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SHIELDS L. DALTROFF
VICE PRESIDENT
ELECTRIC PRODUCTION

October 25, 1982

Docket Nos. 50-277
50-278

Mr. John F. Stolz, Chief
Operating Reactors Branch #4
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Stolz:

The enclosed report is being submitted to satisfy a request for information relative to heavy loads analysis for Peach Bottom Atomic Power Station.

On September 13, 1982, a conference call was conducted between representatives of Philadelphia Electric Company, Franklin Research Center and the NRC concerning the draft Technical Evaluation Report (TER) on the control of heavy loads which you forwarded on April 5, 1982. The purpose of this call was to clarify open items contained within the TER. PECo. has been requested to provide additional information for review by the evaluators.

It is hoped that this additional information will be useful in closing out open items in the Technical Evaluation Review. If there are any further questions, please do not hesitate to contact us.

Very truly yours,

Attachment

cc: I. H. Sargeant
Westec Services, Inc.
100 N. 20th Street
Philadelphia, PA 19103

Site Inspector

A033

PHILADELPHIA ELECTRIC COMPANY
PEACH BOTTOM ATOMIC POWER STATION
UNITS 2 AND 3

Response to Technical Evaluation Report
on Control of Heavy Loads

In order to respond to the Draft TER, the Conclusion and Recommendation sections of Chapter 2, Evaluation and Recommendations, which require further information are restated below followed by our responses.

Section 2.1.2 Safeload Paths (Guideline, NUREG-0612, Section 5.1.1(1))

c. Conclusions and Recommendations

PECo. partially complies with Guideline 1 for Peach Bottom Units 2 and 3. In order to meet the criteria established by this guideline, the Licensee should perform the following:

1. Verify that safe load paths are detailed in load handling procedures.

2. Verify that safe load paths are adequately marked to meet the intent of NUREG-0612, Section 5.1.1(1).

3. Verify that deviations from established load paths require written alternatives that are approved by the plant safety review committee.

Response

Please find the attached draft procedures which provide information regarding the manner in which we address these concerns. The Administrative ("A") procedure must be reviewed and approved by the plant operations review committee, thus their approval gives authority to the

individual approving load path changes hence item 3 is addressed. As discussed during the conference call, safe load paths are not specifically marked. The intent of NUREG-0612 is met procedurally through the requirement for review of safe load path drawings and a review of the lift prior to the operation taking place.

2.1.3 Load Handling Procedures (Guideline 2, NUREG-0612, Section 5.1.1(3)

c. Conclusions and Recommendations

The Licensee has provided insufficient information to allow a determination concerning compliance with Guideline 2. It appears that the Licensee intends to prepare individual load handling procedures that may satisfy this guideline. It is recommended that the Licensee verify that load handling procedures are in place or will be prepared for all loads that could be dropped on or in the vicinity of irradiated fuel, equipment required for safe shutdown, or decay heat removal equipment, regardless of the position of the load on the Q-list. Table 3-1.1 of NUREG-0612 provides a generic list of such loads. This list could be evaluated by the Licensee to reflect plant-specific arrangements and adapted by classifying loads from the NUREG table as Category A or B under current procedures, or the Licensee should provide suitable alternatives. Further, the Licensee should verify that current and proposed load handling procedures will contain the information identified in Guideline 2.

Response

A draft "A" procedure referenced in response to question 2.1.2, above, along with the revised Maintenance Division procedure, MA-7, attached herein, provides the information necessary for the reviewers to complete evaluation of PECo.'s position on this subject.

Extensive procedures exist for load handling operations on the refueling floor. These procedures reference the previously submitted procedure M17.2 - "Reactor Building Crane Operation" and require that the crane operator review M17.2 prior to the commencement of work.

During the conference call, there appeared to be a degree of confusion over the terms "Rigger" and "Crane Operator". At PECo., heavy loads are handled by a team consisting of at least two men qualified as riggers. One of these individuals operates the crane (crane operator) whereas the other directs handling the load (rigger) and is responsible for signaling and directing the crane operator.

2.1.4 Special Lifting Devices (Guideline 4, NUREG-0612, Section 5.1(4))

c. Conclusions and Recommendations

Compliance with Guideline 4 of NUREG-0612 at Peach Bottom Units 2 and 3 cannot be determined from the information provided by the Licensee. Although the Licensee's analysis of special lifting devices at Peach Bottom Units 2 and 3 may indicate that the intent of NUREG-0612 is met, the Licensee should provide information relative to Sections 3, 4 and 5 of ANSI N14.6-1978.

In the case of the shipping cask yokes and the RPV-drywell head strongback, the Licensee should provide the criteria by which it was determined that the devices are "single-failure proof".

Response

It may not be possible in the case of a limited number of existing pieces of equipment to completely meet the requirements of N14.6. Specific difficulties exist with the requirements for documentation and material testing. However, the analyses performed have assumed worst case with regard to materials, thus providing highly conservative results. Further discussions concerning N14.6 will be included in our final report presently under preparation by Bechtel. The enclosed documents, marked Attachment 3, 4, 5 and 6, address reviews of special lifting devices, which have determined, amongst other things, that a few pieces of equipment do not fully meet the guidelines of NUREG-0612. The modification process for these pieces of equipment has been initiated to bring the equipment into compliance with applicable sections of the standards.

As discussed during the conference call, shipping cask yokes will be addressed on a case by case basis using ANSI N 14.6-1978 as a guideline.

2.1.8 Crane Design (Guideline 7, NUREG-0612, Section 5.1.1(7)

c. Conclusions and Recommendations

Peach Bottom Units 2 and 3 comply with NUREG-0612, Section 5.1.1, Guideline 7, to a substantial degree, on the basis of compliance with EOCI-61 criteria. However, the Licensee should provide information to verify that the following CMAA-70 requirements have been satisfied for cranes subject to this review or provide suitable justification for concluding that the requirements of CMAA-70 have been satisfied by equivalent means:

Response

Attachment 3 addresses this item in detail.

2.2.3 Special Review for Heavy Loads Over the Core (Interim Measure 6, NUREG-0612, Section 5.3(1))

b. Evaluation, Conclusions, and Recommendations

Compliance with Interim Protection Measure 6 of NUREG-0612 cannot be determined from the information provided by the Licensee. The Licensee should conduct a special review of heavy load handling over the core and provide sufficient documentation to verify that the intent of Interim Protection Measure 6 of NUREG-0612 has been satisfied.

Response

The recommended review was completed prior to May 15, 1981, as required by the December 22, 1980 letter from D. G. Eisenhut.

Response to Draft Technical Evaluation Report on Control of Heavy Loads

List of Attachments

1. A--- "Procedure for Control of Heavy Loads"

2. MA-7 "Procedure for Handling of Q-Listed Items"

3. Response to Items 2.1.5, 2.1.6 and 2.1.8 prepared for Philadelphia Electric by Bechtel Power Corporation.

4. Report No. 82-32 "Structural Analysis of Peach Bottom 2/3 Reactor Pressure Vessel Head Drop, Shroud Head Assembly Drop, and Steam Dryer Assembly Drop Conditions"

5. Report NSE-50-0582 "Lifting Devices and Lifting Points Stess Analysis for Reactor Pressure Vessel Head Strongback, Steam Dryer/Seperator Sling and Service Platform to Comply with NUREG-0612 for Peach Bottom Units 2 and 3.

6. Report NSEO-72-0782 "Lifting Devices and Lifting Points Stress Analysis for Fuel Pool Gate Lifting Points, Hydraulic Tensioner Lifting Device and Lifting Points, and Reactor Pressure Vessel Insulation Removal Device and Reactor Pressure Vessel Insulation Lifting Points to Comply with NUREG-0612 for Peach Bottom Units 2 and 3.

