



# THE CLEVELAND ELECTRIC ILLUMINATING COMPANY

P.O. BOX 5000 - CLEVELAND, OHIO 44101 - TELEPHONE (216) 622-9800 - ILLUMINATING BLDG - 55 PUBLIC SQUARE

*Serving The Best Location in the Nation*

Dalwyn R. Davidson  
VICE PRESIDENT  
SYSTEM ENGINEERING AND CONSTRUCTION

September 15, 1982

Mr. A. Schwencer, Chief  
Licensing Branch No. 2  
Division of Licensing  
U. S. Nuclear Regulatory Commission  
Washington, D. C. 20555

Perry Nuclear Power Plant  
Docket Nos. 50-440; 50-441  
Response to Draft Technical Evaluation  
Report--Control of Heavy Loads  
(NUREG-0612)

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Dear Mr. Schwencer:

This letter and its attachment provides responses to the recommendations in the draft technical evaluation report, "Control of Heavy Loads," and the concerns raised in an August 11, 1982, conference call between CEI, the NRC staff and Idaho National Engineering Laboratory (INEL). These responses address the recommendations of INEL in the draft technical evaluation report dated May 1982. It is CEI's present position to be in full compliance with the guidelines of NUREG-0612 prior to fuel load.

We believe this information will resolve the open items and provide the basis for the NRC safety evaluation report on this subject.

If you have any questions, please let me know.

Very truly yours,

Dalwyn R. Davidson  
Vice President  
System Engineering and Construction

DRD:mb

cc: Jay Silberg, Esq.  
John Stefano  
Max Gildner  
Nick Fioravante  
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## GUIDELINE

### 1) Safeload Paths (Section 2.3.1)

## RECOMMENDATION

- a) Load paths should be clearly marked on the floor in the areas where the load is to be handled.
- b) Analyze and justify alternate load paths.
- c) Maintain analysis and criteria used for hazard elimination available for review.

## RESPONSE

- a) The load path will be clearly marked on the floor in the area where the load is to be handled and appropriate procedures will be implemented.
- b) No alternate load paths are presently defined in the Perry Equipment Removal scheme; however it is currently under evaluation. The Plant Operations Review committee will designate individuals authorized to approve procedural variations, typically the maintenance or shift supervisors.
- c) The analysis and criteria used for hazard elimination will be maintained on file and available for review. Also the PNPP Equipment Removal scheme and Special Handling/Safe Load Path procedures will be maintained on file and available for review.

## GUIDELINE

### 2. Load Handling Procedure (Section 2.3.2)

## RECOMMENDATION

Load handling procedures should be submitted for review. This should include further information on whether the cranes are employed to lift the loads onto or off the dollies, and on whether the cranes are employed as mechanical mules to move the loaded dollies.

## RESPONSE

The load handling procedures are being written and will be open for review on site when they are complete. Attached is a draft copy of Control of Heavy Loads procedures, MAP-1301. Additional procedures on crane operating guidelines, and guidelines for rigging are provided for your information. Dollies are not used in the movement of heavy loads.

OMIC: MAP-1301  
Page: 1  
Rev.: 0

THE CLEVELAND ELECTRIC ILLUMINATING COMPANY  
PERRY NUCLEAR POWER PLANT OPERATIONS MANUAL

TITLE: CONTROL OF HEAVY LOADS

REVISION 0 EFFECTIVE DATE \_\_\_\_\_

DRAFT

PREPARED: J. P. Goecker

SUBMITTED: \_\_\_\_\_  
PERRY PLANT DEPARTMENT

REVIEWED: \_\_\_\_\_  
NUCLEAR Q.A. DEPARTMENT

PORC REVIEW AND RECOMMENDATION FOR APPROVAL MEETING NUMBER: \_\_\_\_\_

APPROVED: \_\_\_\_\_  
MANAGER - PERRY PLANT DEPARTMENT

APPROVED: \_\_\_\_\_  
MANAGER - NUCLEAR Q.A. DEPARTMENT



Control of Heavy Loads

MAP-1301

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SCOPE OF REVISION:

## 1.0 PURPOSE

To provide controls for movement of "Heavy Loads" over or near safe shutdown equipment, such that possible failure of lifting devices will have a minimal effect on plant safety.

## 2.0 SCOPE

This instruction applies to the handling and movement of safety related equipment and heavy loads (greater than 1048#) in the vicinity of safe shutdown equipment. In addition it specifically addresses those load movements requiring administrative procedure control as identified in the Summary Conclusions of the PNPP Control of Heavy Loads Study.

## 3.0 RESPONSIBILITY

- 3.1 The General Supervisor Maintenance Section has the overall responsibility for ensuring that the guidelines of this procedure are followed. He shall ensure that Maintenance Section Personnel fully understand their responsibilities.
- 3.2 The Maintenance Section Operations Engineers and Supervisors have the responsibility of ensuring that the requirements of this procedure are adhered to. When necessary they shall provide guidance to the personnel performing the work.
- 3.3 The Maintenance Planners and Associate Maintenance Planners have the responsibility of ensuring that the requirements of this procedure are incorporated in work packages as applicable.
- 3.4 All Maintenance Section personnel are responsible for ensuring that the requirements of this procedure are followed when necessary. When the safety of a load handling event is in question or the requirements of this procedure may be violated, load movement shall be suspended until the problem is resolved.

## 4.0 REFERENCES

- 4.1 ANSI/ASME N45.2.15-1981 Hoisting, Rigging and Transporting of Items for Nuclear Power Plants.
- 4.2 Control of Heavy Loads Study - Perry Nuclear Power Plant Units 1 & 2; GAI Report No. 2329; Docket Nos. 50-440, 50-441.

- 4.3 Equipment Removal Scheme - Perry Nuclear Power Plant Units 1 & 2.
- 4.4 PNPP Ops. Manual Chap. OM9A:GMI-004 Guidelines for Rigging.
- 4.5 NUREG-0612 Control of Heavy Loads at Nuclear Power Plants.
- 4.6 Perry Nuclear Power Plant FSAR.
- 4.7 ANSI N14.6-1978 Standards for Special Lifting Devices ...
- 4.8 ANSI B30.9-1971 Slings

## 5.0 DEFINITIONS

### 5.1 Category A Load

A load which requires special lifting equipment and detailed handling procedures because of large size and weight. Shall include but not be limited to: Reactor Vessel, Major Reactor Vessel Components, Spent Fuel Casks and other subassemblies of large size and weight.

### 5.2 Category B Load

A load which may be handled with conventional equipment, but requires special procedures because of susceptibility to damage. Shall include but not be limited to: Reactor Vessel Head, Recirculation Pumps and Internals and Safety-related instrument cabinets and control boards.

### 5.3 Category C Load

A load which may be handled with conventional equipment using sound rigging practices. The requirements of OM9A: GMI-004 "Guidelines for Rigging shall be followed.

### 5.4 Heavy Load

Any load carried in a given area after the plant becomes operational that weighs more than the combined weight of a single spent fuel assembly and its associated handling tool. (1048#)

### 5.5 Safe Load Path

A path defined for transport of a heavy load that will minimize adverse effects, if the load is dropped, in terms of releases of radioactive material and damage to safety systems. This path should be administratively controlled by procedures and/or clearly outlined by markings on the floor where the load is to be handled. It may also be enforced by mechanical stops and/or electrical interlocks.

## 6.0 DETAILS

### 6.1 General

6.1.1 Perry Nuclear Power Plant equipment arrangements in general have been designed to minimize damage due to drops of heavy loads. By strict adherence to the load handling practices outlined in this instruction, the following criteria of NUREG-0612 "Control of Heavy loads at Nuclear Power Plants" will be satisfied:

1. Releases of radioactive material resulting from damage to spent fuel due to the accidental drop of a heavy load will not produce doses in excess of the limits of 10 CFR part 100.
2. Damage to the Reactor Vessel or spent fuel pool following accidental dropping of a heavy load will be limited so as not to result in water leakage that would uncover the fuel.
3. Damage to equipment in redundant or dual safe shutdown paths from the accidental dropping of a heavy load will be limited so as not to result in the loss of required safe shutdown functions.

6.1.2 Safe load paths have been established for most Perry Plant equipment. These paths are shown in the Perry Plant Equipment Removal Scheme and the Perry Plant Control of Heavy Loads Study. Those areas of the plant housing fuel or safe shutdown equipment have been evaluated and found free of hazards due to heavy loads as defined by NUREG-0612 except for:

1. Steam Tunnel - loads may be lifted in the Steam Tunnel only during cold shutdown. This restriction is necessary since damage to both the Main Steam and Feedwater lines could occur simultaneously. See Section 6.6.
2. Emergency Service Water Pump House - loads lifted in the ESW pump house, especially one of the ESW pumps, over redundant system components shall be controlled to the requirements of Section 6.7.
3. Reactor Building - the portable refueling shield shall not be moved over the Reactor Vessel. See Section 6.8.

### 6.1.3 Lifting Devices

1. Special lifting devices used for the movement of "Heavy Loads" shall meet the requirements stated in NUREG-0612 Article 5.1.1 Guidelines 4 and ANSI N14.6-1978.

2. Lifting devices that are not specially designed, used for the movements of "Heavy Loads", shall meet the requirements stated in NUREG-0612 Article 5.1.1 Guideline 5 and ANSI B30.9-1971.

The devices above shall be used in conjunction with PNPP Operations Manual Chapter OM9A: GMI-004 - Guidelines for Rigging.

## 6.2 Precautions

- 6.2.1 Refer to the PNPP Heavy Loads Study and Equipment Removal Scheme to determine the proper load path. Deviations from these paths are allowable only through a written approved procedure.
- 6.2.2 Carefully select the rigging equipment, ensuring its capacity is sufficient to safely handle the load. An adequate safety margin shall be established to minimize the possibility of rigging gear failure if load hangup should occur. In addition, the downgrading effects of off-vertical hitches shall be factored in to the rigging gear selection.
- 6.2.3 All hoisting equipment shall be tested in accordance with accepted industry standards. Test results shall be documented and retained.
- 6.2.4 Visually inspect each item to ensure it is in satisfactory condition. Equipment that is damaged or has not been properly maintained, shall not be used.
- 6.2.5 Prepare the load set-down area. Blocking, pads and other items necessary to ensure safe storage shall be staged.
- 6.2.6 Ensure that satisfactory clearance exists along the load path for load movement. Take action as necessary to ensure clearance is established.
- 6.2.7 Provide protection for instruments and other sensitive components on or in the vicinity of the load to ensure they are not damaged during load movement.
- 6.2.8 Attach rigging equipment to the load, using sound rigging practices. Avoid kinks and twists in rope, chains and slings.
- 6.2.9 When disassembling safety-related components, the removed piece shall be expeditiously cleared from the component. It shall only be suspended for as short a period of time as possible, be securely staged in its laydown area and adequately protected.

- 6.2.10 Lift and move the load cautiously and smoothly. Rigging equipment failures, damage to the load or damage to other equipment shall be immediately reported to the immediate supervisor.
- 6.2.11 Any rigging equipment which is accidentally overloaded shall be removed from service and inspected per the requirements of the appropriate instruction.
- 6.2.12 No load, regardless of weight, shall pass within 5 ft. of:
  - a. A filled New Fuel Vault Rack or Containment Fuel Rack, which could cause an impact force greater than 4000 ft. lbs.
  - b. A filled Fuel Bldg. Rack, which could cause an impact force greater than 4349 ft. lbs.
  - c. An open reactor vessel, with fuel installed, which could cause an impact force greater than 28113 ft. lbs.

### 6.3 Handling of Category A Equipment

NOTE: The handling of Category A items shall be in accordance with written approved procedures and associated instructions or drawings. The procedures shall include the items listed below as a minimum.

- 6.3.1 The requirements of Section 6.2 above shall be included and satisfied.
- 6.3.2 A person shall be designated in charge of the handling operation by the applicable Supervisor. He shall have demonstrated satisfactory abilities in supervision of hoisting, rigging and transporting activities.
- 6.3.3 The rigging equipment to be used shall be identified and its selection based on its ability to handle the load.
- 6.3.4 Instructions for load handling and movement shall be clearly listed. Check points which require documentation by specific individuals shall be included.
- 6.3.5 Load indicating devices shall be used where the primary source of hoisting power has the capability of imposing excessive loads on the component or item being handled.
- 6.3.6 Procedural variations shall be approved and documented. A person shall be designated to act in emergency situations (Normally the person in charge). He shall document such action after the fact.



