1.0 PURPOSE
The purpose of the Crane and Hoist Safety Program is to:
1.1 Ensure a safe work environment for employees who operate, maintain, or work around cranes and hoists
1.2 Inform employees of requirements for safely working around cranes and hoists
1.3 Comply with OSHA regulations dealing with cranes and hoists.

2.0 REGULATORY REFERENCE
OSHA 29 CFR 1926 Subpart N, Cranes, derricks, hoists, elevators, and conveyors, Sections 1926.550-556

3.0 SCOPE
This document is intended as a master document that addresses regulatory requirements. Details specific to implementing the program for a specific department or job can be added by the user in the appendices of the program.

This program is applicable to all employees of Indiana University.

This program is applicable to all mobile cranes, tower cranes, overhead and gantry cranes, including semi-gantry, cantilever gantry, wall cranes, storage bridge cranes and other hoisting equipment that have the same fundamental characteristics.

4.0 ELEMENTS OF THE PROGRAM
4.1 A key component of the Crane Safety Program is this written document. The document is written by OEHSM, reviewed annually, and modified as necessary to ensure safe crane operations.

4.2 All crane operators and those working near cranes must be trained in safe operations. The training is described in Section 6.

4.3 IU’s Physical Plant personnel are responsible for care and maintenance of all cranes used by IU. The protocols for this are presented in Appendix B.

5.0 ADMINISTRATION, RESPONSIBILITIES, COMPLIANCE
5.1 The Office of Environmental Health and Safety is responsible for administering this program, periodically reviewing and updating the written program, and periodically auditing crane operations on campus to ensure compliance with all applicable regulations and safety practices.

5.2 Managers and Supervisors are responsible for
5.2.1 Ensuring all cranes are properly inspected and maintained and in working order
5.2.2 Ensuring any worker assigned to work on a crane is properly trained
5.2.3 Ensuring all crane operating procedures include appropriate safety instructions
5.2.4 Oversight of all crane operations
5.3 **Employees** are responsible for
   5.3.1 Working only on equipment for which they have received training
   5.3.2 following all crane operating procedures
   5.3.3 working safely
   5.3.4 reporting accidents and incidents to supervisors immediately
   5.3.5 notifying supervisors when maintenance or repair of the equipment is required.

5.4 **Contractors and sub-contractors** are responsible for complying with all elements of this program.

6.0 **REQUIRED TRAINING AND RECORDKEEPING**

All operators must be familiar with and be trained to operate the equipment they are assigned to use.

6.2 Recordkeeping: A record will be kept of each employee’s training on crane and/or hoisting equipment. Training records will include the following:
   a) Employee’s name
   b) Employee’s signature
   c) Training topic and brief summary of content
   d) Date and location of training
   6.1.1 Training instructor’s name
Appendix A: Definitions

Cantilever Gantry Crane: A gantry or semi-gantry crane in which the bridge girders extend transversely beyond the crane runway on both sides.

Chain Sprocket or Drum Groove: Grooved or notched wheel in which the hoist rope or chain is seated.

Competent Person: A person 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.

Crane: A machine used to raise, lower or move a load horizontally.

Engineered Lift: A test load that has been identified and evaluated for use in determining the lifting capacity of the hoisting equipment.

Gantry Crane: Similar to an overhead crane, except that the bridge for carrying the trolley or trolleys is rigidly supported on two or more legs running on fixed rails or other runway.

Load Block: The assembly of hook, shackle, swivel, bearing, sheaves, pins, and frame suspended by the hoisting rope and used to attach the load to the hoisting cable or chain.

Main Line Disconnect: The controller used to isolate power to the hoisting equipment.

Overhead Crane: A crane with a movable bridge carrying a movable or fixed hoisting device which travels on a fixed runway.

Semi-gantry Crane: A gantry crane with one end of the bridge rigidly supported on one or more legs that run along a fixed rail or runway, the other end of the bridge supported by a truck running on an elevated runway or rail.

Tower Crane: A vertical crane with a horizontal boom; The boom is balanced asymmetrically across the top of the tower. Its short arm carries a counterweight while the long arm carries the lifting gear.
Appendix B: Specific Procedures