PBAPS

A- PROCEDURE FOR CONTROL OF HEAVY LOADS

DRAFT

1.0 Purpose

1.1 This procedure prescribes the measures to be used to control the handling of heavy loads in the area of the Reactor Vessel, Spent Fuel Pool, and in other areas where accidental load drops could damage safe shutdown systems.

2.0 Scope

This procedure shall apply to all heavy loads that are handled by the following load handling systems:

- Reactor Building Crane (1/Unit)
- Turbine Building Crane (2)
- Diesel Generator Cranes (4)
- Circulating Water Pump Structure Crane (1)
- Recirculation Pump Motor-Generator Hoist (2/Unit)
- Personnel Air Lock Removal Hoist (1/Unit)
- 15 - Ton Yard Crane (1)
- Emergency Cooling Tower Jib Crane and Hoist (1)
- CRD Transport Jib Crane (1/Unit)
- CRD Maintenance Jib Crane (1/Unit)
- CRD Removal Hoist (1/Unit)
- CRD Removal Platform Winch Hoist (1/Unit)
- Precoat Material Handling Hoist (Unit 2 only)
- Torus Equipment Removal Hoist (1/Unit)
- Equipment Access Air Lock Removal Hoist (1/Unit)

- Portable load handling equipment used in lieu of load handling systems listed above.

3.0 References

3.1 NUREG 0612, "Control of Heavy Loads at Nuclear Power Plants"

3.2 NUREG 0554 - 1979, "Single - Failure - Proof Cranes for Nuclear Power Plants"

3.3 ANSI B30.2 - 1976, "Overhead and Gantry Cranes"

3.4 ANSI N14.6 - 1978, "Standard for Special Lifting Divices for Shipping Containers Weighing 10,000 Pounds or More for Nuclear Materials"

3.5 ANSI B30.9 - 1971, "Slings for Special Lifting Devices for Shipping Containers Weighing 10,000 Pounds or More for Nuclear Materials.

3.6 ANSI N45.2.2 - 1972, "QA Requirements for Packaging, Receiving and Storage"

3.7 10CFR50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants"

3.8 PBAPS QA Plan, Volume I - "Design and Construction Phase"

3.9 PBAPS QA Plan, Volume III - "Operations Phase"

3.10 MA-7, "Procedure for Handling of Q-Listed Items"

3.11 M-17.2, "Reactor Building Crane Operation"

3.12 CD-13.1, "Procedure for Handling of Q-Listed Items"

3.13 SWI-16, "Frequent and Periodic Inspection of Overhead Gantry Cranes"

3.14 PBAPS, "Safe Load Path Drawings"

4.0 Definitions

4.1 Heavy Load - A load that is heavier than the weight of a fuel assembly and its associated handling tool (805 lbs.).

4.2 Handling System - All load bearing components used to lift the load, including the crane or hoist, the lifting device and interfacing load lift points.

4.3 Safe Load Travel Path

4.3.1 A path designated for transportation of a heavy load that will minimize adverse effects if the load is dropped.

4.3.2 Any area that is not classified an Exclusion Zone.

4.4 Key Interlock System - A system of electrical interlocks which will prevent the movement of a handling system beyond predetermined limits.

4.5 Safe Shutdown Systems - Safety-related equipment and associated subsystems that would be required to bring the plant to cold shutdown conditions and maintain in safe shutdown condition.

4.6 Cognizant Supervisor - The Maintenance Division Rigging Supervisor, or his designate, and the Construction Division Rigging Foreman, or his designate.

4.7 Exclusion Zone - Area of the Reactor Vessel or Spent Fuel Pool, or other areas where an accidental drop of the heavy load could damage irradiated fuel or a Safe Shutdown System without a redundant system.

4.8 Single Failure-Proof List - Redundant rigging used to insure a single component failure will not result in an uncontrolled lowering of the heavy load.

4.9 Item Handling Report - IHR (Exhibit C&D). Report that is used for the planning of the lift. Report shall be prepared by the Cognizant Supervisor prior to the start of any heavy load handling activity. IHR can be updated without procedural change.

4.10 Special Lifting Devices - A lifting device that is designed specifically for handling a certain load or loads, such as the Reactor Head Strongback.

4.11 Special Handling Instructions - Instruction for items that require special handling because of weight, size, susceptibility to shock damage, etc.. Instructions should include weights, sling locations, balance points, and other pertinent features necessary for safe handling.

5.0 Responsibility

5.1 Maintenance Division

5.1.1 The Maintenance Engineer, or his designate, is responsible for reviewing the Item Handling Reports (IHR) and any associated Special Handling Instructions used by Maintenance or Vendors working under Maintenance Supervision.

5.1.2 The Maintenance Division Cognizant Supervisor is responsible for:

- Determining when this procedure shall be utilized.
- Preparing the IHR and any associated Special Heavy Loads Handling Instructions.
- Reviewing the Safe Load Travel Path and documenting on the IHR.

5.2 Construction Division

5.2.1 The Construction Division Engineer is responsible for reviewing the Item Handling Reports (IHR) and any associated Special Handling Instructions used by Construction Division or Vendors working under Construction Supervision.

5.2.2 The Construction Division Cognizant Supervisor is responsible for:

- Determining when this procedure shall be utilized.
- Preparing the Item Handling Report (IHR) and any associated Special Handling Instructions.
- Reviewing the Safe Load Travel Path and documenting on the IHR.

5.2.3 The Construction Division QC Inspector is responsible for witnessing the handling operation and verifying that it was performed as specified in the Item Handling Report.

6.0 Prerequisite - None

7.0 Procedure

7.1 This procedure shall be utilized to control the handling of all "heavy loads" by the handling systems defined in Section 2.0 of this procedure.

7.2 Planning

7.2.1 The Cognizant Supervisor shall make a preliminary review of the proposed handling operation and determine whether the conditions of Section 1.0 and 2.0 of this procedure apply. If applicable, the Cognizant Supervisor shall:

7.2.1.1 Review Safe Load Path drawings and determine if proposed handling can be performed while avoiding Exclusion Zones. The Safe Load Path should be delineated in the IHR.

7.2.1.2 If a Safe Load Path cannot be used, one of the following methods shall be implemented:

- Single Failure-Proof Lift
- Use of rigging which has a minimum design safety factor of ten (10).

7.2.1.3 Verify that the Handling System has been inspected, tested, and maintained, in accordance with ANSI B30.2 - 1976 (Exhibit A).

7.2.1.4 Verify that the Handling Systems Key Interlocks are operable and are not in the Bypass Mode.

7.3 Operation

7.3.1 All handling operations must be made at the lowest possible height.

7.3.2 The following Special Lifting Devices shall comply with the guidelines of ANSI N14.6 - 1978, Exhibit B.

- Reactor Pressure Vessel - Drywell Head Strongback
- Fuel Cask Yoke
- Hydraulic Tensioner Strongback
- Dryer Separator Sling with Hook Box
- Service Platform Sling

7.3.3 All lifting points shall be inspected prior to making a lift.

7.3.4 Safe Load Paths will be followed, if practicable. Deviations from Safe Load Path shall be analyzed based on plant safety. If the Safe Load Path must be changed, the Cognizant Supervisor shall be notified and he will review the alternate load path and specify alternate rigging requirements, if necessary.

7.3.5 Cranes and hoists that can be operated in exclusion areas will be prevented from traversing the exclusion area by the use of electrical interlocks. The interlocks shall not be bypassed except by written authorization of the Shift Supervision. This bypass authorization shall be documented on the IHR.

7.3.6 If electrical interlocks are inoperable, documentation shall be noted in the IHR with precautions to avoid this exclusion area during the lift, unless bypass authorization was obtained per Section 7.3.4 of this procedure.