#### 6.4 Handling of Category B Equipment

NOTE: The handling of Category B items shall be in accordance with written, approved procedures and associated instructions and drawings. The procedure shall include the following as a minimum.

- 6.4.1 The requirements of Section 6.2 above shall be satisfied.
- 6.4.2 The rigging equipment to be used shall be identified and its selection based on its ability to handle the load.
- 6.4.3 Instructions for load handling and movement shall be clearly listed. Check points which require documentation by specific individuals shall be included.
- 6.4.4 Procedural variations shall be approved and documented. A person shall be designated to act in emergency situations (Normally the person in charge). He shall document such action after the fact.

#### 6.5 Handling of Category C Equipment

- 6.5.1 The rigging equipment shall be properly maintained.
- 6.5.2 Category C items shall be handled by experienced personnel utilizing good rigging and safety practices. Manufacturer's load charts and general safe rigging manuals shall be available.

#### 6.6 Special Requirements for Loads Handled in the Steam Tunnel

- 6.6.1 Heavy loads handled in or through either Steam Tunnel shall be controlled to the requirements of Category B equipment and the requirements below.
- 6.6.2 Procedures for handling equipment in the Steam Tunnel shall contain the following precaution: "This component shall not be lifted or transported unless the Reactor is in cold shutdown condition."
- 6.6.3 Permission of the applicable Unit Supervisor must be obtained prior to load handling in the Steam Tunnel.
- 6.6.4 Signs of high visibility shall be permanently posted within each steam tunnel stating the following: "Permission of the Unit Supervisor must be obtained prior to lifting and transporting loads within the steam tunnel. Load handling shall be controlled by written, approved procedures. Ref. PNPP Control of Heavy Loads Study; GAI Report No. 2329, Docket Nos. 50-440, 50-441.



6.7 Special Requirements for Loads Handled in the Emergency Service Water Pump House

- 6.7.1 Heavy loads handled in the Emergency Service Water Pump House shall be controlled to the requirements of Category B equipment, and the requirements below.
- 6.7.2 The floor of the ESW Pump House shall be clearly marked with (later) paint indicating the paths to be followed for load movement. These paths shall be identified as applicable within the handling procedure.
- 6.7.3 The permission of Shift and Maintenance Supervisor (later) is required for movement of loads within the ESW Pump House.
- 6.7.4 Movement of heavy loads (especially one of the ESW pumps over redundant safe shutdown equipment) must be minimized and shall be strictly controlled.
- 6.7.5 Signs of high visibility shall be permanently posted within the ESW Pump House and in the cab of the ESW Crane, stating the following: Permission of Shift and Maintenance Supervisor (later) must be obtained prior to lifting and transporting loads within this building. Load handling shall be controlled by written, approved procedure and must follow the marked paths. Ref. PNPP Control of Heavy Loads Study; GAI Report No. 2329; Docket Nos. 50-440, 50-441.

6.8 Special Requirements for Handling the Portable Refueling Shields (1 & 2F15E0010)

- 6.8.1 Movement of the Portable Refueling Shields within the Reactor Building shall be controlled by the refueling procedure. That portion of the procedure pertaining to shield movement must conform to the requirements for handling Category B equipment.
- 6.8.2 The refueling procedure shall contain the following precaution: "The Portable Refueling Shield shall not be permitted to pass over or remain suspended in close proximity to the Reactor vessel.

6.9 Records

None

7.0 ATTACHMENTS

None

THE CLEVELAND ELECTRIC ILLUMINATING COMPANY  
PERRY NUCLEAR POWER PLANT OPERATIONS MANUAL  
MAINTENANCE SECTION INSTRUCTION NUMBER OM9A: GMI-0004  
REVISION 0 EFFECTIVE DATE \_\_\_\_\_

TITLE: GUIDELINES FOR RIGGING

PREPARED: S. J. Veale 3/24/82  
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LIST OF INCOMPLETE ITEMS

At the time this procedure was written, information regarding the items listed below were incomplete. These items are designated as "(Later)" within the procedure. As the information becomes available, the procedures will be revised.

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## GENERAL GUIDELINES FOR RIGGING

### 1.0 PURPOSE

- 1.1 To provide guidelines for load handling to ensure it is conducted in a safe manner.

### 2.0 SCOPE

- 2.1 This instruction applies to the use of chain hoists, rope hoists, slings, shackles and eyebolts when rigging in all areas of the Plant Complex.

### 3.0 PRECAUTIONS

- 3.1 Any person using rigging gear shall be familiar with the equipment and its care. If adjustments or repairs are necessary, or if any damage is known or suspected, it shall be promptly reported. Damaged or defective rigging gear shall not be used.
- 3.2 The rated capacity of any piece of rigging gear shall not be exceeded unless an authorized test is being conducted.
- 3.3 If a piece of rigging equipment is accidentally overloaded, it shall be immediately removed from service and thoroughly inspected. This inspection shall include as a minimum the applicable Preventive Maintenance Requirements. A written signed report shall be completed stating the date and cause of overload, results of inspections, any repairs made and whether the equipment was returned to normal use or rejected.
- 3.4 Either the PNPP Equipment Removal Scheme or the PNPP Heavy Loads study shall be referenced to determine the proper load path. Deviations from these paths may require special controls.
- 3.5 Upper and lower limit switches shall not be used as normal operating controls.

3.6 Personnel shall not intentionally pass under or work below a suspended load. If it is necessary to work while partly under a load, it should be adequately blocked or cribbed to prevent dropping or shifting.

#### 4.0 REQUIRED EQUIPMENT

4.1 Necessary rigging gear.

#### 5.0 INSTRUCTION

##### 5.1 General Rigging Guidelines

###### 5.1.1 Equipment Selection

- 5.1.1.1 Determine the approximate weight of the load. The PNPP Equipment Removal Scheme, PNPP Heavy Loads Study, nameplate data, vendor manuals or other suitable means may be used.
- 5.1.1.2 Decide on the hitch to be used. The shape and bulk of the load must be accommodated as well as weight.
- 5.1.1.3 The selected rigging equipment shall have suitable characteristics for the working environment and suitable capacity to safely handle the load. Rated capacity charts should be referenced to ensure the sling will handle the load using the selected hitch at the pull angle determined by the sling length.
- 5.1.1.4 Slings shall be long enough to provide the maximum practical angle between the sling leg and horizontal (or the maximum practical angle at the hook if vertical angles are used).

5.1.1.5 The rigging equipment shall be carefully inspected prior to use per the requirements of this instruction. See Section 5.2.

5.1.2 Attaching the Load

5.1.2.1 Determine the load's center of gravity and lift from above this point whenever possible. The load shall be balanced and adequately supported to prevent slippage.

5.1.2.2 Hoist chains shall not be wrapped around the load.

5.1.2.3 Ensure sufficient headroom exists to sufficiently lift the load.

5.1.2.4 Pad sharp corners and angles on the load to prevent excessive strain on the rigging gear at the point of contact.

5.1.2.5 Slings shall be securely attached to the load. They shall not be shortened with bolts, knots or other unapproved methods. Kinks and twists shall be avoided.

5.1.2.6 Shouldered eyebolts shall be installed so that the shoulder firmly butts against the load. When necessary shims or washers may be used to provide the shoulder with a firm base.

5.1.2.7 Slings or other approved devices shall be properly seated in the saddle of the hook.

5.1.2.8 Provide protection for instruments and other sensitive components on or in the vicinity of the load to ensure they are not damaged during load movement.

5.1.2.9 Guide loads with tag lines when possible.

5.1.3 Moving the Load

5.1.3.1 The hoist operator shall not engage in any operation which will divert his attention while involved in rigging activities.

5.1.3.2 The hoist operator shall have clear unobstructed access to the lifting mechanism at the point of lift and along the path of travel.

5.1.3.3 Personnel shall stand clear of the load. Loads shall not be passed over personnel.

5.1.3.4 Do not shock load rigging gear. Inch slowly into load engagement and avoid sudden stops and starts.

5.1.3.5 Initially lift the load a few inches and check for proper load balance. Proceed with the lift only when assured that slipping or tilting will not occur.

5.1.3.6 When a load approaching the hoist's capacity is being handled, the brakes shall be tested by lifting the load several inches and checking the braking action. The lift may be continued only after the operator is assured the brake will hold properly.

5.1.3.7 Lift and move loads slowly and cautiously, ensuring that all obstructions are cleared. Rigging equipment failures, damage to the load or other equipment shall be immediately brought to the attention of the Immediate Supervisor.

- 5.1.3.8 When possible, loads shall not be left suspended at the end of a work shift or for extended or unattended periods. If it is necessary to leave a load suspended, specific precautions must be taken to provide protection against accidental load dropping. The operating mechanism or chain should be secured.

NOTE: Loads shall not remain suspended over safety or quality-related equipment unless controlled by an authorized, written procedure which outlines the necessary safety precautions.

- 5.1.3.9 When possible, the load shall be properly staged and protected to prevent damage. Openings on the load and disassembled components should be protected to prevent entry of foreign material.

#### 5.1.4 Restoration

- 5.1.4.1 Do not pull slings from under a load when the load is resting on it. Block the load up to remove the sling.
- 5.1.4.2 Reinspect all gear to ensure no damage occurred during the lift.
- 5.1.4.3 Properly clean and store all equipment.

### 5.2 Inspections of Equipment Prior to Use

#### 5.2.1 Hoists and Come-A-Longs

- 5.2.1.1 Ensure proper and adequate lubrication.



5.2.1.2 Check the load hook for distortion or cracks.

5.2.1.3 Check the load chain or rope for abnormalities.

5.2.1.4 Ensure free and proper operation.

5.2.1.5 Do not use if any of above abnormalities exist.

5.2.2 Hooks

5.2.2.1 Check for twisting more than  $10^{\circ}$  from plane of unbent hook.

5.2.2.2 Check for throat opening greater than 15% of normal.

5.2.2.3 Check for cracks, nicks or gouges.

5.2.2.4 If a hook latch is provided, ensure it engages properly.

5.2.2.5 Do not use if any of the above abnormalities exist.

5.2.3 Wire Rope Slings

5.2.3.1 Ensure there is no evidence of corrosion, heat damage or internal damage.

5.2.3.2 Check for broken wires. There shall be no more than 6 broken wires in any one lay or 3 broken wires in one strand in one lay.

5.2.3.3 Check for kinking, crushing, bird caging or other distortion.

5.2.3.4 Ensure end attachments are not cracked, worn or otherwise deformed.

5.2.3.5 Do not use if any of the above abnormalities exist.

5.2.4 Synthetic Web Slings

5.2.4.1 Check for evidence of burning or melting.

5.2.4.2 Check for snags, punctures and tears.

5.2.4.3 Check condition of stitching and end fittings.

5.2.4.4 Do not use if any of the above abnormalities exist.

5.2.5 Wire Mesh Slings

5.2.5.1 Check for lack of flexibility due to distortion of the mesh fabric.

5.2.5.2 Check for broken wires in any part of the mesh or reduction in wire diameter of 25% due to corrosion or 15% due to abrasion.