This section can be used to add procedures specific to a crane or process

Appendix B1: General Operating Information

1.1 The safe design capacity of a crane, or other hoisting equipment, must not be exceeded.
1.2 All cranes and hoisting equipment must be in safe working condition and be inspected by a competent person before use, and during use, to make sure it is in safe working condition. Proper guards must be in place for exposed gears, belts, electrical equipment, couplings and fans.
1.3 All operators must be familiar with and be trained to operate the equipment they are assigned to operate. Documentation of the operators training must be available upon request.
1.4 Equipment shall be inspected by a competent person before each use and during use, and all deficiencies corrected before further use. A documented annual inspection log must be kept with the crane at all times. Boom cable installation documents must be readily available as well.
1.5 No persons shall ever be under a load while it is being lifted.
1.6 To avoid tipping, outriggers must be fully extended and remain firmly on the ground.
1.7 Cribbing is necessary when the ground cannot support outriggers. Boom angle indicators and load charts and a standard hand signal chart must be visibly posted in the crane.
1.8 While moving a crane, the “headache” ball must be retracted to avoid swinging.
1.9 Minimum clearance between power lines and any part of the crane shall be at least 10 feet. For power lines rated over 50 kV, additional clearance is required.
1.10 Overhead cranes shall have stops at the limit of travel of the trolley. Bridge and trolley bumpers or equivalent automatic devices shall be provided. Bridge trucks shall have tail sweeps.
1.11 A preventive maintenance program based on the crane manufacturer’s recommendations shall be established for all overhead and gantry cranes.
1.12 Any temporary or permanent structure, including cranes, that exceed an overall height of 200 feet above ground level or that fall under the notification requirements shall be marked and/or lighted, in accordance with the guidelines of the FAA publication Advisory Circular AC 70/7460-1K.
Appendix B2 Operating Procedures
Note: These are generic procedures, given as examples. Each specific crane will be operated per the operating manual provided by the manufacturer.

2.1 General Operations
The operator of the aforementioned devices shall perform his/her duties as follows:

2.1.1 Equipment shall be operated by a qualified operator or trainee that is under the direct supervision of the qualified operator. Exception: Maintenance and test personnel and inspectors, when in the performance of their duties, shall be allowed access only after permission has been granted by the operator.

2.1.2 The operator, when operating the equipment, shall maintain full attention on the task being performed (e.g., no use of headsets, music).

2.1.3 The operator shall ensure that hand signals used during the lift are understood and followed by all involved.

2.1.4 No load in excess of the rated capacity shall be lifted, unless for test purposes, and the test shall be an engineered lift.

2.1.5 Before leaving the crane or carrier unattended, the operator shall land any load, place the controls or master switch in the off position and open the main line device of the specific crane or carrier.

2.1.6 The main line disconnect shall not be closed until the operator has made sure that no one is on or adjacent to the crane or carrier.

2.1.7 If the crane or carrier has been locked out or tagged out, the operator shall not remove the lock or tag, unless the lock or tag has been placed there by the operator. To remove someone else's lock or tag refer to the Indiana University Lockout/Tagout program.

2.1.8 For cab-operated equipment, make sure that all controls are in the "off" position prior to closing the line-disconnect.

2.1.9 During use of cab-operated equipment, if the power should fail, the operator shall turn off all controllers. Before restarting, the operator shall check the motion controls for proper direction to ensure controls are in the neutral position.

2.1.10 Persons boarding or leaving cab-operated equipment shall do so at the designated point of access or egress.

2.2 Attaching the Load

2.2.1 Hoist chains or ropes shall be free of kinks or twists.

2.2.2 Hoist chains or ropes shall not be wrapped around the load.

2.2.3 The load shall be attached to the load block.

2.2.4 Prior to lifting the load, the operator shall make certain that the load, sling, attachments, lifting devices and the load block are unobstructed.

2.3 Moving the Load

2.3.1 The person responsible for directing the lift shall make sure that the load is properly secured, balanced and positioned in the sling or other lifting device.

2.3.2 The person responsible for directing the lift shall make another visual inspection of the hoist chain or rope to make sure there are no kinks or twists.

2.3.3 The load block shall be brought over the load in a manner that will prevent swinging when lifting the load.
2.3.4 The chain or rope shall be inspected to ensure that it is properly seated in the
chain sprocket or drum groove.
2.3.5 Lift equipment shall not be used for side pulls.
2.3.6 The operator shall not move the load while a person is on the load or hook.
2.3.7 The operator shall avoid lifting the load over people.
2.3.8 If the load being lifted approaches the rated load to be handled, the operator
shall test the brakes by lifting the load a few inches and applying the brakes.
2.3.9 The load shall not be lowered below the point where there are less than two
wraps of rope on the hoisting drum, unless a lower limit device is provided.
If a lower limit device is provided, no less than one wrap shall remain.

2.4 Parking the Load
2.4.1 The operator shall not leave a suspended load unattended
2.4.2 The load block of the hoist shall be raised above head level when not in use.

2.5 Hand Signals
Hand signals shall be used unless the participants of the lift are equipped with telephones,
radios or other equivalent means of communication.
Appendix B3: Inspection Procedures

3.1 Cranes in Periodic Use
A crane or overhead gantry that has not been used for a period of one month or more shall be inspected by the employee trained to use such equipment before each use and the focus for such an inspection is as follows:

3.1.1 Inspect all functional operating mechanisms
3.1.2 Check for damage to or leaks from lines, tanks, valves, drain pumps, and air or hydraulic systems
3.1.3 Check the load hook for deformities or cracks
3.1.4 Check all hoist chains for excessive wear, including end connectors
3.1.5 Check all chains for kinks, twists and distorted links and stretches that are beyond what is recommended by the manufacturer
3.1.6 Inspect the rope for damage such as kinks, cracks, cutting, bending, broken wires, unraveling, corroded or improperly connected end connections.

Regardless of how often a crane or overhead gantry is used, the unit shall be inspected annually by an outside contractor qualified to inspect the unit. This inspection shall be the responsibility of the department to arrange. The contractor shall document and provide the owner with a copy of the findings who will in turn provide copies to Environmental Health & Safety.