8.0 Documentation

8.1 The "Item Handling Report" (IHR) shall document that the item is handled in accordance with this procedure. The Construction Divsion shall use the IHR in Exhibit C; the Maintenance Division shall use the IHR in Exhibit D.

8.2 The IHR shall be handled according to appropriate implementing procedures. (MA-7 or CD 13.1)

9.0 Exhibits

- Exhibit A - ANSI B30.2 - 1976 excerpts
- Exhibit B - ANSI N14.6 - 1978 excerpts
- Exhibit C - Sample of Construction Division Item Handling Report
- Exhibit D - Sample of Maintenance Division Item Handling Report

Exhibit A

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

The following is an excerpt of the salient items of ANSI B30.2.0 - 1976. It is intended to be used as a guide in this procedure. For complete information, this standard should be consulted.

Inspection

Initial - Crane shall be inspected and load tested prior to use after modification or after extensive repair.

Frequent - Inspection shall be performed and documented by the operator prior to handling heavy loads.

Periodic - A documented inspection shall be performed yearly by qualified personnel to ensure that handling equipment conforms to various codes and standards.

Any hazardous conditions disclosed by the inspection shall be corrected prior to normal operation of the crane.

Maintenance

A Preventive Maintenance Program shall be maintained and records shall be readily available.

Maintenance adjustment and repairs shall be in accordance with Procedure Section 2.2.3.2 (ANSI B30.2 - 1976).

Qualifications for Operators

- Operators shall be required to pass a written or oral examination and a practical operating examination.
- Possess vision of at least 20/30 Snellen in one eye and 20/50 in the other eye with or without corrective lenses.
- Able to distinguish colors.
- Have adequate hearing.
- Possess normal depth of perception, field of vision, reaction time, manual dexterity, coordination and no tendencies of dizziness or similar undesirable characteristics.

Handling the Load

Crane shall not be loaded beyond its rated load except for test purposes or for special heavy loads, as provided for in Section 2-3.2.1.1. The Hoist Limit Device shall be functionaly tested at the beginning of each shift that the handling system will be used.

Exhibit B

ANSI N14.6 - 1978, "Standard for Special Lifting Devices for Shipping Containers Weighing 10,000 Pounds or More for Nuclear Materials.

The following is an excerpt of the salient items of ANSI N14.6 - 1978. It is intended to be used as a guide in this procedure. For complete information, this standard should be consulted.

9.0.1 Responsibilities

- Verify by scheduled periodic tests that the Special Lifting Device continues to be capable of reliable and safe performance.
- A procedure shall be used for operation and maintenance of Special Lifting Devices.
- Each Special Lifting Device will be permantly marked with its load limit.
- Each Special Lifting Divice will be identified and an operation and maintenance history will be maintained.

- Special Lifting Devices shall be visually inspected by operating personnel for indications of damage or deformation prior to use.

- Remove from service any Special Lifting Device or component for which the period of test validity has expired or which has experienced an incident causing doubt as to its continous safe operation.

- Verify that any user of Special Lifting Devices conforms to the above requirements.

EXHIBIT C

IHR NO. _____ 4/9/80

PEACH BOTTOM ATOMIC POWER PLANT
CONSTRUCTION DIVISION

ITEM HANDLING REPORT

SECTION I

Unit No. _____ Mod No. _____

Item: _____ Approx. Wt. _____

Sketch of Proposed Handling Arrangement:

Special Handling Procedures: Required? _____ Yes Attached? _____ Yes

_____ No _____ No

Additional Precautions:

NOTE: Only certified rigging tools and equipment may be used.

Prepared by _____ Date _____
Rigger Foreman

Approved by _____ Date _____
QC Inspector

SECTION II

Work completed per above procedure with: _____ No exceptions

_____ The exceptions listed below

Prepared by _____ Date _____
Rigger Foreman

Approved by Date

Exhibit D

PEACH BOTTOM ATOMIC POWER STATION
MAINTENANCE DIVISION
ITEM HANDLING REPORT

EXIBIT MA-7.2
Rev. 1
IHR No._____

Section 1

Unit No._____ MRF No._____

Item:_____ Approximate Wt._____

Sketch of Proposed Handling Arrangements:

Special Handling Procedures: _____Yes
_____No

Additional Precautions: _____

_____

_____

_____

_____

_____

_____

Rigging Equipment Used

Description	Serial No.	Inspection Satistactory Name/Date
_____	_____	_____/_____
_____	_____	_____/_____
_____	_____	_____/_____
_____	_____	_____/_____
_____	_____	_____/_____
_____	_____	_____/_____
_____	_____	_____/_____
_____	_____	_____/_____
_____	_____	_____/_____

Approved by: _____
Rigging Supervisor/Date

SECTION II

Work completed per above procedure with:_____ No exceptions.

The exceptions listed below:

Approved by: _____
Rigging Supervisor/Date

Reviewed by: _____
Maintenance Engr./Date

Attachment 2

4/30/82

PROCEDURE FOR HANDLING OF Q-LISTED ITEMS

PHILADELPHIA ELECTRIC SERVICE AND ELECTRIC COMPANY MAINTENANCE DIVISION	Procedure for Handling of Q-Listed Items	NO. MA-7
		REV. 2 DATE 3/3/82
	APPR. [signature] APPR.	PAGE 1 OF 12

MD F-1 REV.0
3/78

1.0 PURPOSE

1.1 The purpose of this procedure is to ensure that the quality of Q-Listed items at nuclear power plants is not impaired by handling operations performed by the Maintenance Division.

2.0 SCOPE

2.1 This procedure applies to the handling of all Q-Listed items from the point of receipt by the Maintenance Division, transportation to the work area, and installation.

This procedure shall also be utilized to control the operation of Maintenance Division personnel in handling non-Q-listed items that weigh over 805 lbs. when said handling operations could jeopardize a Q-Listed system.

2.2 This procedure does not apply to the unloading, transporting, and storing of small items which can be handled manually. Such items may, for convenience, be placed on pallets and handled by fork lift turck or be transported to the work area by truck and shall remain exempt from this procedure.

3.0 REFERENCES

3.1 ANSI N45.2.2 - 1972 - Packaging, Shipping, Receiving, Storage, and Shipping.

3.2 10 CFR 50, Appendix B, Criterion XIII - Handling, Storage, and Shipping.

3.3 Peach Bottom Quality Assurance Plan, Volume I, Section 13, Handling, Storage, and Shipping.

3.4 Regulatory Guide No. 1.38 (3/16/73) - Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage, and Handling of Items for Water-Cooled Nuclear Power Plants.

3.5 MA-20 - Procedure for Certification of Inspectors of Handling Equipment and Rigging.

3.6 MA-12 - General Requirements of QC Inspectors.

3.7 A-19 - Administrative Procedure for Preparation and Distribution of Maintenance (M) Procedures.

3.8 Peach Bottom Procedure, M-17.1, "Frequent and Periodic Inspection of Overhead and Gantry Cranes."

3.9 ANSI B30.2.0 1976 - Safety Standard for Overhead and Gantry Crane.

3.10 USNRC-NUREG-0612 - Control of Heavy Loads at Nuclear Power Plants.

B30.9-1976

4.0 RESPONSIBILITIES

4.1 Maintenance Division Engineering Section, Engineer-In-Charge, or designated alternate, is hereafter referred to as Maintenance Engineer.

4.1.1 The Maintenance Engineer is responsible for reviewing the Item Handling Reports and any associated Special Handling Instructions.

4.2 The Maintenance Division Rigging Supervisor, or designated alternate is responsible for:

4.2.1 Insuring the preparation of the Item Handling Report and any associated Special Handling Instructions.

4.2.2 Installing and testing handling equipment and rigging, and directing the subsequent handling operations.

4.2.3 Establishing and controlling access to the Maintenance Division's certified rigging storage area.

4.2.4 Requesting the use of various rigging/lifting equipment from Transportation Division or PBAPS Shift Supervision as applicable.