5.2.5.3 Check for distortion of handles and broken welds/brazed joints along the sling edge.

5.2.5.4 Do not use if any of the above abnormalities exist.

5.2.6 Shackles

5.2.6.1 Ensure the pin threads freely into the body and is not bent.

5.2.6.2 Ensure the body is not twisted.

5.2.6.3 Check for cracks.

5.2.6.4 Do not use if any of the above abnormalities exist.

5.2.7 Eyebolts

5.2.7.1 Ensure the threads are not damaged and the pin is not bent.

5.2.7.2 Check for cracks and distortion of the eye.

5.2.7.3 Do not use if any of the above abnormalities exist.

6.0 POST-MAINTENANCE CRITERIA

6.1 Visually inspect all equipment for damage.

6.2 Clean equipment and return to proper storage.

7.0 ACCEPTANCE CRITERIA

7.1 No deficiencies exist which hinder safe use of the equipment.

8.0 REFERENCES

8.1 ANSI B30.9-1971, Slings.

8.2 ANSI B30.10-1975, Hooks.

8.3 ANSI B30.16-1973, Overhead Hoists.

8.4 OSHA 1910.184, Slings.

8.5 PNPP Equipment Removal Scheme.

8.6 OM1C:MAP-1301, Control of Heavy Loads.

9.0 LIST OF ATTACHMENTS

Later - Equipment Manufacturer Load Tables

304/H/9/ba

THE CLEVELAND ELECTRIC ILLUMINATING COMPANY  
PERRY NUCLEAR POWER PLANT OPERATIONS MANUAL  
MAINTENANCE SECTION INSTRUCTION NUMBER OM9A: GMI-0003  
REVISION 0 EFFECTIVE DATE \_\_\_\_\_

TITLE: CRANE OPERATING GUIDELINES

PREPARED: S. J. Veale 6/17/82  
NAME/TITLE/DATE

REVIEWED: \_\_\_\_\_  
MAINTENANCE SECTION - NAME/TITLE/DATE

REVIEWED: \_\_\_\_\_  
NQAD - PROGRAM QUALITY SECTION - NAME/TITLE/DATE

DRAFT

APPROVED: \_\_\_\_\_  
MAINTENANCE SECTION - NAME/TITLE/DATE

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REV. NO.	PREPARED	PPD REVIEW	QA REVIEW	MAINT. SEC. APPROVAL	ADMIN. SEC.	EFFECTIVE DATE
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## CRANE OPERATING GUIDELINES

### 1.0 PURPOSE

- 1.1 To provide guidelines for crane operation to ensure all load handling is conducted in a safe manner.

### 2.0 SCOPE

- 2.1 This instruction applies to the operation of the overhead cranes in the Unit 1 and 2 Turbine Buildings, Circulating Water Pump Houses and the Service Water Pump House.

### 3.0 PRECAUTIONS

- 3.1 Crane Operators shall be qualified in accordance with the requirements of OM1C: MAP-0201.
- 3.2 The rated capacity of either the main or auxiliary hoist shall not be exceeded unless an authorized, controlled load test is being conducted.
- 3.3 Refer to the PNPP Equipment Removal Scheme to determine the proper load path. Deviations from these paths may require special controls.
- 3.4 Ensure that satisfactory clearance exists along the load path for load movement. Action shall be taken as necessary to obtain the necessary clearance.

### 4.0 REQUIRED EQUIPMENT

None.

### 5.0 INSTRUCTIONS

- 5.1 Conduct of Crane Operators

- 5.1.1 Crane Operator trainees must be under the direct supervision of qualified operator or other designated person when operating any overhead crane.
- 5.1.2 When physically or otherwise unfit, the operator shall not engage in operation of the equipment. This shall also apply if the operator is under the influence of alcohol or medication which may cause drowsiness or at the discretion of the man's immediate Supervisor.
- 5.1.3 Operators shall not engage in horseplay or any other activity which may divert attention when involved in operation of the equipment.
- 5.1.4 Operators shall be familiar with the equipment and its care. Known defects or needed repairs shall be promptly reported. The operator shall inform his relief of any uncorrected defects at shift change.
- 5.1.5 Operators shall ensure that inspections are conducted at the required periodicities.
- 5.1.6 The Operator shall ensure that crane controllers are off and no workers are on or adjacent to the crane before closing the mainline disconnect.
- 5.1.7 Crane controls shall be tested at the beginning of each shift.
- 5.1.8 The Operator is responsible for those operations under his direct control. When safety is in doubt, the Operator shall consult his Supervisor for resolution prior to handling the load.
- 5.1.9 Operators shall respond to all hand signals from the designated person directing the lift. However, STOP signals shall be obeyed regardless of the source.

- 5.1.10 The crane warning device shall be sounded each time before moving either the trolley or the bridge and intermittently when approaching personnel.

## 5.2 Operating Guidelines

- 5.2.1 Complete the DAILY - PRIOR TO USE inspection. Discrepancies shall be noted and corrected as soon as possible.

- 5.2.2 Guidelines for attaching the load.

- 5.2.2.1 The hook shall be brought over the load in a manner to prevent swinging.

- 5.2.2.2 The hoist rope should be vertical and the hook block centered over the load. Off-center lifts or side pulls require special authorization.

- 5.2.2.3 The hoist rope shall be free from kinks or twists and not wrapped around the load.

- 5.2.2.4 If there is a slack in the rope condition, it shall be ensured that the rope is still properly seated on the drum and in the sheaves.

- 5.2.2.5 The load shall be well secured.

- 5.2.2.6 No loose items shall remain on the load during load movement.

- 5.2.3 Guidelines for load movement.

- 5.2.3.1 One person shall be designated as in charge of the lift. He shall communicate with the crane operator using the standard hand signals identified in ANSI B30.2.0-1976, Figure 5 (Attachment 2).



For special cases where additions to or modifications of these hand signals are required, the special signals shall be agreed upon and thoroughly understood by both the signal person and the operator. These signals shall not conflict with the standard hand signals.

Two way radios may be used when making lifts in areas of low visibility.

NOTE: A STOP signal shall be obeyed regardless of the source.

5.2.3.2 Inch slowly into load engagement. Ensure proper load balance prior to raising to the desired height.

5.2.3.3 When a load at or near hoist capacity is to be lifted, test the hoist brake as follows:

- a. lift the load a few inches,
- b. allow the load to remain suspended for several minutes.
- c. If the brake slips or fails to hold, it shall be adjusted or repaired before load handling is continued.

5.2.3.4 The warning bell shall be sounded before load movement and intermittently when approaching personnel. Loads shall not be moved over people.

5.2.3.5 Accelerate and decelerate all load movements slowly.

5.2.3.6 Care shall be taken to ensure the load does not contact obstructions.

5.2.3.7 The natural lag in load movement will cause the load to swing past the vertical centerline when motion stops. Operators must expect and learn to gauge this swing to minimize the pendulum action.

5.2.3.8 Suspended loads should not remain unattended. The operator should remain at the controls to take action in case of brake failure.

#### 6.0 POST MAINTENANCE REQUIREMENTS

None.

#### 7.0 ACCEPTANCE CRITERIA

None.

#### 8.0 REFERENCES

8.1 ANSI B30.2.0-1976, Overhead and Gantry Cranes.

8.2 OSHA Chap. XVII, Part 1910.179, Overhead and Gantry Cranes.

8.3 P&H Overhead Crane Operation and Maintenance Manual.

8.4 Whiting Overhead Crane Operation and Maintenance Manual.

OVERHEAD CRANE  
DAILY INSPECTION CHECKLIST

1. Ensure runways and rails are clear. \_\_\_\_\_
  2. Ensure lighting on the bridge and in the cab are proper. \_\_\_\_\_
  3. Ensure the bridge, trolley and cab are clean. There should be no loose debris or tools in any of the aforementioned areas. \_\_\_\_\_
  4. Inspect wire rope for corrosion, broken wires, bird caging, kinking and diameter reduction. \_\_\_\_\_
  5. Inspect hook(s) for cracks or abnormalities. \_\_\_\_\_
  6. Check gearcase oil levels. \_\_\_\_\_
  7. Check for fluid leakage on lines, tanks and valves. \_\_\_\_\_
  - \*8. Check all controls for proper operation. \_\_\_\_\_
  - \*9. Check controls for improper adjustment which could interfere with operation. \_\_\_\_\_
  10. Ensure brakes operate properly. \_\_\_\_\_
  - \*11. Check hook limit switches for hoist(s) to be used. \_\_\_\_\_
- \*Perform each shift the crane is in operation.

Attachment 1

(Continued)

12. Check operation of warning devices. \_\_\_\_\_

13. If provided, check settings of load weight indicator. \_\_\_\_\_

AMERICAN NATIONAL STANDARD  
OVERHEAD AND GANTRY CRANES  
(TOP RUNNING BRIDGE, MULTIPLE GIRDER)

ANSI B30.2.0-1976

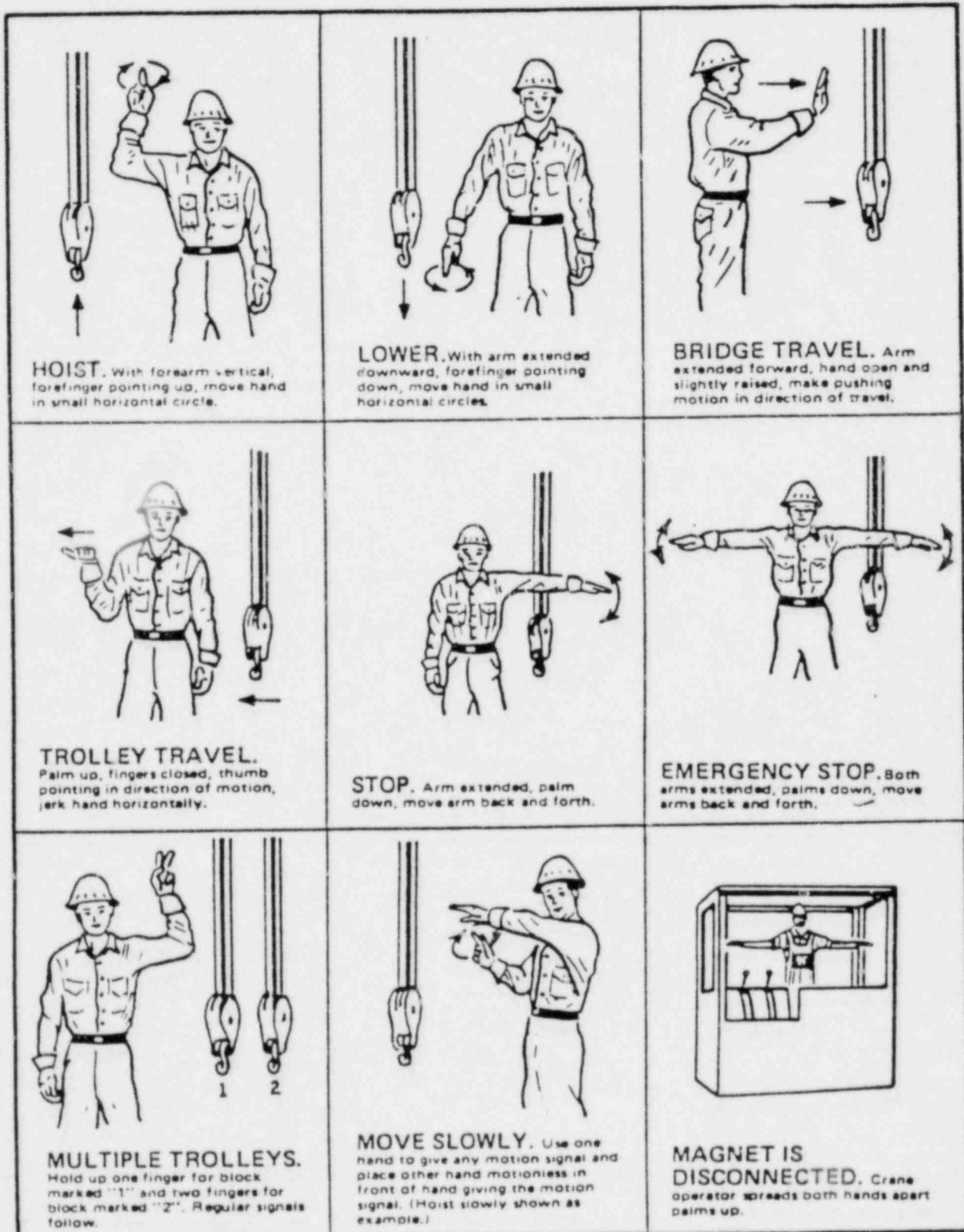


FIG. 5 STANDARD HAND SIGNALS FOR CONTROLLING OVERHEAD AND GANTRY CRANES

GUIDELINE

RECOMMENDATION

3. Crane Operator Qualifications NO RECOMMENDATION  
(Section 2.3.3)

RESPONSE

Although not specifically requested, a draft copy of the procedure used in the qualification of crane operators is being submitted for the staffs' review (see attached MAP-0201).