3.2 Maintenance
Preventive maintenance shall be performed as prescribed by the manufacturer as detailed in the owner's manual. Maintenance of the units shall be performed by an outside contractor qualified to perform maintenance. Any unsafe condition noted during the inspection of the crane shall be repaired before the crane is used.
Appendix C: Forms, Links to Forms, if applicable

C.1 CRANE INSPECTION & MAINTENANCE CHECKLIST

Date __________________________ Project Name ________________________________________
Inspector ______________________ Location _________________________________________

<table>
<thead>
<tr>
<th>EVALUATION ITEMS</th>
<th>YES</th>
<th>NO</th>
<th>COMMENTS</th>
<th>ACTION TO BE TAKEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>GENERAL</td>
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<tr>
<td>Re-rate modified cranes as long as a qualified engineer or manufacturer checks the modifications and supporting structure</td>
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<tr>
<td>Rated load is plainly marked on each side of the crane</td>
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<td>Maintain a clearance of 3 inches overhead and 2 inches laterally between the crane and obstructions</td>
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<tr>
<td>INSPECTION</td>
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<tr>
<td>Prior to initial use, inspect all the new and altered cranes to ensure compliance with regulations</td>
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<td>Crane inspections are broken into two classifications – frequent inspections of daily to monthly intervals and periodic inspections of one to 12-month intervals</td>
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<td>Frequent inspections must include the following:</td>
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<td>All functional operating mechanisms for maladjustments interfering with proper operation-DAILY;</td>
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<td>Deterioration or leakage in lines, tanks, valves, drain pumps and other parts of air or hydraulic systems- DAILY;</td>
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<tr>
<td>Hooks with deformations or cracks – visual inspection DAILY; MONTHLY inspection with signed reports;</td>
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<td>Hoist chains (including end connections) for excessive wear, twists, distorted links interfering with proper function or stretch beyond</td>
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<tr>
<td>manufacturer’s recommendations – visual inspection DALY; MONTHLY inspection with signed reports;</td>
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<tr>
<td>All functional operating mechanisms for excessive wear of components;</td>
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<tr>
<td>And rope reeving for noncompliance with manufacturer’s recommendations</td>
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<td>Periodic inspections are complete inspections, and include the requirements of frequent inspections as well as checking for the following:</td>
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<td>Deformed, cracked, or corroded members;</td>
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<td>Loose bolts or rivets;</td>
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<td>Cracked or worn sheaves and drums;</td>
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<tr>
<td>Worn, cracked or distorted parts such as pins, bearings, shafts, gears, rollers and locking and clamping devices;</td>
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<tr>
<td>Excessive wear on brake system parts, linings, pawls and ratchets;</td>
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<td>Load, wind and other indicators over the full range for any inaccuracies;</td>
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<td>Gasoline, diesel, electric or other power plants for improper performance or noncompliance with applicable safety requirements;</td>
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<td>Excessive wear of chain drive sprockets and excessive chain stretch;</td>
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<td>And electrical apparatus for signs of pitting or any deterioration of controller contractors, limit switches and push-button stations</td>
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<td>Inspect cranes that have been idle for at least one month, but less than six months, per requirements for frequent, periodic and rope inspections</td>
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<tr>
<td>Check cranes idle for more than six months per requirements for frequent, periodic and rope inspections</td>
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<tr>
<td>Inspect standby cranes at least semiannually in accordance with frequent, periodic and rope inspection maintenance</td>
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</table>

**MAINTENANCE**

| Establish a preventive maintenance program based on crane manufacturer’s recommendations |
| Before adjustments and repairs are |
started on cranes, take the following precautions:

<table>
<thead>
<tr>
<th>Precaution</th>
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<tbody>
<tr>
<td>Run the crane to a location where it will cause the least interference with other cranes and operations;</td>
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<tr>
<td>Ensure that all controllers are at the off position;</td>
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<tr>
<td>Open and lock the main or emergency switch in the open position;</td>
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<tr>
<td>Place warning or “out of order” signs on the crane and on the hook where they are visible from the floor;</td>
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<tr>
<td>And provide rail stops or other suitable means to prevent interference from other cranes in operation on the same runway</td>
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<tr>
<td>Do not operate the crane until all guards have been reinstalled, safety devices reactivated and maintenance equipment removed</td>
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<tr>
<td>Before resuming crane operation, correct any unsafe conditions disclosed by testing Allow only designated personnel to perform adjustments and repairs</td>
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<tr>
<td>Promptly provide repairs or replacement as needed for safe operation</td>
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</tbody>
</table>
Appendix D: Additional References and Related Programs

The American Society of Mechanical Engineers – B30.2 - 2005 Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist); B30.16 - 2003 Overhead Hoists (Under hung); B30.17 - 2003 Overhead and Gantry Cranes (Top Running Bridge, Single Girder, Under hung Hoist)

Crane Manufacturers Association of America – CMAA Specification 78 - Standards and Guidelines for Professional Services Performed on Overhead Traveling Cranes and Associated Hoisting Equipment

Manufacturers' Operations Manual