4.2.5 Establishing and monitoring an inspection program for handling equipment and rigging.

4.2.6 Creating and maintaining files containing the Item Handling Reports and Item Handling Report Log.

4.2.7 Notifying the Maintenance Engineering Section when unsure of the category of the item.

4.3 The Maintenance Division Inspector of Handling Equipment and Rigging is a responsible 1st Class Maintenance Division Craftsman or qualified alternate that has been selected and qualified in accordance with MA-12, "General Requirements for QC Inspectors," or MA-20, "Procedure for Certification of Inspectors of Handling Equipment and Rigging." The inspector is responsible for performing periodic inspections to verify that certified rigging and equipment is in good condition, and for performing frequent inspection of handling equipment during use as required.

4.4 The Transportation Division is responsible for providing (and periodically inspecting) certified mobile handling equipment, as requested by the Maintenance Division. Transportation is further responsible for providing qualified operators and evidence that both the equipment and operators are properly certified to ANSI B.30.2 - 1976.

4.5 PBAPS Shift Supervision is responsible for approving and scheduling the use of permanent plant handling equipment by Maintenance personnel.

5.0 PREREQUISITES

5.1 None

6.0 PROCEDURE

6.1 General Requirements

6.1.1 This procedure shall be utilized to control the operations of Maintenance Division personnel in handling Q-listed items from the point of receipt to installation in the plant. The point of receipt is the location at which the Maintenance Division assumes responsibility for handling the item.

6.1.2 This procedure shall also be utilized to control the operations of Maintenance Division personnel in handling non-Q-listed items over 805 lbs. when said handling operations could jeopardize a Q-listed system.

6.2 Classification of Items Handled

6.2.1 The quality control requirements for handling activities covered by this procedure are based on dividing the items into three (3) categories according to their important physical characteristics. The manufacturer's minimum requirements shall be considered when classifying the items. An item shall not be reclassified to a lower status without approval by the Maintenance Division Engineering Section, which assigned the original category.

6.2.2 Category A - Items classified in Category A are those that require specially selected equipment and detailed procedures for handling operations because of large size and weight. Examples of items that may be assigned to this category are:

(a) Reactor vessels
(b) Major components of reactor vessel internals
(c) Spent fuel casks

6.2.3 Category B - Items classified in Category B are those that may be handled with conventional handling equipment, but require detailed procedures because of weight, size, susceptibility to shock damage, high nil-ductility transition temperature, or any similar condition. Examples of items that may be assigned to this category are:

(a) Recirc pump, coolant pumps and their internals.
(b) Safety related instrument cabinets and control boards.
(c) Control rod drive mechanisms.
(d) Fuel handling equipment.
(e) Purification equipment.
(f) Fuel.
(g) Care components (small).
(h) Reactor vessel head.

6.2.4 Category C - Items classified in Category C are those that may be handled with conventional equipment using standard rigging practice. Included in this category are both construction and permanent plant materials not included in Categories A and B.

6.3 Planning

6.3.1 The Rigging Supervisor or designated alternate shall make a preliminary review of the handling operation to determine whether the conditions of paragraph 6.1 are present and accordingly, whether this procedure shall be invoked. If invoked, the Rigging Supervisor shall:

6.3.1.1 Verify that all handling equipment and rigging is certified and that proper documentation is available.

6.3.1.2 Verify that all crane operators are qualified to ANSI B30.2.0 1976 and that such qualification is currently valid.

6.3.1.3 Verify that proper inspection checklist has been completed for the handling equipment or rigging that is to be used for the handling operation.

6.3.1.4 Review "safe load path" drawings, when applicable to determine when special precautions are required or areas which should be avoided is possible.

6.3.2.5 If a "safe load path" drawing does not exist for any area encountered during the handling operation, the area should be surveyed to identify any system or equipment required for safe shutdown or decay heat removal which could be damaged by a "load drop." (The Administration Building, screen structure, off-gas recombiner building, off-gas filter building, and off-gas stack are areas which do not contain systems or equipment required for safe shutdown or decay heat removal.)

6.3.2 For all lifting categories, when lifting a heavy load which could affect a Q-listed component, one of the following should exist:

6.3.2.1 The rigging, lifting equipment, and crane are single failure proof or;

6.3.2.2 The effects of the load drop have been analyzed to show that damage to the Q-listed equipment would not preclude its operation.

Redundant systems are available

6.3.3 If the requirements of 6.3.2 cannot be satisfied, then the handling system must be upgraded by either of the following methods:

6.3.3.1 Provide redundant rigging such that a single component failure will not result in uncontrolled lowering of the load, or;

6.3.3.2 Use rigging which has a design safety factor of 10. This can be accomplished by using rigging rated for twice the load to be lifted.

6.3.4 If the Rigging Supervisor feels that a detailed procedure may be required or is unsure of the item classification, or questions the applicability of paragraph 6.1, he will contact the Maintenance Engineering Section representative for clarification.

6.4 Procedures and Instructions

6.4.1 When the Rigging Supervisor or Maintenance Engineer has determined that this procedure shall be invoked, an IHR (Item Handling Report) (Exhibit MA-7.2) shall be prepared under the direction of the Rigging Supervisor prior to the start of any handling activity.

6.4.2 The Rigging Supervisor, or the designated alternate shall complete Section I of the Item Handling Report as follows:

6.4.2.1 Category A handling activities are not covered by this procedure. Separate detailed procedures for each Category A item shall be prepared and shall include the following:

(a) Responsibilities of organizations and key individuals.

(b) Identification of equipment to be used.

(c) Applicable manufacturer's instructions and conditions of operation for both the handling equipment and the item being handled.

(d) Work instructions for single tasks that must be accomplished in a specified sequence.

(e) Acceptance criteria for satisfactory completion of a task.

(f) Inspection check points which require documented acceptance.

(g) Maximum allowable safe loads and specific measures to ensure that these loads are not exceeded.

(h) Any restoration which may be required to return modified permanent plant equipment to its original condition.

(i) Soil tests, as applicable.

6.4.2.2 For Category B handling activities, he shall request a detailed procedure, list the approximate weight of the item, and shall attach a sketch of the proposed rigging arrangement, showing the size of the rigging tools to be used, specific lift points, the center of gravity of the item (if available), and the size, length, and the approximate angle of all chokers, slings, and chain hoists; also hoist capacity, maximum hoist line speeds, and other pertinent features to be considered as necessary for safe handling. Separate detailed procedures for each item would include the following:

(a) Identification of equipment to be used.

(b) Applicable manufacturer's instructions and conditions of operations for both handling equipment and the item being handled.

(c) Work instructions for single tasks that must be accomplished in a specific sequence.

6.4.2.3 For Category C handling activities he shall: List the approximate weight of the item, provide a sketch/description of the proposed handling.

6.4.2.4 The Rigging Supervisor shall approve Section I of the IHR, assign the IHR a number, make appropriate entries on the IHR log and transmit the IHR number to the 1st Class Rigger for use during the handling operation.

6.4.3 The Maintenance Engineer shall review, on a periodic basis, the Item Handling Report and detailed handling instructions to verify that the proposed rigging arrangement and handling instructions were satisfactory and comply with good engineering practice as described in various procedures, specifications, and manufacturer's recommendations.

6.5 Handling

6.5.1 The 1st Class Rigger or qualified alternate shall install all necessary handling equipment and rigging in accordance with the details of the Item Handling Report. Only certified rigging tools and equipment (see 6.6) shall be used.

6.5.2 In some cases, the detailed Handling Instructions may require that a test load of the rigging arrangement be performed prior to the actual handling of the item. The 1st Class Rigger or qualified alternate makes the necessary arrangements and shall simulate as closely as possible the loading and field conditions of the actual lift.