OM1C: MAP-0201  
Page: 1  
Rev.: 0

THE CLEVELAND ELECTRIC ILLUMINATING COMPANY  
PERRY NUCLEAR POWER PLANT OPERATIONS MANUAL

TITLE: QUALIFICATION OF CRANE OPERATORS

REVISION 0 EFFECTIVE DATE \_\_\_\_\_

DRAFT

PREPARED: J. P. Goecker

SUBMITTED: \_\_\_\_\_  
PERRY PLANT DEPARTMENT

REVIEWED: \_\_\_\_\_  
NUCLEAR Q.A. DEPARTMENT

PORC REVIEW AND RECOMMENDATION FOR APPROVAL MEETING NUMBER: \_\_\_\_\_

APPROVED: \_\_\_\_\_  
MANAGER - PERRY PLANT DEPARTMENT

APPROVED: \_\_\_\_\_  
MANAGER - NUCLEAR Q.A. DEPARTMENT

Qualification of Crane Operators

MAP-0201

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OMIC: MAP-0201  
Page: 111  
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SCOPE OF REVISION:

## 1.0 PURPOSE

To establish a uniform method of training operators of overhead cranes to ensure crane operations are conducted in a safe manner.

## 2.0 SCOPE

This procedure applies to Maintenance Section personnel involved in the operation and use of the various overhead traveling cranes at the Perry Site.

## 3.0 RESPONSIBILITIES

3.1 The General Supervisor Maintenance Section has the overall responsibility for ensuring that the requirements of this procedure are followed. He shall ensure that Maintenance Section Personnel fully understand their responsibilities.

3.2 The Maintenance Section Operations Engineers and Supervisors have the responsibility of ensuring that Crane Operators are qualified to the requirements of this procedure. They shall ensure that the Crane Operators conduct crane operations in a responsible and safety conscious manner.

In addition they shall take necessary action to resolve any questions or problems related to load handling and safety.

3.3 Crane Operators qualified to the requirements of this procedure, are responsible for ensuring that all crane operations under their cognizance are conducted in a safe, responsible manner. They shall ensure through inspections that the equipment is in a proper state of usability. They shall immediately identify the need for any repairs and shall ensure that all preventive maintenance is completed as necessary.

## 4.0 REFERENCES

- 4.1 Harnischfeger P&H Crane Service and Operation Manuals
- 4.2 Whiting Crane Service and Operation Manuals
- 4.3 ANSI B30.2-1976 Overhead and Gantry Cranes

- 4.4 ANSI/ASME N45.2.15-1981 Hoisting, Rigging and Transporting of Items for Nuclear Power Plants
- 4.5 NUREG-0612 Control of Heavy Loads at Nuclear Power Plants
- 4.6 Perry Nuclear Power Plant - Control of Heavy Loads Study. GAI Report #2329.
- 4.7 PNPP Equipment Removal Scheme
- 4.8 OM1C: MAP-1301, Control of Heavy Loads
- 4.9 ANSI B30.9-1971 Slings
- 4.10 ANSI N4.6-1978 Special Lifting Devices

## 5.0 DEFINITIONS

### 5.1 Heavy Load

Any load carried in a given area after the plant becomes operational that weighs more than the combined weight of a single spent fuel assembly and its associated handling tool. (1048#)

### 5.2 Safe Load Path

A path defined for transport of a heavy load that will minimize adverse effects, if the load is dropped, in terms of releases of radioactive material and damage to safety systems. This path should be administratively controlled by procedures and/or clearly outlined by markings on the floor where the load is to be handled. It may also be enforced by mechanical stops and/or electrical interlocks.

## 6.0 DETAILS

### 6.1 Administrative Requirements for Operator Qualification

Immediate Supervisor shall insure requirements met and sign indicating same on qualification card.

#### 6.1.1 Experience Requirements

1. Must be a Nuclear Mechanic Grade II or above.
2. Must be knowledgeable about crane maintenance and inspection requirements.

3. Must have a generally alert and safety conscious attitude.

6.1.2 Physical Requirements

1. Must be at least 18 years of age.
2. Must read and speak English fluently.
3. Vision, with or without corrective lenses, must be at least 20/30 Snellen in one eye and 20/50 in the other. This may be determined from the Operator's most recent eye exam.
4. Hearing with or without correction must be good.
5. The Operator shall not be afflicted with any known heart conditions which might cause a sudden loss of ability to react.
6. Shall have no physical impairment which could affect his abilities to meet the demands of equipment operation.
7. Should have normal depth perception, field of vision, reaction time, manual dexterity, and coordination.

6.2 Crane Operator Conduct

- 6.2.1 Crane Operator Trainees must be under the direct supervision of a qualified operator or other designated person when operating any overhead crane.
- 6.2.2 When physically or otherwise unfit the operator shall not engage in operation of the equipment. This shall also apply if the operator is under the influence of alcohol or medication which may cause drowsiness or at the discretion of the man's Immediate Supervisor.
- 6.2.3 Operators shall not engage in horseplay or any other activity which may divert their attention, when involved in operation of the equipment.
- 6.2.4 Operators shall be familiar with the equipment and its care. Known defects or needed repairs shall be promptly reported. The operator shall inform his relief of any uncorrected defects at shift change.
- 6.2.5 Operators shall ensure that inspections are conducted at the required intervals.

- 6.2.6 The Operator shall ensure that crane controllers are off and no workers are on or adjacent to the crane before closing the mainline disconnect.
- 6.2.7 Crane controls shall be tested at the beginning of each shift.
- 6.2.8 The Operator is responsible for those operations under his direct control. When safety is in doubt the Operator shall consult his Supervisor for resolution prior to handling his load.
- 6.2.9 Operators shall respond to all hand signals from the designated person directing the lift. However, STOP signals shall be obeyed regardless of the source.
- 6.2.10 The crane warning device shall be operated each time before moving either the trolley or bridge and intermittently when approaching personnel.
- 6.2.11 Before leaving the crane unattended, the operator shall land any attached load, place controllers in the "off" position and open the main line device of the specific crane.
- 6.2.12 If power goes off during operation, the operator shall immediately place all controllers in the "off" position. Prior to reuse of the crane, operating motions shall be checked for proper direction.
- 6.2.13 Contacts with runway stops or other cranes shall be made with extreme caution. The operator shall do so with particular care for the safety of persons on or below the crane, and only after making certain that any persons on the other cranes are aware of what is being done.
- 6.2.14 Before the operator performs any maintenance work on the crane, the operator shall lock, tag or flag the main switch (see Paragraph 2-2.3.2) in the deenergized position.
- 6.2.15 Persons boarding or leaving overhead cranes should do so only at authorized locations and designated boarding entrances.
- 6.2.16 Before closing the main device, the operator shall see to it that all controllers are in the "off" position.

### 6.3 Qualification as Standard Crane Operator (See Attachment 1)

Qualification as a Standard Crane Operator applies to prospective operators of the Unit 1 & 2 Turbine Building Cranes, Circulating Water Pump House Cranes and the Service Water Pump House Crane.

6.3.1 Each prospective operator shall complete a qualification card in accordance with the guidelines below. The qualification card shall be maintained in the operator's training file for the full length of his employment at Perry Nuclear Power Plant.

6.3.2 Part A - Reference Material

1. The prospective operator shall be trained to ANSI B30.2.0-1976, ASME/ANSI N45.2.1.5-1981 and ANSI B30.9-1971. This may be done by review of each manual or through classroom training.
2. The completion signature may be obtained by discussion with the operator's immediate supervisor, the classroom instructor or other designated person.

6.3.3 Part B - Safety Requirements and Control Equipment

1. Read and understand the guidelines for Operator conduct found in Section 6.2 of this procedure.
2. Become familiar with the control equipment associated with the crane through reading and/or classroom training.
3. Completion signature may be obtained as in Section 6.3.2.2 above.

6.3.4 Part C - Classroom Training (Optional)

1. If available during qualifications attend any organized classroom training applicable to crane use, maintenance or safety.

6.3.5 Part D - Operation Training

1. Operate the crane under the direction of a qualified operator or other designated person until familiar and confident with controls.
2. Signature may be received from same.

6.3.6 Part E - Operation Demonstration

1. Conduct an operational ability demonstration to the satisfaction of immediate Supervisor or other designated person.
2. Demonstration shall include but not be limited to:
  - a. Energizing the crane.

- b. Conducting a daily prior to use inspection, including the testing of all controls.
  - c. Operating the crane along a predetermined path with no load on the hook following hand signals and spotting the hook at a predetermined position.
  - d. If available handling a small load as in Step c above.
  - e. De-energizing the crane.
3. Completion signature may be obtained from the person observing the demonstration.

6.3.7 Part F - Written Exam

1. Satisfactorily complete a written exam covering the information discussed in Parts A - E above. This shall be administered by the PPD Training Unit.

6.3.8 Part G - Certification

1. Receive an interview from General Supervisor Maintenance Section or designated person covering any or all aspects of the areas above.
2. Receive certification signature from same.

6.4 Qualification as Special Handling Crane Operator (See Attachment 2)

Qualification as Special Handling Crane Operator applies to prospective operators of the Unit 1 and 2 Reactor Building Polar Cranes, the Fuel Handling Building Crane and the Emergency Service Water Pump House Crane. Load handling with these cranes involves movement of safety related equipment and heavy loads in the vicinity of safe shutdown equipment as addressed in NUREG-0612. Therefore, additional training and control is necessary.

- 6.4.1 Each prospective Special Handling Crane Operator shall have been previously qualified as a PNPP Standard Crane Operator. A Special Handling Crane Operator qualification card shall be completed as outlined in Section 6.3 with emphasis on the additional items listed below.

6.4.2 Part A - Reference Material

1. The prospective operator shall be trained to the requirements of OMI C: MAP-1301, Control of Heavy Loads, PNPP Control of Heavy Loads Study and ANSI N14.6-1978.

6.4.3 Part D - Operation Training

1. Crane Operation Training shall include discussion of identified "heavy loads" and "safe load paths".

6.4.4 Part E - Operation Demonstration

1. The Operational Ability Demonstration shall include crane travel along one or more of the safe load paths defined in the PNPP Heavy Loads Study and MAP-1301.

6.4.5 Part F - Written Exam

1. A written exam shall be satisfactorily completed covering all areas on the qualification card, including additional information identified in 6.4.2 - 6.4.4 above.

6.4.6 Part G - Certification

1. Interview from General Supervisor Maintenance Section or designated person shall include special requirements for handling heavy loads.

6.5 Records

1. Standard Crane Operator Qualification Card.
2. Special Handling Crane Operator Qualification Card.

7.0 ATTACHMENTS

- 7.1 Attachment 1 - Standard Crane Operator Qualification Card.
- 7.2 Attachment 2 - Special Handling Crane Operator Qualification Card.



STANDARD CRANE OPERATOR  
QUALIFICATION CARD

Applies to: Turbine Building Cranes, Circulation Water Pump House Cranes, Service  
Water Pump House Crane.

NAME \_\_\_\_\_ QUAL. DATE \_\_\_\_\_

SECTION \_\_\_\_\_ TITLE \_\_\_\_\_

PHYSICALLY QUALIFIED \_\_\_\_\_

A. REFERENCES

1. Applicable Crane Operator & Service Manuals
2. ANSI B30.2-1976 Overhead & Gantry Cranes
3. PNPP Equipment Removal Scheme
4. ANSI B30.9-1971 Slings
5. ANSI/ASME N45.2.15-1981 Hoisting, Rigging and Transporting items at Nuclear Plants

\_\_\_\_\_  
Signature Date

B. SAFETY REQUIREMENTS & CONTROL EQUIPMENT

1. Operator Conduct & Safety
2. Crane control equipment & safety devices

\_\_\_\_\_  
Signature Date

C. CLASSROOM TRAINING ATTENDED

Title	Instructor	Date
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

D. OPERATIONAL TRAINING

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

E. OPERATIONAL DEMONSTRATION

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

F. WRITTEN EXAM GRADE

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

G. CERTIFICATION INTERVIEW

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

SPECIAL HANDLING CRANE OPERATOR  
QUALIFICATION CARD

Applies to: Rx. Bldg. Polar Cranes, Fuel Handling Bldg. Crane, ESW Pump House Crane.

