.
- Maintaining training records of operators in the TRAIN database.

The Person-in-Charge (PIC) is responsible for:

- Reviewing HA and lift plan for special lifts with all involved or affected by the lift before the lift is initiated.
- Directing the operation of assigned lift in accordance with the HA, lift plan, and all appropriate rigging and lifting best practices.
- Identification of appropriately trained individuals participating in the lift. Skill level of each participant in the lift shall be commensurate with the assigned duty.

The Qualified Operator is responsible for:

- Recognizing if a lift or rigging task is within his/her capability based on previous experience or training. If level of training or experience is insufficient to assure a safe lift, operator must state this to their supervisor or the Person-in-Charge and not proceed with the task.
- Following best practices in rigging and hoisting to assure a safe lift.
- Identify hazards and mitigations associated with the hazard, including appropriate personal protective equipment (PPE).
- Identifying appropriately trained individuals, if required, to participate in the lift. Skill level of each participant in the lift shall be commensurate with the assigned duty.
- Performing a pre-lift inspection of lift site location. If a problem or situation appears to not be safe, or if the crane is not operating properly, contact FESS to have a pre-lift inspection/repair completed by a subcontractor.
- Conducting crane inspection and checks prior to use.

WARNING. This paper copy may be obsolete soon after it is printed. The current version of this FESHM Chapter is found at http://www-esh.fnal.gov/pls/default/esh_manuals.html.

- Inspecting slings, fastenings and attachments for damage or defects prior to each use and remove from service if damaged or defective (See FESHM Chapter 5024).
- Ensuring the sling identification is legible and shows the rated capacities for each type of hitch: vertical, basket and choke (See FESHM Chapter 5024).
- Performing lift in accordance with any formal hazard analysis (HA) or lift plan, if one exists.

Mechanical Safety Subcommittee is responsible for:

- Serving the Divisions/Sections in a consulting capacity on all Mobile Crane matters.

Task Manager is responsible for:

- Acquiring Advanced Rigging Training (designed for these mobile crane tasks).
- Being able to use and demonstrate knowledge of the "Standard Hand Signals for Controlling Crane Operations."

OPERATIONS

Qualification for Operators

Operators shall be required to successfully meet the qualifications for the specific type crane that they are operating. Operators shall be required to meet the qualifications requirements listed in ASME B30.5 Section 5-3.1.2. Formal training is required and is available through the Fermi ES&H Training Office.

Conduct of Operators

The operator shall not engage in any practice that will divert their attention while actually engaged in operating the crane.

The operator shall respond to signals from the person who is directing the lift or an appointed signal person. The standard hand signals shall be as specified in the ASME B30-5 standards. When a signal person or a crane follower is not part of the crane operation, the operator is then responsible for the lifts.

Before leaving the crane unattended, except as permitted in ASME B30-5.3.1.3.e.7, the operator shall:

- land any load, bucket, lifting magnet, or other device;
- disengage the clutch;
- set travel, swing, boom brakes, and other locking devices;
- put controls in the off or neutral position;

WARNING. This paper copy may be obsolete soon after it is printed. The current version of this FESHM Chapter is found at http://www-esh.fnal.gov/pls/default/esh_manuals.html.

- secure the crane against accidental travel;
- stop the engine

Operating Practices

Know the rated capacity of the crane and the weight of the load. A safe lift depends on many factors including boom length, boom angle, and load radius. At no time shall the operating capacity of the crane be overloaded.

A durable load-rating chart with legible letters and figures shall be provided with each crane and attached in a location accessible to the operator while at the controls. The load rating chart shall provide a full and complete range of manufacturer's crane load ratings at all stated operating radii, boom angles, work areas, and all stated boom lengths and configurations, jib lengths and angles (or offset), as well as alternate ratings for use and nonuse of optional equipment on the crane, such as outriggers and extra counterweights, that affect ratings.

A 10BC or larger fire extinguisher shall be installed at all operator stations. Fire extinguishers shall be maintained in a serviceable condition.

Always position the crane on a solid and level footing. It may be necessary in certain situations to use heavy timber mats to build a good working foundation.
When moving a crane:

- Secure the boom and hook block.
- Check clearances under overpasses, overhead lines, or any overhead obstruction; when side clearances are tight, install a barrier or post a lookout, and make certain there is sufficient clearance for tail swing.
- When traveling with a load, snub the load to prevent swaying if possible; never travel with near-capacity loads.
- Never travel a rubber-tired unit with a load over the side.

To minimize the hazard of electrocution or serious injury as a result of contact between the energized power lines and the crane, load line, or load, observe the safe working distances list in the table below:

Normal voltage (phase to phase)	Minimum required clearance
to 50 kV	10 ft (3.1 m)
Over 50 to 200 kV	15 ft (4.6 m)
Over 200 to 350 kV	20 ft (6.1 m)
Over 350 to 500 kV	25 ft (7.6 m)
Over 500 to 750 kV	35 ft (10.7 m)
Over 750 to 1000 kV	45 ft (13.7m)

WARNING. This paper copy may be obsolete soon after it is printed. The current version of this FESHM Chapter is found at http://www-esh.fnal.gov/pls/default/esh_manuals.html.

See FESHM Chapter 5021, "Special Lifts," for special lift requirements.

TESTING

All Mobile Cranes are subject to the test requirements of ASME B30.5, the manufacturer, and this chapter. Operational and Load tests shall be performed using hoisting equipment of the proper size and capacity for the mobile crane being tested. Operational tests do not require that written records be kept. Rated load tests require testing at 125% of the mobile crane's rated capacity. The tests details shall conform to the specific requirements for the unit and shall be documented in form at the end of this Chapter. This test shall be conducted and a record signed and dated with the signature of the qualified person.

INSPECTIONS

All mobile cranes shall be inspected in accordance with ASME B30.5 and the manufacturer's recommendations. Each mobile crane shall be inspected on a monthly and annual basis. Minimum inspection criteria shall incorporate the items as noted in this chapter and ASME B30.5.

The Crane Management Office will maintain records of all monthly and annual inspections on units requiring compliance to this Chapter.

MAINTENANCE

Seasonal

Seasonal maintenance will be done to verify that the mobile cranes covered by this chapter are well lubricated, tires are in good condition and all fluids are at appropriate levels. An inspection of the unit for any other functional issues or problems will be completed to prepare the unit for summer or winter operations.

Regular

Operators are responsible for reporting regular maintenance items to the Crane Operations Office. They will make arrangements for personnel trained to maintain these units to repair or perform maintenance tasks.

All units shall be kept indoors through inclement and/or winter weather. This type of weather ages the units quickly and it is best to avoid extended exposure.

WARNING. This paper copy may be obsolete soon after it is printed. The current version of this FESHM Chapter is found at http://www-esh.fnal.gov/pls/default/esh_manuals.html.