6.5.3 The Rigging Supervisor or the designated alternate shall monitor the actual handling operation to ensure that it is performed in accordance with the approved Item Handling Report and any associated detailed Handling Instructions.

6.5.4 At the completion of the handling operation, the Rigging Supervisor or the designated alternate shall sign Section II of the Item Handling Report to verify that the handling operation was performed in accordance with the approved procedures and instructions. He shall submit the IHR to the Maintenance Engineer, who will sign Section II to verify that he reviewed the handling operation. The Rigging Supervisor shall attach a copy of the Item Handling Report to the completed MRF and place the original in the "Item Handling Reports" file and shall complete the item entry in the IHR Log, Exhibit MA-7.3.

6.6 Certification, Inspection, Maintenance, and Control of Rigging Tools and Equipment

6.6.1 Equipment and rigging used for handling of items covered by this procedure can be divided into four general types. The following paragraphs define the four types of handling equipment and rigging, list examples and define the various responsibilities for certification, inspection, maintenance, and control of each.

6.6.2 Standard Manufactured Components - including rigging which is kept available from several sources as catalog items, generally kept in stock, and normally used as components of a handling system. Examples: Chains, hooks, shackles, links, fiber ropes, casters, rollers, showes, sheels, wire rope cribbing, eyebolts, and chain blocks.

6.6.2.1 Certification for each piece of rigging, a manufacturer's "Certification of Test: shall be available in the Maintenance Division local rigging files. The "Certificate of Test" shall verify that the piece is in accordance with applicable industry standards, and shall be traceable to the rigging by means of a unique, permanent identification number on the rigging or adequate description.

6.6.2.2 Control - The Maintenance Division will maintain a list of certified rigging. All certified rigging will contain a unique I.D. number where possible.

is there a procedure for this

6.6.2.3 Inspection - The Maintenance Division shall be responsible for inspecting its rigging. A visual examination of all rigging shall be made prior to any handling operation to ensure that the installed rigging is in good condition. The rigging equipment utilized will be described and listed on the Item Handling Report or in the detailed special procedure.

6.6.3 Heavy Equipment - (owned or rented) supplied by Transportation Division, for use by the Maintenance Division, shall be certified and controlled by Transportation Division. (Examples - gantry, mobile, and jib cranes, forklift trucks, tractors & trailors.)

6.6.3.1 Certification - Transportation Division is responsible for obtaining and filing the necessary certifications for all equipment which is furnished to the Maintenance Division for handling under this procedure. Evidence of the certification shall be sent with the equipment to provide a means of assuring that the equipment is properly certified for the intended use. A copy of the certificate will be attached to the MRF. When equipment is provided with an operator or driver, Transportation Division shall provide evidence that he is qualified to operate the equipment.

6.6.3.2 Control - The Rigging Supervisor shall notify Transportation Division of the equipment needed, the accompanying certifications required, the date it will be required, and shall state that the equipment will be used to handle Q-listed items. Transportation Division will arrange to furnish the requested equipment with evidence of proper certification on the date specified.

6.6.3.3 Inspections - A Maintenance Division Inspector of Handling Equipment and Rigging shall perform inspections of the equipment prior to its use. These inspections shall be documented on the "Frequent Inspection Checklist," as required by applicable standard Exhibit MA-7.5 or equivalent document. Periodic inspections required by applicable ANSI standards shall be performed by Transportation Division.

6.6.4 Permanent Plant Handling Equipment - includes permanently installed equipment which is intended primarily for maintenance and operation, Examples: Fuel handling equipment, overhead cranes for reactor and turbine buildings, jib cranes.

6.6.4.1 Certification - PBAPS, is responsible for preparing the necessary certifications for all permanent plant handling equipment.

6.6.4.2 Control - The Rigging Supervisor shall contact PBAPS shift supervision and request the use of specific permanent plant handling equipment, noting the date and duration the equipment will be required and briefly describing the handling activity. PBAPS shift supervisicn shall grant permission for Maintenance Division to use the request equipment provided it does not interfere with other previously scheduled plant activities.

6.6.4.3 Inspections - A Maintenance Division Rigging Equipment Inspector or qualified alternate shall make a visual inspection of the permanent plant handling equipment prior to its use and shall document the inspection by signing the "Pre-Operational Inspection Form," Exhibit MA-7.1, which is kept in the operator's cab or other accessible spot if the crane does not have a cab. The upper limit switch shall be checked at the beginning of each day. All documented periodic inspections required by Maintenance Division will be performed in accordance with specific procedures or Maintenance Division Standard Work Instructions as required.

6.6.5 Specially Designed Rigging Assemblies - includes specially designed rigging assemblies designed for specific lifting operations throughout the plant. Examples: Reactor pressure vessel head strongback, reactor pressure vessel drywell/separator strongback, tensioner strongback, cattleshute strongback, drywell personnel airlock lifting beam, steam line plug removal tool, and LPRM strongback.

6.6.5.1 Certification - Maintenance Division is responsible for preparing the necessary certifications for all specially designed rigging assemblies supplied by the Maintenance Division

6.6.5.2 Control - The Maintenance Division shall be responsible for storing specially designed rigging assemblies in areas where they will remain undamaged, and not interfere with other plant operations.

6.6.5.3 Inspections - A Maintenance Division Rigging Equipment Inspector shall make a visual inspection of the specially designed rigging assemblies prior to initial handling operations. All documented periodic inspections required by Maintenance Division will be performed in accordance with specific procedures and Maintenance Division Standard Work Instructions.

7.0 DOCUMENTATION

The "Item Handling Report," (Form MDF-7) shall document that the item is handled in accordance with the approved procedure. The original of the report shall be filed in the "Item Handling Reports" file of the Maintenance Division Rigging files, by the Rigging Supervisor.

7.1 The "Item Handling Reports Log" (Form MDF-8) shall be used to provide accountability of the Item Handling Reports and to provide a reference for possible repetitive handling of the same type item. The Log shall be maintained in the local Maintenance Division Rigging files.

7.2 A Rigging Equipment List (Form MDF-11) shall be prepared and maintained by the Rigging Supervisor or his designate, to provide a list of all certified handling equipment and rigging controlled by the Maintenance Division at his location. Each certified piece shall be included and shall be identified by listing the following information: Description, serial number, maximum rated load and any special inspection frequencies.

7.3 The certification papers for the handling equipment and rigging shall be maintained by the Rigging Supervisor and kept in the local Maintenance Division Rigging file.

7.4 The written evidence supplied by the Transportation Division to verify that a piece of handling equipment (or its operator) is properly certified to perform a specific operation shall be filed in the local Maintenance Division Rigging file.

7.5 The Frequent Inspection Checklist (Form MDF-10) or equivalent form contained in other procedures shall be used to document the daily inspections prior to use performed by the Inspector of Handling Equipment and Rigging on the lifting, hoisting, and transporting equipment supplied by the Maintenance or Transportation Divisions. The completed checklist shall be filed in the local Maintenance Division Rigging file.

7.6 The "Daily Pre-Operational Inspection," (Form MDF-6), is kept in the operator's cab of each piece of permanent plant handling equipment to document the daily inspections. The form is designed to cover the use of the piece during the entire calendar month and when completed, is filed in the local Maintenance Division Rigging files.