NAME \_\_\_\_\_ QUAL. DATE \_\_\_\_\_

SECTION \_\_\_\_\_ TITLE \_\_\_\_\_

PHYSICALLY QUALIFIED \_\_\_\_\_

A. REFERENCES

1. Applicable Crane Operator & Service Manuals
2. ANSI/ASME N45.2.15-1981 Hoisting, Rigging & Transporting items at Nuclear Plants
3. PNPP Control of Heavy Loads Study
4. NUREG-0612 - Control of Heavy Loads at Nuclear Power Plants
5. OMIc: MAP-1301 Control of Heavy Loads
6. ANSI B.30.2-1976 Overhead and Gantry Cranes
7. ANSI B.30.9-1971 - Slings
8. ANSI N14.6-1978 - Special Lifting Devices

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

B. SAFETY REQUIREMENTS & CONTROL EQUIPMENT

1. Operator Conduct & Safety
2. Crane control equipment & safety devices

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

C. CLASSROOM TRAINING ATTENDED

Title	Instructor	Date
_____	_____	_____
_____	_____	_____
_____	_____	_____

D. OPERATIONAL TRAINING

_____	_____
Signature	Date

E. OPERATIONAL DEMONSTRATION

_____	_____
Signature	Date

F. WRITTEN EXAM GRADE

_____	_____
Signature	Date

G. CERTIFICATION INTERVIEW

_____	_____
Signature	Date

#### GUIDELINE

4. & 5. Special Lifting Devices  
(Section 2.3.4) and  
Lifting Devices  
(Section 2.3.5)

#### RECOMMENDATION

Special lifting devices and their associated problems are sufficiently important and a special section should be written to show CEI's compliance with the guidelines concerning these devices. This write-up should address the NUREG 0612 specification that the allowable offsite radioactive release applicable to heavy loads as 25% of the guideline exposures outlined in 10CFR Part 100.

The information on special lifting devices and lifting devices should include both the maximum static, and dynamic load stress of each loading device compared with the calculated and tested load strength. In addition, each sling should be properly identified as to its' lifting capacity, applicability to specific load handling operation, and if appropriate, restriction of its' use to specific cranes.

#### RESPONSE

Details of CEI's compliance with ANSI N14.6-1978 and ANSI B30.9-1971 will be provided by Decembrer 1982. Each sling will be properly identified as to its' lifting capacity, applicability to specific load handling operations, and if appropriate, restriction of its' use to specific cranes.

## GUIDELINE

### 6. Cranes (Section 2.3.6)

## RECOMMENDATION

The crane inspection, testing, and maintenance program should be written with special attention to the specification of ANSI B30.2-1976 and the limitations placed on the program by the plant operating conditions.

## RESPONSE

The crane inspection, testing, and maintenance program is written in detail in the Perry Maintenance Section procedures. For example, the Reactor Polar Crane Monthly Preventive Maintenance, Reactor Polar Crane Quarterly and Semiannual Preventive Maintenance, and Reactor Polar Crane Yearly Preventive Maintenance procedures (see attached) are written in detail and reference ANSI B30.2-1976. CEI will meet the specifications of ANSI B30.2-1976.

THE CLEVELAND ELECTRIC ILLUMINATING COMPANY  
PERRY NUCLEAR POWER PLANT OPERATIONS MANUAL  
MAINTENANCE SECTION INSTRUCTION NUMBER OM9B:PMI-0015  
REVISION 0 EFFECTIVE DATE \_\_\_\_\_

TITLE: REACTOR POLAR CRANE MONTHLY PREVENTIVE MAINTENANCE

PREPARED: S. S. Veale 6/16/82  
NAME/TITLE/DATE

REVIEWED: \_\_\_\_\_  
MAINTENANCE SECTION - NAME/TITLE/DATE

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## RX POLAR CRANE MONTHLY PREVENTIVE MAINTENANCE

### 1.0 PURPOSE

To provide guidelines for conduct of monthly preventive maintenance on the Reactor Polar Cranes. Use of this instruction and attention to detail by operators and maintenance personnel, will serve to maintain these cranes in their desired high state of operability.

### 2.0 SCOPE

This instruction applies when performing monthly preventive maintenance on:

1L51E0001	Unit 1 Polar Crane	125/10 Ton
2L51E0001	Unit 2 Polar Crane	125/10 Ton

The enclosed requirements shall be satisfied once per month when the crane is regularly used (several times per month) and prior to use when the crane has been idle for an extended period of time (greater than 6 months).

### 3.0 PRECAUTIONS AND LIMITATIONS

- 3.1 Only qualified crane operators may operate the crane and its associated equipment.
- 3.2 The crane shall be positioned such that the maintenance will minimally interfere with other operational activities. No maintenance may be performed with the crane resting over critical equipment.



3.3 During preventive maintenance, power shall be isolated and the associated breaker safety tagged in accordance with PAP-1104, unless periodic operational checks are required. When power is not isolated, the operator shall remain in the cab to ensure that the controls are not operated without authorization.

3.4 Warning or out of order signs should be placed on the crane or on the floor directly below.

3.5 After inspection and adjustments, the crane shall not be operated until all guards have been replaced, safety devices reactivated and tools removed.

3.6 If any unsafe or abnormal conditions are discovered, the person in charge shall be notified.

#### 4.0 REQUIRED EQUIPMENT

4.1 Basic hand tools.

4.2 Vacuum cleaner or air supply.

4.3 Calipers.

4.4 Feeler Gauges.

4.5 Mobil Vactra Oil BB.

4.6 Mobil Oil DTE Extra Heavy.

#### 5.0 INSTRUCTIONS

## 5.1 Inspection of Motors

### 5.1.1 Main Drive and Micro Drive Motors

- 5.1.1.1 Check brushes for excessive wear (40-60% of original).
- 5.1.1.2 Ensure brushes move freely in the holder and contact the slip ring properly.
- 5.1.1.3 Ensure the brush pigtail lugs are secure.
- 5.1.1.4 Check brush spring tension. Proper tension is 3.5-4# per square inch of contact area.
- 5.1.1.5 Clean out dust and dirt. A vacuum or compressed air up to 50 psi may be used. Wipe the slip rings.
- 5.1.1.6 Ensure terminals are tight and insulation is not worn.

### 5.1.2 Main Hoist Position Indicator (Synchrotie Motor)

- 5.1.2.1 Remove end bell and clean out dust and dirt.
- 5.1.2.2 Check brushes for excessive wear.

## 5.2 Inspection of Brakes

### 5.2.1 Magnetorque Brakes

- 5.2.1.1 Clean out dust and dirt. A vacuum or compressed air up to 50 psi may be used. Ensure ventilation openings are clear.

## 5.2.2 Type CD Brakes (See Figure 1.)

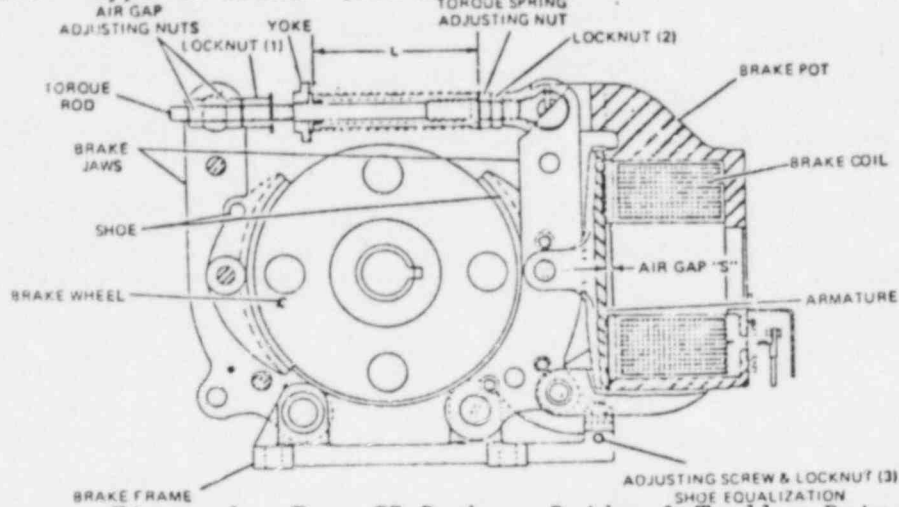


Figure 1 - Type CD Brake - Bridge &amp; Trolley Drive

- 5.2.2.1 Ensure linkages are not bent or worn.
- 5.2.2.2 Check brake shoe linings for excessive wear. Replace when 1/16" or less of pad remains.
- 5.2.2.3 Check brake wheel (drum) for evidence of overheating.
- 5.2.2.4 Check brake wheels for cracks or other abnormalities.
- 5.2.2.5 Ensure mounting bolts are tight.
- 5.2.2.6 Check torque spring length (L). If less than 2-7/8", adjust as follows:
  1. Loosen locknut (2).
  2. Turn the torque spring adjusting nut until the desired length is obtained.
  3. Retighten the locknut.

5.2.2.7 Measure the air gap(s). If not within the range of  $\frac{3}{64}$ " to  $\frac{3}{32}$ " adjust as follows:

1. Loosen locknut (1).
2. Turn the two air gap adjusting nuts as required.
3. Retighten the locknut.

5.2.2.8 Measure the clearance between each brake shoe and the drum at the point even with the shot pivot pin. If the two measurements differ, adjust the shoe equalization as follows:

1. Back off the air gap locknut (1) and tighten it against the yoke until the air gap is closed.
2. Loosen the shoe equalization locknut (3) and turn the adjusting screw until equal clearance is obtained.
3. Retighten the shoe equalization locknut (3) and air gap locknut (1).
4. Recheck measurement to ensure it has not changed.

5.2.3 Type SBE Brakes (See Figure 2.)

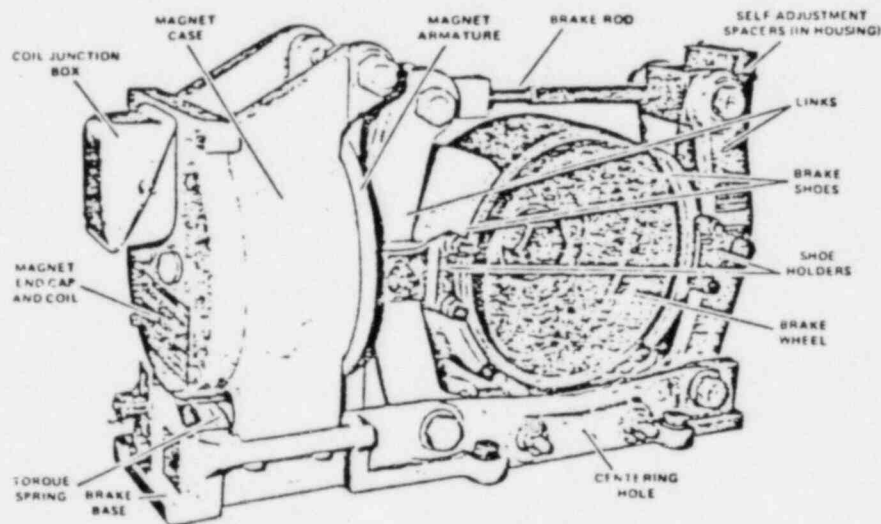


Figure 2 - Type SBE

- 5.2.3.1 Ensure linkages are not bent or worn.
  - 5.2.3.2 Check brake shoe linings for excessive wear. Replace when  $3/16"$  or less of pad remains.
  - 5.2.3.3 Check brake wheel (drum) for indication of overheating.
  - 5.2.3.4 Check brake wheel for cracks or other abnormalities.
  - 5.2.3.5 Ensure mounting bolts are tight.
  - 5.2.3.6 Each SBE brake is fully adjusted at the factory and requires no periodic adjustments during normal service. Lining wear is automatically compensated for by spacer plates at the end of the brake rod.
- 5.2.4 Pull-a-Hoist Brake
- 5.2.4.1 This brake is set at the factory. No inspection is required. Adjust only if drift is excessive or if hoist stops too quickly.
- 5.2.5 Zip-Lift Hoist Brake (See Figure 3.)

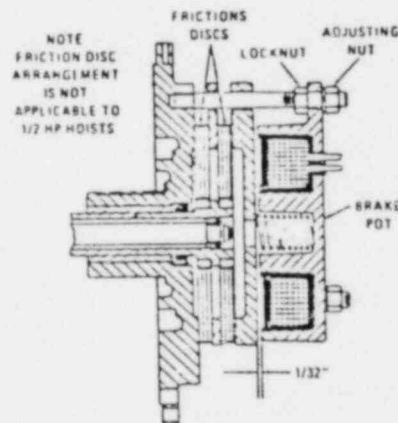


Figure 3 - Zip-Lift Hoist Brake Adjustment

5.2.5.1 Check the armature operating clearance between 1/32" to 1/8". Adjust as necessary using the following method:

1. Remove the brake cover.
2. Loosen the locknuts. Turn the adjusting nuts to obtain 1/32" clearance.
3. Retighten locknuts and verify clearance.
4. Replace brake cover.

5.2.5.2 Inspect and clean disc plate and linings.

### 5.3 Inspection of Electrical Panels and Controls

#### 5.3.1 All Panels

5.3.1.1 Clean out all dust and dirt.

5.3.1.2 Check for evidence of overheating.

5.3.1.3 Ensure contacts operate freely.

5.3.1.4 Check for worn insulation.

### 5.4 Inspection of Electric Clutch Couplings

#### 5.4.1 Warner Electric Clutches

5.4.1.1 Check cleanliness of clutch.

5.4.1.2 Ensure no oil or grease is on friction surfaces. Small amounts may be removed by wiping with a rag dampened with trichloroethylene.

## 5.5 Inspection of Gearcases and Gear Reducers

### 5.5.1 Micro-Drive Gear Reducers and Tachometer Boston Gear Reducers

5.5.1.1 Check oil level proper. Check oil for presence of foreign material. If necessary, fill to proper level with Mobil DTE Extra Heavy.

### 5.5.2 Gear Cases

5.5.2.1 Check exterior of case for evidence of leakage at joints and for cracks or dents.

5.5.2.2 Check oil seals for leakage, chipping or other abnormalities.

5.5.2.3 Check gears for excessive wear, chipping or cracking.

5.5.2.4 Check oil for evidence of water or foreign material.

5.5.2.5 Ensure oil level is proper. Add as necessary using the following lubricants:

Mobil Vactra Oil BB - Bridge drive, auxiliary hoist, main hoist and trolley drive.

## 5.6 Inspection of Couplings

### 5.6.1 Flexible Couplings

5.6.1.1 Check bolts for tightness.

5.6.1.2 Check for hole elongation.

## 5.7 Inspection of Hoisting Mechanisms and Rope

NOTE: Lower the respective hook so it rests about one foot above the floor at the 689'6" level. The block must be in the same position to ensure that the same areas of rope are inspected each time.

### 5.7.1 Inspection of Sheaves

5.7.1.1 Ensure all sheave grooves are smooth.

5.7.1.2 Ensure sheaves rotate smoothly.

5.7.1.3 Ensure sheave pins are secure.

5.7.1.4 Ensure the sheave frame is free of rough areas or sharp edges.

### 5.7.2 Inspection of Hooks

5.7.2.1 Ensure the hook nut retaining bolt is in place and securely tightened.

5.7.2.2 Ensure the hook safety latch operates smoothly and properly.

5.7.2.3 Visually inspect the hook for cracks.

5.7.2.4 Measure the hook throat opening between the punched gauge points and compare with the stamped dimension. The measurement must be within 1 to 1.15 times the stamp.

5.7.2.5 Check for twisting of the hook point from center. If twisting is evident, it shall not exceed 10°.



5.7.3 Inspection of Drums

5.7.3.1 Check condition of drum grooves.

5.7.3.2 Check condition of flanges at end of drums.

5.7.3.3 Ensure rope end attachments are intact and tight.

5.7.4 Inspection of Rope

5.7.4.1 Perform inspection on accessible areas of the rope as it leaves the drum and as it exits each sheave on the block.

5.7.4.2 Measure the rope diameter across its widest point with calipers. Rotate the caliper to ensure the true diameter is measured. Loss in diameter shall not exceed 10%.

5.7.4.3 Take lay measurements. The following method may be used. (See Figure 4.):

1. Firmly hold a piece of carbon paper and a piece of white paper against the rope. Stroke with the side of a pencil, so the ropes imprint is made on the paper.
2. Draw a line through a strand, and a second line where the strand reappears.

3. Measure the distance between the lines (lay length) and compare to previous measurements. An abrupt change may indicate impending problems.

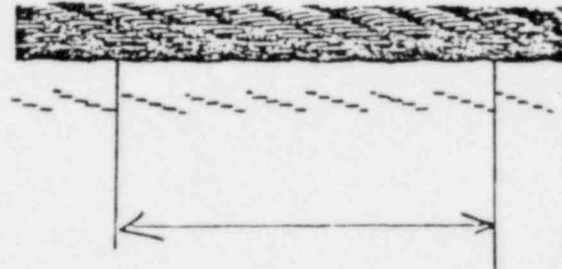


Figure 4 - Rope Lay Measurements

- 5.7.4.4 Check for flattened sections where the diameter is less than  $5/6$  of original.
- 5.7.4.5 Check for surface wear not to exceed  $1/3$  of the original diameter of the outside wires.
- 5.7.4.6 Check for broken or torn wires. The number shall not exceed six randomly distributed broken wires in one lay or 3 broken wires in one strand in one lay.
- 5.7.4.7 Slowly raise the hook and inspect the rope for evidence of external damage or abuse.

## 6.0 POST-MAINTENANCE REQUIREMENTS

- 6.1 Ensure all guards and covers are properly reinstalled.
- 6.2 Ensure all tools and equipment are removed from the crane.
- 6.3 All switches and breakers shall be returned to normal.

6.4 Warning or out of order signs shall be removed.

7.0 ACCEPTANCE CRITERIA

7.1 Requirements of this instruction shall be satisfied and/or exceptions noted.

7.2 Discrepancies must be corrected or scheduled for repair.

8.0 REFERENCES

8.1 OSHA Chap. XVII, Part 1910.179, Overhead and Gantry Cranes.

8.2 ANSI B30.2.0-1976, Overhead and Gantry Cranes.

8.3 Harnischfeger Service Manual - Polar Crane 125/10 Ton.

9.0 LIST OF ATTACHMENTS

9.1 Attachment 1 - Monthly Preventive Maintenance Checklist - Electrical.

9.2 Attachment 2 - Monthly Preventive Maintenance Checklist - Mechanical.

9.3 Attachment 3 - Wire Rope Inspection Report.

Attachment 1

MONTHLY PREVENTIVE MAINTENANCE  
Polar Cranes 1L51E0001 & 2L51E0001

Electrical

Motors	See Section 5.1	Satis.	Unsat.	Comments
1. Bridge Drive Motor A*				
2. Micro-Drive Bridge Motor A*				
3. Bridge Drive Motor B				
4. Micro-Drive Bridge Motor B				
5. Auxiliary Hoist Motor				
6. Main Hoist Motor				
7. Main Hoist Micro Drive Motor				
8. Trolley Main Drive Motor				
9. Trolley Micro Drive Motor				
10. Main Hoist Position Indicator				
11. Zip-Lift Hoist Motor				
12. Pull-a-Hoist Motor				

Brakes	See Section 5.2	Satis.	Unsat.
13. Bridge Drive A* (Type 5CD40)			
14. Bridge Drive B (Type 5CD40)			
15. Trolley Drive (Type 5CD40)			
16. Aux. Hoist Brake A (Type 10SBE)			
17. Aux. Hoist Brake B (Type 10SBE)			
18. Main Hoist Brake A (Type 13SBE)			
19. Main Hoist Brake B (Type 13SBE)			
20. Zip-Lift Hoist Brake			
21. Aux. Hoist Magnetorque Brake			
22. Main Hoist Magnetorque Brake			

Panels & Controls	See Section 5.3	Satis.	Unsat.
23. Push Button Station			
24. Main Line Switch Panel			
25. Utility Circuit Breaker			
26. Bridge Breaker Rectifier			
27. Bridge Breaker Equipment			
28. Motor Breakers			
29. Line Cont./Aux. Hoist Control			
30. Bridge Control			
31. Trolley Cont./Aux. Equip. 1 & 2			
32. Main Hoist Control			
33. Aux. Hoist/Bridge Resistor			
34. Trolley/Main Hoist Resistor			

Completed by \_\_\_\_\_ Date \_\_\_\_\_  
Reviewed by \_\_\_\_\_ Date \_\_\_\_\_

\*Bridge Drive A refers to unit above operator's cab.

MONTHLY PREVENTIVE MAINTENANCE  
Polar Cranes 1L51E0001 & 2L51E0001

Mechanical

Gearcases & Gear Reducers See Sec. 5.5	Satis.	Unsat.	Comments	
1. Bridge Drive A*				
2. Bridge Micro-Drive Reducer A*				
3. Bridge Drive B				
4. Bridge Micro-Drive Reducer B				
5. Trolley Drive				
6. Trolley Micro-Drive Reducer				
7. Aux. Hoist				
8. Main Hoist				
9. Main Hoist Micro-Drive				
Couplings See Sec. 5.4 & 5.6	Satis.	Unsat.		
10. Bridge Drive A (2 flex, 1 electric)*				
11. Bridge Drive B (2 flex, 1 electric)				
12. Trolley Drive (4 flex, 1 electric)				
13. Aux. Hoist (1 flex.)				
14. Main Hoist (2 flex, 1 electric)				
Sheaves See Sec. 5.7.1	Satis.	Unsat.		
15. Main Hoist Upper Block				
16. Main Hoist Bottom Block				
17. Aux. Hoist Bottom Block				
18. Aux. Hoist Equalizer				
Hooks	Satis.	Unsat.		
19. Main Hoist				
20. Aux. Hoist				
21. Zip-Lift Hoist				
Drums	Satis.	Unsat.		
22. Main Hoist				
23. Aux. Hoist				

Completed by \_\_\_\_\_ Date \_\_\_\_\_  
Reviewed by \_\_\_\_\_ Date \_\_\_\_\_

\*Bridge Drive A refers to unit above operator's cab.

CRANE \_\_\_\_\_ MPL NO. \_\_\_\_\_ DATE \_\_\_\_\_

[illegible]

Inspected By \_\_\_\_\_

1. Aux. Hoist Rope 9/16 6 x 37 (6 x 41 WS) IPS F/C RRL, Breaking Strength 28,200#, Reel No. 4197, Universal Wire Products.

1. Main Hoist Rope 1-1/8 6 x 37 (6 x 41 WS) SEIP IWRC RRL, Breaking Strength 154,000#, Reel No. 8375, Universal Wire Products.

233/M/3/mm

THE CLEVELAND ELECTRIC ILLUMINATING COMPANY

PERRY NUCLEAR POWER PLANT OPERATIONS MANUAL

MAINTENANCE SECTION INSTRUCTION NUMBER OM9B: PMI-0016

REVISION 0 EFFECTIVE DATE \_\_\_\_\_

TITLE: REACTOR POLAR CRANE QUARTERLY AND SEMIANNUAL PREVENTIVE MAINTENANCE

PREPARED: S. J. Veale 6/18/82  
NAME/TITLE/DATE

REVIEWED: \_\_\_\_\_  
MAINTENANCE SECTION - NAME/TITLE/DATE

REVIEWED: \_\_\_\_\_  
NQAD - PROGRAM QUALITY SECTION - NAME/TITLE/DATE

APPROVED: \_\_\_\_\_  
MAINTENANCE SECTION - NAME/TITLE/DATE

PPD: \_\_\_\_\_  
ADMINISTRATIVE SECTION - NAME/TITLE/DATE

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REACTOR POLAR CRANE QUARTERLY  
AND SEMIANNUAL PREVENTIVE MAINTENANCE

1.0 PURPOSE

To provide guidelines for conduct of quarterly and semiannual preventive maintenance on the Reactor Polar Cranes. These items are primarily lubrication requirements and shall be done in conjunction with monthly preventive maintenance as outlined in OM9B: PMI-0015.

2.0 SCOPE

This instruction applies when performing quarterly and semiannual preventive maintenance on:

1L51E0001	Unit 1 Polar Crane	125/10 Ton
2L51E0001	Unit 2 Polar Crane	125/10 Ton

The enclosed requirements shall be satisfied once every 3 months and once every 6 months respectively when the crane is in regular use (several times per month). They shall be satisfied prior to use when the crane has been idle for an extended period of time (greater than 6 months).

3.0 PRECAUTIONS AND LIMITATIONS

- 3.1 Only qualified crane operators may operate the crane and its associated equipment.
- 3.2 The crane shall be positioned such that the maintenance will minimally interfere with other operational activities. No maintenance may be performed with the crane resting over critical equipment.