8.0 EXHIBITS

8.1 Exhibit MA-7.1, Rev. 1, "Pre-Operational Inspection Report," Form MDF-6, (two sheets).

8.2 Exhibit MA-7.2, Rev. 1, "Item Handling Report," Form MDF-7.

8.3 Exhibit MA-7.3, "Item Handling Reports Log," Form MDF-8.

8.4 Exhibit MA-7.4, "Frequent Inspection Checklist," Form MDF-10.

8.5 Exhibit MA-7.5, "Rigging Equipment List," Form MDF-11.

9.0 REVISION

9.1 General revision to entire procedure to incorporate the requirements of NUREG 0612.

MAINTENANCE DIVISION

PEACH BOTTOM ATOMIC POWER PLANT

MAINTENANCE DIVISION

PRE-OPERATIONAL INSPECTION REPORT

STATION: _____ MONTH/YEAR: _____

CRANE NO.: _____ CAPACITY: _____

MANUFACTURER: _____

CONDITIONS:

1. Good Condition, operable.
2. Fair condition, maintenance may be required next inspection.
3. Poor condition, maintenance required, restricted operation.
4. Poor condition, unsafe to operate.
5. Items not applicalbe to the crane under inspection should be marked "N/A" in the (1) box.

REMARKS:

Inspect the two items listed below and insert the number corresponding to one of the five conditions listed above. Initial sheet under applicable day before placing crane into service. Days when crane is not operated, leave blank.

Item Description DAY:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Check mechanisms for maladjustment interfering w/proper operation.																			
	20	21	22	23	24	25	26	27	28	29	30	31							
Check upper limit switch trip for proper operation.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	20	21	22	23	24	25	26	27	28	29	30	31							
			-																

Inspected by: _____
Rigging Inspector

PEACH BOTTOM ATOMIC POWER STATION
MAINTENANCE DIVISION
ITEM HANDLING REPORT

EXHIBIT MA-7.2
Rev. 1
IHR No._____

Section 1

Unit No._____ MRF No._____

Item:_____ Approximate Wt._____

Sketch of Proposed Handling Arrangements:

Special Handling Procedures: _____Yes
_____No

Additional Precautions: _____

Rigging Equipment Used

Description	Serial No.	Inspection Satistactory Name/Date
		/_____
		/_____
		/_____
		/_____
		/_____
		/_____
		/_____
		/_____
		/_____

Approved by: _____
Rigging Supervisor/Date

SECTION II

Work completed per above procedure with:_____ No exceptions.

The exceptions listed below:

Approved by: _____
Rigging Supervisor/Date

Reviewed by: _____
Maintenance Supt./Date

PHILADELPHIA ELECTRIC COMPANY SERVICE

MAINTENANCE DIVISION

PEACH BOTTOM ATOMIC POWER PLANT

MAINTENANCE DIVISION

ITEM HANDLING REPORTS LOG

Sheet No. _____

IHR Number	Date Assigned	Rigging Superv. Initials	Unit No(s).	MRF No.	Special Instruct. Required?		IHR Section II Reviewed Initials	Date	IHR Filed (Date)	Comments

Exhibit MA-7.3

MAINTENANCE DIVISION

PEACH BOTTOM ATOMIC POWER STATION

MAINTENANCE DIVISION

FREQUENT INSPECTION CHECKLIST

Equipment Description: _____

Serial Number: _____ Other Identification: _____

Indicate the results of the inspection by the following codes:

- Acceptable NA - Not Applicalbe X - Not acceptable - repairs required before work may proceed.

Record of Frequent Inspections:

Date															
Shift															
Inspections Required Each Work Shift: (1) Brakes															
(2) Up Direction Limit Switches															
(3) Controllers															
Inspections Required Daily: (1) Main Hoist Rope															
(2) Aux. Hoist Rope															
(3) Spooling															
(4) Anchoring															
(5) Main Hook															
(6) Aux. Hook															
(7) Safety Latch															
(8) Markings															
(9) Cleanliness															
(10) Lubrication															
(11) Alarms															
(12) Lights															
Inspected by (Initials)															

EXHIBIT 7.5

MAINTENANCE DIVISION

RIGGING EQUIPMENT LIST

ITEM #	DESCRIPTION	MANUFACTURER	MODEL #	SERIAL #	MAXIMUM LOAD RATING	INSPECTION FREQUENCY

2.1.5. Special Lifting Devices (Guidelines 4, NUREG-0612, Section 5.1.1(4))

"Special lifting devices should satisfy the guidelines of ANSI N14.6-1978, 'Standard for Special Lifting Devices for Shipping Containers Weighing 10,000 Pounds (4500 kg) or More for Nuclear Materials' (7). This standard should apply to all special lifting devices which carry heavy loads in areas as defined above. For operating plants certain inspections and load tests may be accepted in lieu of certain material requirements in the standard. In addition, the stress design factor stated in Section 3.2.1.1 of ANSI N14.6 should be based on the combined maximum static and dynamic loads that could be imparted on the handling device based on characteristics of the crane which will be used. This is in lieu of the guideline in Section 3.2.1.1 of ANSI N14.6 which bases the stress design factor on only the weight (static load) of the load and of the intervening components of the special handling device."

a. Summary of Licensee Statements and Conclusions

The following special lifting devices are used at Peach Bottom Units 2 and 3:

- o reactor pressure vessel-drywell head strongback
- o fuel cask yoke
- o hydraulic tensioner
- o dryer separator sling (with hook box)
- o service platform sling
- o spent fuel grapple
- o lifting bar (tandem) (turbine building crane)
- o lifting bar (rotor) (turbine building crane)

Response:

- o REACTOR PRESSURE VESSEL-DRYWELL HEAD STRONGBACK
- o HYDRAULIC TENSIONER
- o DRYER SEPARATOR SLING (WITH HOOK BOX)

- SERVICE PLATFORM SLING

  General Electric, the supplier of the above lifting devices, has been requested to evaluate these items for compliance with the requirements of ANSI N14.6-1978 and applicable sections of NUREG-0612. Results will be submitted at a later date. GE has also been requested to review the lifting device for the fuel pool gates 1 & 2.

- SPENT FUEL GRAPPLE

  The spent fuel grapple is excluded from the evaluation for compliance with the guidelines of NUREG-0612 because it is used only for handling fuel bundles. The consequences of a load drop due to the failure of the spent fuel grapple does not exceed the consequences of a fuel bundle drop.

- FUEL CASK YOKE

  The fuel cask yoke will be provided by the spent fuel cask supplier. The yoke will be evaluated for compliance with ANSI N14.6-1978 on a case-by-case basis. This was stated in the December 22, 1981 letter to the NRC, Attachment 1, Section 4, page 1-4.

- LIFTING BAR (TANDEM) (TURBINE BUILDING CRANE)

- LIFTING BAR (ROTOR) (TURBINE BUILDING CRANE).

  Evaluation of the tandem and rotor lifting bars to satisfy ANSI N14.6 is not required because the turbine building (TB) crane does not carry any critical loads. The TB crane has been eliminated in the analysis in Section 2.3.2.b(2), pages 29-31, of the December 22, 1981 report to the NRC.

- TYPE 1 DRYER - SEPARATOR POOL PLUG

  In addition to the lifting devices listed under this section, the type 1 dryer-separator pool plug lifting device has been identified in our December 22, 1981 report to the NRC, in Attachment 1, Section 4, page 1-6:

  "The steam dryer-separator pool plug lifting device is in the process of modification and upgrading so that it will be in compliance with NUREG-0612, Section 5.1.6(1) and ANSI N14.6-1978. The lifting device for the type 1 steam dryer-separator pool plug will be designed to have redundant load paths so that the failure of one path would not cause the uncontrolled lowering of the load".