- 3.3 During preventive maintenance power shall be isolated and the associated breaker safety tagged in accordance with PAP 1104, unless periodic checks are required. When power is not isolated, the operator shall remain in the cab to ensure that the controls are not operated without authorization.
- 3.4 Warning or out of order signs should be placed on the crane or on the floor directly below.
- 3.5 After inspections and adjustments, the crane shall not be released for operation until guards have been replaced, safety devices reactivated and tools removed.
- 3.6 If any unsafe or abnormal conditions are discovered, the person in charge shall be notified.
- 4.0 REQUIRED EQUIPMENT
  - 4.1 Basic Hand Tools.
  - 4.2 Grease Gun.
  - 4.3 Mobil Lux EP-2 grease.
  - 4.4 Mobil Tac gear lube.
  - 4.5 Mobil Delvac 1210 oil.
  - 4.6 Shell Cyprina #3 grease.
  - 4.7 Shell Darina #2 grease.
  - 4.8 WITCO CHEM SACI 300.

4.9 Universal Wire Products UWP-AECL wire rope lube.

4.10 Mobil Vactra BB.

## 5.0 INSTRUCTIONS

### 5.1 Lubrication of Motors

#### 5.1.1 Main Drive and Micro Drive Motors

5.1.1.1 Clean area around plugs and remove.

5.1.1.2 Remove any hardened grease around openings with plastic or wood stick.

5.1.1.3 With motor running (if possible), pump in grease through upper hole until expelled through lower hole.

5.1.1.4 If possible, run motor with lower plug removed until no grease flows from lower hole.

### 5.2 Lubrication of Brakes

#### 5.2.1 Type CD Brakes

5.2.1.1 Lube pivot pins and bushings.

#### 5.1.2 Magnitorque Brakes

5.1.2.1 Follow instructions outlines in Section 5.1.1 for motors.

### 5.3 Lubrication of Hoist Drum Gears and Pinions

#### 5.3.1 Main and Auxiliary Hoist

5.3.1.1 Closely inspect gears for wear, chipping, and cracking.

5.3.1.2 While slowly rotating drum, brush gears with required lubricant.

NOTE: "Brush on" lubricant vice spray must be used as spray requires application at more frequent intervals.

### 5.4 Lubrication of Hoist Ropes

#### 5.4.1 Main and Auxiliary Hoist Ropes

5.4.1.1 Rope lubricant should be applied to the rope at a position where the rope is flexed and accessible. This will allow the lubricant to penetrate and lubricate the center. Best locations are as the rope leaves the drum or exits a sheave.

5.4.1.2 Prior to lubricating rope it should be cleaned to remove dust, dirt and dried lubricant.

### 5.5 Lubrication of Zip-Lift Hoist Gearcase

#### 5.5.1 Zip-Lift Hoist

5.5.1.1 Change the gearcase oil as follows:

1. Remove drain plug and drain oil into suitable container. ENSURE NO OIL DROPS TO FLOOR BELOW.

2. Wipe and replace the drain plug.
3. Refill with 1 pint of Mobil Vactra Oil BB.

#### 5.6 Other Equipment

- 5.6.1 All other equipment shall be lubricated as defined on the appropriate checklists.

#### 6.0 POST MAINTENANCE REQUIREMENTS

- 6.1 Ensure all guards and covers are properly reinstalled.
- 6.2 Ensure all tools and equipment are removed from the crane.
- 6.3 All switches and breakers shall be returned to normal.
- 6.4 Warning or Out of Order signs shall be removed.

#### 7.0 ACCEPTANCE CRITERIA

- 7.1 Requirements of this instruction shall be satisfied and/or exceptions noted.
- 7.2 Discrepancies must be corrected or scheduled for repair.

#### 8.0 REFERENCES

- 8.1 OSHA Chapter XVII, Part 1910.179, "Overhead and Gantry Cranes."
- 8.2 ANSI B30.2.0-1976, "Overhead and Gantry Cranes."
- 8.3 Harnischfeger Service Manual - Polar Crane 125/10 Ton.

9.0 LIST OF ATTACHMENTS

- 9.1 Attachment 1 - Quarterly Preventive Maintenance Checksheet - Lubrication.
- 9.2 Attachment 2 - Semiannual Preventive Maintenance Checksheet - Lubrication.

QUARTERLY PREVENTIVE MAINTENANCE  
POLAR CRANES  
1L51E0001 & 2L51E0001

LUBRICATION

BRAKES SEE SECTION 5.2	LUBRICANT	TYPE	FITTINGS	AMOUNT	DONE
1. Bridge Drive A* (Type 5CD40)	DELVAC 1210	Oil	-	Sparingly	
2. Bridge Drive B (Type 5CD40)	DELVAC 1210	Oil	-	Sparingly	
3. Trolley Drive (Type 5CD40)	DELVAC 1210	Oil	-	Sparingly	
GEARS & PINIONS SEE SECTION 5.3					
4. Aux. Hoist Drum Gears	MOBIL TAC	Swab	-	Liberally	
5. Main Hoist Drum Gears	MOBIL TAC	SWab	-	Liberally	
OTHER					
6. Bridge Wheels A End* (4)	LUX EP-2	Grs.	2 Ea.	8 Strokes	
7. Bridge Wheels B End* (4)	LUX EP-2	Grs.	2 Ea.	8 Strokes	
8. Pendant Festoon Trolley Wheels (4 Per Set/4 Sets)	LUX EP-2	Grs.	4 Per Set	2 Strokes	
9. Trolley Drive Wheels (4)	LUX EP-2	Grs.	2 Ea.	5 Strokes	
10. Trolley Festoon Wheels (4 Per Set/4 Sets)	LUX EP-2	Grs.	4 Per Set	2 Strokes	
11. Main Hoist Drum Pedestal Bearings (2)	LUX EP-2	Grs.	3 Ea.	4 Strokes	
12. Main Hoist Upper Block	LUX EP-2	Grs.	2	10 Strokes	
13. Aux. Hoist Drum Pedestal Bearing	LUX EP-2	Grs.	1	5 Strokes	
14. Aux. Hoist Equalizer Saddle	LUX EP-2	Grs.	1	3 Strokes	
15. Aux. Hoist Equalizer Sheave Pins and Bushings	DELVAC 1210	Oil	-	Sparingly	

COMMENTS \_\_\_\_\_

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COMPLETED BY \_\_\_\_\_ DATE \_\_\_\_\_

REVIEWED BY \_\_\_\_\_ DATE \_\_\_\_\_

\*Bridge A end equipment refers to end at which operators cab is located.

405/H/1/es

SEMIANNUAL PREVENTIVE MAINTENANCE  
POLAR CRANES  
1L51E0001 & 2L51E0001

LUBRICATION

MOTORS SEE SECTION 5.1	LUBRICANT	TYPE	FITTINGS	AMOUNT	DONE
1. Bridge Drive Motor A*	Shell Cyprina #3	Grs.	2	3 Strokes	
2. Micro-Drive Bridge Motor A*	Shell Cyprina #3	Grs.	2	3 Strokes	
3. Bridge Drive Motor B	Shell Cyprina #3	Grs.	2	3 Strokes	
4. Micro-Drive Bridge Motor B	Shell Cyprina #3	Grs.	2	3 Strokes	
5. Aux. Hoist Motor	Shell Cyprina #3	Grs.	2	3 Strokes	
6. Main Hoist Motor	Shell Cyprina #3	Grs.	2	3 Strokes	
7. Main Hoist Micro-Drive Motor	Shell Cyprina #3	Grs.	2	3 Strokes	
8. Trolley Drive Motor	Shell Cyprina #3	Grs.	2	3 Strokes	
9. Trolley Micro-Drive Motor	Shell Cyprina #3	Grs.	2	3 Strokes	
BRAKES SEE SECTION 5.2					
10. Aux. Hoist Magnetorque	Shell Darina #2	Grs.	2	2 Strokes	
11. Main Hoist Magnetorque	Shell Darina #2	Grs.	2	2 Strokes	
ROPE SEE SECTION 5.4					
12. Aux. Hoist Rope	UWP-AECL	Spray	-	Coat	
13. Main Hoist Rope	UWP-AECL	Spray	-	Coat	
14. Zip-Lift Hoist Rope	UWP-AECL	Spray	-	Coat	
ZIP-LIFT HOIST SEE SECTION 5.5					
15. Zip-Lift Gearcase	Mobil Vactra BB	Change	-	1 Pint	
OTHER					
16. Aux. Hoist Bottom Block	Witco Chem SACI 300	Grs.		5 Strokes	
17. Main Hoist Bottom Block	Witco Chem SACI 300	Grs.		5 Strokes	
18. Pull-A-Hoist Wheels	Mobil Lux EP2	Grs.	-	Repack	
19. Zip-Lift Hoist Wheels	Mobil Lux EP2	Grs.	2	2 Strokes	
20. Zip-Lift Hoist Block	Mobil Lux EP2	Grs.	1	2 Strokes	

COMMENTS \_\_\_\_\_

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COMPLETED BY \_\_\_\_\_ DATE \_\_\_\_\_

REVIEWED BY \_\_\_\_\_ DATE \_\_\_\_\_

\*Bridge A end equipment refers to end at which operators cab is located.

405/H/2/es

THE CLEVELAND ELECTRIC ILLUMINATING COMPANY  
PERRY NUCLEAR POWER PLANT OPERATIONS MANUAL  
MAINTENANCE SECTION INSTRUCTION NUMBER OM9B:PMI-0017  
REVISION 0 EFFECTIVE DATE \_\_\_\_\_

TITLE: REACTOR POLAR CRANE YEARLY PREVENTIVE MAINTENANCE

PREPARED: JS. Vule 6/17/82  
NAME/TITLE/DATE

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ADMINISTRATIVE SECTION - NAME/TITLE/DATE

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LIST OF INCOMPLETE ITEMS

At the time this procedure was written, information regarding the items listed below were incomplete. These items are designated as "(Later)" within the procedure. As the information becomes available, the procedures will be revised.

<u>No.</u>	<u>Page</u>	<u>Section</u>	<u>Item</u>	<u>Completed</u>
<u>1</u>	<u>10</u>	<u>ATT. 2</u>	<u>Oil Capac. (Amount)</u>	<u>          </u>
<u>2</u>	<u>          </u>	<u>          </u>	<u>          </u>	<u>          </u>
<u>3</u>	<u>          </u>	<u>          </u>	<u>          </u>	<u>          </u>
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<u>5</u>	<u>          </u>	<u>          </u>	<u>          </u>	<u>          </u>
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<u>10</u>	<u>          </u>	<u>          </u>	<u>          </u>	<u>          </u>
<u>11</u>	<u>          </u>	<u>          </u>	<u>          </u>	<u>          </u>
<u>12</u>	<u>          </u>	<u>          </u>	<u>          </u>	<u>          </u>
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<u>16</u>	<u>          </u>	<u>          </u>	<u>          </u>	<u>          </u>
<u>17</u>	<u>          </u>	<u>          </u>	<u>          </u>	<u>          </u>
<u>18</u>	<u>          </u>	<u>          </u>	<u>          </u>	<u>          </u>
<u>19</u>	<u>          </u>	<u>          </u>	<u>          </u>	<u>          </u>
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## REACTOR POLAR CRANE YEARLY PREVENTIVE MAINTENANCE

### 1.0 PURPOSE

To provide guidelines for the conduct of yearly preventive maintenance on the Reactor Polar Cranes. Use of this instruction and attention to detail by crane operators and maintenance personnel will serve to maintain these cranes in their desired high state of operability.

### 2.0 SCOPE

This instruction applies when performing yearly preventive maintenance on:

1L51E0001	Unit 1 Polar Crane	125/10 Ton
2L51E0001	Unit 2 Polar Crane	125/10 Ton

The enclosed requirements shall be satisfied every 12 months when the crane is regularly used (several times a month) and prior to use when the crane has been idle for greater than 12 months.

These items should be done in conjunction with the monthly, quarterly and semiannual preventive maintenance requirements of OMPB:PMI-0015 and 0016.

### 3.0 PRECAUTIONS AND LIMITATIONS

- 3.1 Only qualified crane operators may operate the crane and its associated equipment.
- 3.2 The crane shall be positioned such that the maintenance will minimally interfere with other operational activities. No maintenance may be performed with the trolley resting over critical equipment.

- 3.3 During preventive maintenance, power shall be isolated and the associated breaker safety tagged in accordance with PAP-1104, unless periodic operational checks are required. When power is not isolated, the operator shall remain in the cab to ensure that the controls are not operated without authorization.
- 3.4 Warning or out of order signs should be placed on the crane or on the floor directly below.
- 3.5 After inspections and adjustments, the crane shall not be operated until all guards have been replaced, safety devices reactivated and tools removed.
- 3.6 If any unsafe or abnormal conditions are discovered, the person in charge shall be notified.

#### 4.0 REQUIRED EQUIPMENT

- 4.1 Basic Hand Tools.
- 4.2 Megger.
- 4.3 Outside Micrometer.
- 4.4 Mobil Vactra Oil BB.
- 4.5 Mobil Oil DTE Extra Heavy.
- 4.6 Mobil Lux EP No. 2.

## 5.0 INSTRUCTIONS

### 5.1 Inspection of Motors

#### 5.1.1 All Motors.

5.1.1.1 Ensure the motor mounting bolts are tight.

5.1.1.2 Check the rotor and stator resistance to ground by meggering in accordance with OM9A:EMI-0001, Performing Insulation Resistance Checks. File a copy of each Megger Test Data Sheet (Attachment 1 of EMI-0001) with the completed PM checklist.

### 5.2 Inspection of Electrical Panels and Controls

#### 5.2.1 All Panels and Controls.

5.2.1.1 Check all contacts for wear and pitting.

5.2.1.2 Ensure all contacts operate freely.

5.2.1.3 Check that all the connections are tight.

### 5.3 Inspection of Conductors and Collectors

#### 5.3.1 Bridge.

5.3.1.1 Ensure contact surfaces are clean and polished.

5.3.1.2 Check that all the supports are securely fastened.

5.3.1.3 Check that all the insulators are clean.

5.3.1.4 Ensure continuous contact of collectors to conductors.

5.3.1.5 Check the collector shoes and wheels for excessive wear and for freedom of movement.

5.3.1.6 Check terminal and shunt connections for good contact.

5.3.2 Trolley.

5.3.2.1 Check the condition of the festoons.

5.3.2.2 Ensure cable support chains are of adequate length and are not broken.

5.4 Servicing Gearcases and Gear Reducers

5.4.1 Microdrive Gear Reducers.

NOTE: The oil need not be changed if the crane has been idle for 1 year or greater and the oil appears clean and uncontaminated.

5.4.1.1 Drain old oil. ENSURE NO OIL DROPS TO FLOOR BELOW.

5.4.1.2 Refill to proper level with Mobil DTE Extra Heavy.

5.4.1.3 Wipe up any spillage on gearcase and surrounding walkway.

5.4.1.4 Check that the mounting bolts are tight.

5.4.2 Main Drive Gearcases.

NOTE: The oil need not be changed if the crane has been idle for 1 year or greater and the oil appears clean and uncontaminated.

- 5.4.2.1 Remove gearcase breather and clean in solvent.
- 5.4.2.2 Drain the oil from the gearcase.
- 5.4.2.3 Refill the gearcase with Mobil Vactra Oil BB to the level indicated by the dipstick.
- 5.4.2.4 Reinstall the gearcase breather.
- 5.4.2.5 Check that the mounting bolts are tight.

#### 5.4.3 Pull-a-Hoist Gearcase.

NOTE: The oil need not be changed if the crane has been idle for 1 year or greater and the oil appears clean and uncontaminated.

- 5.4.3.1 Remove gearcase breather and clean in solvent.
- 5.4.3.2 Drain the oil, tilting the gearcase so all the old oil is removed.
- 5.4.3.3 Refill with 1/2 pint Mobil Vactra Oil BB. Ensure the oil is up to the level of the plug.
- 5.4.3.4 Reinstall the breather.

### 5.5 Inspection of Rails

#### 5.5.1 Bridge and Trolley Rails.

- 5.5.1.1 Carefully inspect the rails along their full circumference or span. Be alert for cracked rail clamp welds (trolley), loose clamp bolts (bridge), loose rails and any abnormal wear.

## 5.6 Inspection of Wheels

### 5.6.1 Bridge and Trolley Wheels.

5.6.1.1 Check each wheel for flanging, flat spots and abnormal wear.

5.6.1.2 Measure the tread diameter with a micrometer. Each pair of wheels shall not deviate by more than 0.010".

## 5.7 Structural Inspection

### 5.7.1 Bridge and Trolley.

5.7.1.1 Check girders, webs and supports for cracks, peeling paint or other signs of overstressing.

5.7.1.2 Randomly check mounting bolts for tightness.

5.7.1.3 Check for evidence of corrosion.

5.7.1.4 Check bumpers intact, and that the mounting bolts are tight.

## 5.8 Inspection of Hooks

### 5.8.1 Hook MPT.

5.8.1.1 Conduct Magnetic Particle Testing of the hooks to detect any cracks.

5.8.1.2 File a copy of the completed MPT data sheets with the PM checklist.

## 5.9 Lubrication

### 5.9.1 Lubrication of flexible couplings.

5.9.1.1 Remove one of the grease plugs.

5.9.1.2 Fill with grease until it appears at vent hole.

5.9.1.3 Reinstall the vent plug.

## 6.0 POST-MAINTENANCE REQUIREMENTS

6.1 Ensure all guards and covers are properly reinstalled.

6.2 Ensure all tools and equipment are removed from the crane.

6.3 All switches and breakers shall be returned to normal.

6.4 Warning or out of order signs shall be removed.

## 7.0 ACCEPTANCE CRITERIA

7.1 Requirements of this instruction shall be satisfied and/or exceptions noted.

7.2 Discrepancies must be corrected or scheduled for repair.

## 8.0 REFERENCES

8.1 OSHA Chapter XVII, Part 1910.179, "Overhead and Gantry Cranes."



8.2 ANSI B30.2.0-1976, "Overhead and Gantry Cranes."

8.3 Harnischfeger Service Manual - Polar Crane 125/10 Ton.

9.0 LIST OF ATTACHMENTS

9.1 Attachment 1 - Yearly Preventive Maintenance - Electrical.

9.2 Attachment 2 - Yearly Preventive Maintenance - Mechanical.

405/N/8/ba

Attachment 1

YEARLY PREVENTIVE MAINTENANCE  
Polar Cranes 1L51E0001 & 2L51E0001

Electrical

Motors See Section 5.1		Satis.	Unsat.	Comments
1.	Bridge Drive Motor A*			
2.	Micro-Drive Bridge Motor A*			
3.	Bridge Drive Motor B			
4.	Micro-Drive Bridge Motor B			
5.	Auxiliary Hoist Motor			
6.	Main Hoist Motor			
7.	Main Hoist Micro-Drive Motor			
8.	Trolley Main Drive Motor			
9.	Trolley Micro-Drive Motor			
10.	Zip-Lift Hoist Motor			
11.	Pull-a-Hoist Motor			
Panels & Controls See Section 5.2		Satis.	Unsat.	
12.	Push Button Station			
13.	Main Line Switch Panel			
14.	Utility Circuit Breaker			
15.	Bridge Breaker Rectifier			
16.	Bridge Breaker Equipment			
17.	Motor Breakers			
18.	Line Cont./Aux. Hoist Control			
19.	Bridge Control			
20.	Trolley Cont./Aux. Equip. 1&2			
21.	Main Hoist Control			
22.	Aux. Hoist/Bridge Resistor			
23.	Trolley/Main Hoist Resistor			
Conductors & Collectors See Section 5.3		Satis.	Unsat.	
24.	Bridge			
25.	Trolley			

Completed by \_\_\_\_\_

Date \_\_\_\_\_

Reviewed by \_\_\_\_\_

Date \_\_\_\_\_

\*Bridge Drive A refers to unit above operators cab.

Attachment 2

YEARLY PREVENTIVE MAINTENANCE  
Polar Cranes 1L51E0001 & 2L51E0001

Mechanical

Rails	See Section 5.5	Satis.	Unsat.	Comments
1. Bridge				
2. Trolley				
Wheels	See Section 5.6			
3. Bridge				
4. Trolley				
Structure	See Section 5.7			
5. Bridge				
6. Trolley				
Hooks	See Section 5.8			
7. Main Hook MPT				
8. Aux. Hook MPT				

GEARCASES	SEE SECTION 5.4	LUBRICANT	TYPE	FITTINGS	AMOUNT	DONE
1. Bridge Drive A*		Mobil Vactra Oil BB	Oil	-		
2. Bridge Micro-Drive Reducer A*		Mobil DTE Extra Heavy	Oil	-		
3. Bridge Drive B		Mobil Vactra Oil BB	Oil	-		
4. Bridge Micro-Drive Reducer B		Mobil DTE Extra Heavy	Oil	-		
5. Trolley Drive		Mobil Vactra Oil BB	Oil	-		
6. Trolley Micro-Drive Reducer		Mobil Vactra Oil BB	Oil	-		
7. Aux. Hoist		Mobil Vactra Oil BB	Oil	-		
8. Main Hoist		Mobil Vactra Oil BB	Oil	-		
9. Main Hoist Micro-Drive		Mobil Vactra Oil BB	Oil	-		
10. Pull-a-Hoist		Mobil Vactra Oil BB	Oil	-	½ pint	

OTHER	SEE SECTION 5.9					
11. Bridge Drive A Coupling (2)	Mobilux EP-2	Grs.	1	-		
12. Bridge Drive B Coupling (2)	Mobilux EP-2	Grs.	1	-		
13. Trolley Drive Coupling (4)	Mobilux EP-2	Grs.	1	-		
14. Aux. Hoist Coupling (1)	Mobilux EP-2	Grs.	1	-		
15. Main Hoist Coupling (2)	Mobilux EP-2	Grs.	1	-		

Completed by \_\_\_\_\_ Date \_\_\_\_\_  
Reviewed by \_\_\_\_\_ Date \_\_\_\_\_

\*Bridge Drive A refers to unit above operators cab.

## GUIDELINE

### 7. Crane Design (Section 2.3.7)

## RECOMMENDATION

Information pertaining to the crane model maximum load capacity, manufacturer name, and purchase data should be provided for review.

## RESPONSE

The following information (crane model, load capacity, manufacturer name and purchase data) is provided for review.

1. Each crane shall be designed to meet the requirements of the American National Standards Code for Overhead and Gantry Cranes -- ANSI B30.2.0-1976, the Crane Manufacturers Association of American Specification No. 70 (CMAA No. 70) for Class A1 indoor service, and Part 1910.179 of the Department of Labor Occupational Safety and Health Standards (OSHA).
2. Motors and Controls shall be manufactured in accordance with National Electrical Manufacturers Association NEMA MG1-1972-18.501 through 18.520 (except for the Service Water Pumphouse Crane: which shall be as interpreted by Harnischfeger's Engineering Department -- SP-332), NEMA ICS-1970 as follows:

SP-318 -- Part ICS 3-442 through 3-444

SP-332 -- Shall be met in its intent but not necessarily in every detail.

SP-502 -- Part ICS 3-442

Also the National Electric Code (NEC) 1971 Article 610 for SP-318 and 502. For SP-332 follow P&H Bulletin 580.

3. Gears shall be in accordance with the American Gear Manufacturers Association (AGMA) as follows:

SP-318 -- as modified by Section 4.5.2 of CMAA No. 70

SP-332 -- AGMA standards

SP-502 -- AGMA Handbook 390.03

## CRANE DATA

<u>Crane</u>	<u>Manufacturer</u>	<u>Capacity</u>	<u>Type</u>	<u>Serial No.</u>
Turbine Bldg(4)	Whiting Corp.	215/25 T	OVHD	11100, 01, 02, 03
Circ Wtr PH(2)	Whiting Corp.	80/10 T	OVHD	11104, 05
Service Wtr(1)	Harnischfeger	15 Ton	OVHD	CN 26300
Polar Crane(2)	Harnischfeger	125/10 T	OVHD	CN 25588, 89
Emg Ser Wtr Ph	Harnischfeger	15 Ton	OVHD	CN 25591
Fuel Hdlg Area	Harnischfeger	125/20 T	OVHD	CN 25590