2.1.6 Lifting Devices (Not Specially Designed) [Guidelines 5, NUREG-0612, Section 5.1.1(5)]

"Lifting devices that are not specially designed should be installed and used in accordance with the guidelines of ANSI B30.9-1971, 'Slings' [8]. However, in selecting the proper sling, the load used should be the sum of the static and maximum dynamic load. The rating identified on the sling should be in terms of the 'static load' which produces the maximum static and dynamic load. Where this restricts slings to use on only certain cranes, the slings should be clearly marked as to the cranes with which they may be used."

a. Summary of Licensee Statements and Conclusions

b. Evaluation

c. Conclusions and Recommendations

The Licensee does not comply with Guideline 5. PECo should verify that all slings in use conform with the guidelines of ANSI B30.9-1971 and include verification that measures are implemented to identify those slings which may be restricted to use with certain cranes due to limitations in static load ratings. The Licensee should verify that a program exists to determine that the requirements of ANSI B30.9-1971 are met regarding sling inspection, replacement, and safe operating practices.

Response:

PECo's letter, for PBAPS, to the NRC dated June 18, 1981, Attachment 1, page 4, states:

"All slings utilized at Peach Bottom, on Q-Listed systems, by the Construction Division meet ANSI N45.2.2-1972. Maintenance Division is in the process of upgrading all slings to the levels of ANSI N45.2.2-1972 with a completion date of September 30, 1981 anticipated. None of the slings specifically meet the requirements of ANSI B30.9-1971 as supplemented by NUREG 0612 Section 5.1.1(5)."

At the time of the June report, an investigation was initiated regarding this requirement as it applies to slings and special lifting devices. Since the review was not complete, we reserved the right to take exception to these supplemented standards.

After more detailed review of the slings and their use on the refueling floor, we revised our statement to reflect compliance with ANSI B30.9-1971 for slings used on the refueling floor.

In the December 22, 1981 letter to the NRC, Attachment 1, Section 4, page 1-4, we made the following statement:

> "For critical loads on the refueling floor where there is no specific lifting device, slings will be used. The loads to be lifted with slings are:
>
> a. Shield plug (half moon)
> b. Type 2 dryer-separator pool plug
> c. Fuel pool slot plug
>
> Slings for critical loads will be selected in accordance with ANSI B30.9-1971, modified by the guidelines of NUREG-0612, Sections 5.1.1(5) and 5.1.6(1)(b)."

It is our intent, therefore, to qualify the slings, for the items identified above, to the requirements of ANSI B30.9-1971 and NUREG-0612, Section 5.1.6(1)b. Sling design loads will include both static and dynamic loads.

Our procedures will be modified to invoke the requirements of ANSI B30.9-1971 for sling inspections, replacement, and safe operating practices.

2.1.8 Crane Design (Guideline 7, NUREG-0612, Section 5.1.1.(7))

"The crane should be designed to meet the applicable criteria and guidelines of Chapter 2-1 of ANSI B30.2-1976, 'Overhead and Gantry Cranes,' and of CMAA-70, 'Specifications for Electric Overhead Traveling Cranes' [8]. An alternative to a specification in ANSI B30.2 or CMAA-70 may be accepted in lieu of specific compliance if the intent of the specification is satisfied."

a. Summary of Licensee Statements and Conclusions

b. Evaluation

The reactor building cranes, turbine building cranes, pump structure crane, and diesel generator cranes substantially meet the criteria of Guideline 7 of NUREG-0612 on the basis of procurement to EOCI-61 standards. However, several more restrictive design requirements were imposed by CMAA-70 which could affect the cranes' ability to safely handle heavy loads.

Response:

In the nine-month report to the NRC (PECo letter to NRC dated December 22, 1981), a more detailed analysis of these cranes was made. We have determined that the requirements of CMAA-70, identified in the Franklin Report, apply only to the reactor building crane.

The turbine building (TB) cranes, pump structure (PS) crane, and the diesel generator (DG) cranes do not require compliance with the item of CMAA-70 in the Franklin Report because these cranes will be modified to restrict the carrying of loads over safety related items required for safe shutdown. The addition of electrical interlocks (area travel limit switch with a key overide) to the TB and PS cranes, supplemented by procedures and load paths and the addition of mechanical stops on the DG crane rails without any bypass will provide adequate protection to the safety related items that may be damaged by a load drop. Elimination of the TB cranes, DG cranes, and PS crane is acceptable based on the NRC December 22, 1980 letter to licensees of operating plants in Enclosure 3, Section 2.3.2. Our December 22, 1981 letter to the NRC, under the same section number, contains our justification for eliminating these cranes. Based on the above, we believe further efforts to qualify the cranes for specific sections of CMAA-70 is not required.

The evaluation of the turbine building cranes is contained in the report transmittal, by the December 22, 1981 letter to the NRC, in the response to Section 2.3.2.b(2), page 30. The diesel generator crane is discussed under the same section, page 32. The circulating water pump structure crane is discussed under the same section, page 34.

The reactor building crane has been evaluated for compliance with NUREG-0554. The evaluation is contained in Attachment 2 of the December 22, 1981 letter to the NRC. In addition, we have provided the information about the reactor building crane which was requested in Attachment 1 to the December 22, 1980 letter from the NRC to the licensees. This information was transmitted in Attachment 1 of the December 22, 1981 letter to the NRC.

2.1.8.b Evaluation Continued
CMAA-70 Comparison

A comparison of the recommendations of CMAA-70 and those of EOCI-61 has revealed several areas where revisions incorporated into CMAA-70 may affect crane safety. The licensee should evaluate these areas to determine whether the intent of NUREG-0612 is satisfied. In particular, the following issues should be addressed in the Licensee's review:

1. Torsional forces. CMAA-70, Article 3.3.2.1.3 requires that the twisting moments due to overhanging loads and lateral forces acting eccentric to the horizontal neutral axis of a girder be calculated on the basis of the distance between the center of gravity of the load, or force center line, and the girder shear center measured normal to the force vector. EOCI-61 states that such moments are to be calculated with reference to girder center of gravity. For girder sections symmetrical about each principal central axis (e.g., box section or I-beam girders commonly used in cranes subject to this review), the shear center coincides with the centroid of the girder section and there is no difference between the two requirements. Such is not the case for non-symetrical girder sections (e.g., channels).

Response:

The reactor building crane construction uses rigid box section girders symmetrical about each principal central axis. The shear center of the box guiders will coincide with the centroid of the girder section.

2. Longitudinal stiffeners. CMAA-70, Article 3.3.3.1 specifies (1) the maximum allowable web depth/thickness (h/t) ratio for box girders using longitudinal stiffeners and (2) require-

ments concerning the location and minimum moment of inertia for such stiffeners. EOCI-61 allows the use of longitudinal stiffeners but provides no similar guidance. The requirements of CMAA-70 represent a codification of girder design practice and they are expected to be equivalent to design standards employed in cranes built to EOCI-61 specifications.

Response:

The RB crane girder sections were designed and constructed to include longitudinal stiffeners in the compression area of the webs.

The longitudinal stiffeners, in the construction of the RB crane, conform to the requirements of CMAA-70. The allowable h/t ratios in box girders, with the stiffeners, do not exceed ratios specified in CMAA-70.

3. Allowable compressive stress. CMAA-70, Article 3.3.3.1.3 identifies allowable compressive stresses of approximately 50% of yield strength of the recommended structural material (A-36) for girders, where the ratio of the distance between web plates to the thickness of the top cover plate (b/c ratio) is less than or equal to 38. Allowable compressive stresses decrease linearly for b/c ratios in excess of 38. EOCI-61 provides a similar method for calculating allowable compressive stresses except that the allowable stress decreases from approximately 50% of yield only after the b/c ratio exceeds 41. Consequently, structural members with b/c ratios in the general range of 38 to 52 designed under EOCI-61 will allow a slightly higher compressive stress than those designed under CMAA-70. This variation is not expected to be of consequence for cranes subject to this review since b/c ratios of structural members are expected to be less than 38.

Response:

The RB crane girders do not use b/c ratios in excess of 38. The b/c ratio of the RB crane structural members is 14.6 which is less than 38 as required by CMAA-70.

4. Fatigue considerations. CMAA-70, Article 3.3.3.1.3 provides substantial guidance with respect to fatigue failure by indicating allowable stress ranges for various structural members in joints under repeated loads. EOCI-61 does not address fatigue failure. The requirements of CMAA-70 are not expected to be of consequence for cranes subject to this review since the cranes are not generally subjected to frequent loads at or near design conditions (CMAA-70 provides allowable stress ranges for loading cycles in excess of

20,000) and are not generally subjected to stress reversal (CMAA-70 allowable stress range is reduced to below the basic allowable stress for only a limited number of joint configurations).

Response:

RB crane fatigue failure was discussed in the December 22, 1981 report to NRC, Attachment 2 (Point by Point Comparison of the RB crane for each section of NUREG-0554), Section 2.7:

"A structural fatigue analysis was not part of the design requirements for the reactor building crane at the time of fabrication. The reactor building crane is classified as a low use crane in the guidelines of CMAA Specification #70. Structural fatigue is not expected to be of significant design concern."

5. Hoist rope requirements. CMAA-70, Article 4.2.1 requires that the capacity load plus the bottom block divided by the number of parts of rope not exceed 20% of the published rope breaking strength. EOCI-61 requires that the rated capacity load divided by the number of parts of rope not exceed 20% of the published rope breaking strength. The effect of this variation on crane safety margins depends on the ratio of the weights of the load block and the rated load.

Response:

The sum of maximum RB crane load weight and the weight of the bottom block, divided by the number of parts of rope is 7.325 tons. This does not exceed 20% of the manufacturer's published rope breaking strength of 54.8 tons for one inch diameter, 6x37 construction, galvanized super tensile, regular lay with IWRC wire, crane rope.

6. Drum design. CMAA-70, Article 4.4.1 requires that the drum be designed to withstand combined crushing and bending loads. EOCI-61 requires only that the drum be designed to withstand maximum load, bending and crushing loads, with no stipulation that these loads be combined. This variation is not expected to be of consequence since the requirements of CMAA-70 represent the codification of the same good engineering practice that would have been incorporated in cranes built to EOCI-61 specifications although a specific requirement was not contained in EOCI-61.

Response:

The drum design calculations were based on crushing stress for carbon steel C-1030 material with an ultimate tensile strength

of 72,000 psi. Bending stresses were considered negligible.

7. Drum design. CMAA-70, Article 4.4.3 provides recommended drum groove depth and pitch. EOCI-61 provides no similar guidance. The recommendations in CMAA-70 constitute a codification of good engineering practice with regard to reeving stability and reduction of rope wear and are not expected to differ substantially from practices employed in the design of cranes subject to this review and built to EOCI-61 specifications.

Response:

The drum groove depth and pitch conform to the recommendations of CMAA-70, Article 4.4.3. The drum grooves were machined from solid metal and grooved left and right hand.

8. Gear design. CMAA-70, Article 4.5 requires that gearing horsepower rating be based on certain American Gear Manufacturers Association Standards and provides a method for determining allowable horsepower. EOCI-61 provides no similar guidance. The recommendations in CMAA-70 constitute a codification of good engineering practice for gear design and are not expected to differ substantially from the practices employed in the design of cranes subject to this review and built to EOCI-61 specifications.

Response:

Calculations, for the verification of the gear horsepower ratings, were provided by the reactor building crane manufacturer. The crane manufacturer's gear horsepower ratings were found to be comparable to those required by CMAA-70, Article 4.5.

9. Bridge brake design. CMAA-70, Article 4.7.2.2 requires that bridge brakes, for cranes with cab control and the cab on the trolley, be rated for at least 75% of bridge motor torque. EOCI-61 requires a brake rating of 50% of bridge motor torque for similar configurations. A cab-on-trolley control arrangement is not expected for crane subject to this review.

Response:

A cab on bridge control arrangement is used in the RB crane. This section is not applicable.

10. Hoist brake design. CMAA-70, Article 4.7.4.2 requires that hoist holding brakes, when used with a method of a control braking other than mechanical, have torque ratings no less than 125% of the hoist motor torque. EOCI-61 requires a hoist holding brake torque rating of no less than 100% of the hoist motor torque without regard to the type of

control brake employed. This variation is not expected to be of consequence for cranes subject to this review since mechanical load brakes were typically specified for cranes built to EOCI-61 specifications. The addition of a holding brake safety margin in conjuction with electric control braking is a codification of good engineering practice. Some manufacturers provide holding brakes rated at up to 150% of hoist motor torque when used with electrical control braking systems.

Response:

The RB crane hoist holding brake design are rated at up to 150 per cent of hoist rated full load motor torque. The RB crane hoist braking system design is discussed in PBAPs report on NUREG 0612 to the NRC dated December 22, 1981, Attachment 2, Section 4.9:

> "The main and auxiliary hoists each have self-adjusting solenoid load braking. In addition to the above braking capability, AC eddy-current brakes are provided for each hoist. One of the two holding brakes is controlled through a time-delay relay so that the brake is applied automatically following a slight time delay from the application of the first holding brake. The torque rating of each brake is not less than 150 percent of rated full load motor torque. The brakes automatically set when current is cut off from the hoist motor, and they are equally effective in both directions of motor rotation.
>
> The holding brakes are located such that there is no coupling between the brake and the hoist pinion gear shafts. The pinion shafts extend beyond the gear case sufficiently to apply the brake to this shafting."

11. Bumpers and stops. CMAA-70, Article 4.12 provides substantial guidance for the design and installation of bridge and trolley bumpers and stops for cranes which operate near the end of bridge and trolley travel. No similar guidance is provided in EOCI-61. This variation is not expected to be of significance for cranes subject to this review since these cranes are not expected to be operated under load at substantial bridge or trolley speed near the end of travel. Further, the guidance of CMAA-70 constitutes the codification of the same good engineering practice that would have been used in the design of cranes built to EOCI-61 specifications.

Response:

The crane operation under load near the end of the bridge or trolley travel is compensated for by the bumpers and stops which satisfy the intent of CMAA-70.

The bumper and safety stop is covered in the PBAPs report to the NRC on December 22, 1981, Attachment 2, Section 5.2:

"The crane is provided with bridge spring bumpers with sufficient energy-absorbing capacity to stop the crane when at a speed of 40 percent of full load rated speed. Bumpers are mounted so that there is no direct shear on bolts and that no part can fall from the crane in the event of breakage. Trolley spring bumpers are capable of stopping the trolley, unloaded, when traveling in either direction of 40 percent of full load rated speed. Bridge stops are provided for crane runway rails. Safety cables are provided for the crane to prevent movement of the bridge or trolley during a tornado when in the parked position."

12. Static control systems. CMAA-70, Article 5.4.6 provides substantial guidance for the use of static control systems. EOCI-61 provides guidance for magnetic control systems only. This variation is not expected to be of safety significance because magnetic control systems were generally employed in cranes designed when EOCI-61 was in effect and the static control requirements identified in CMAA-70 constitute a codification of the same good engineering practice that would have been used in the design of static control systems in cranes built to EOCI-61 specifications.

Response:

The static power components were selected by the crane manufacturer to match the rated horsepower, voltage, and time rating with which the components are used.

13. Restart protection. CMAA-70, Article 5.6.2. requires that cranes not equipped with spring-return controllers or momentary-contact push buttons be provided with a device that will disconnect all motors upon power failure and will not permit any motor to be restarted until the controller handle is brought to the OFF position. No similar guidance is provided in EOCI-61 This variation is not expected to be of consequence for cranes subject to this review since they are generally designed with spring-return controllers or momentary-contact push buttons.

Response:

All motors are disconnected from the line upon power failure. No motor can be re-started, after the power failure, until the spring return magnetic reset switch is operated. The reactor building crane has momentary-contact push buttons.