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TECHNICAL EVALUATION REPORT

CONTROL OF HEAVY LOADS

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

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Prepared by

Franklin Research Center
20th and Race Street
Philadelphia, PA 19103

Author: D. J. Vito

FRC Group Leader: I. H. Sargent

Prepared for

Nuclear Regulatory Commission
Washington, D.C. 20555

Lead NRC Engineer: F. Clemenson

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Franklin Research Center
A Division of The Franklin Institute
The Benjamin Franklin Parkway, Phila., Pa. 19103 (215) 448-1000

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FOREWORD

This Technical Evaluation Report was prepared by Franklin Research Center under a contract with the U.S. Nuclear Regulatory Commission (Office of Nuclear Reactor Regulation, Division of Operating Reactors) for technical assistance in support of NRC operating reactor licensing actions. The technical evaluation was conducted in accordance with criteria established by the NRC.

Mr. I. H. Sargent and Mr. D. J. Vito contributed to the technical preparation of this report through a subcontract with WESTEC Services, Inc.

1. INTRODUCTION

1.1 PURPOSE OF REVIEW

This technical evaluation report documents the Franklin Research Center (FRC) review of general load handling policy and procedures at Philadelphia Electric Company's (PECO) Peach Bottom Atomic Power Station Units 2 and 3. This evaluation was performed with the following objectives:

- to assess conformance to the general load handling guidelines of NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants" [1], Section 5.1.1
- to assess conformance to the interim protection measures of NUREG-0612, Section 5.3.

1.2 GENERIC BACKGROUND

Generic Technical Activity Task A-36 was established by the U.S. Nuclear Regulatory Commission (NRC) staff to systematically examine staff licensing criteria and the adequacy of measures in effect at operating nuclear power plants to assure the safe handling of heavy loads and to recommend necessary changes to these measures. This activity was initiated by a letter issued by the NRC staff on May 17, 1978 [2] to all power reactor licensees, requesting information concerning the control of heavy loads near spent fuel.

The results of Task A-36 were reported in NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants." The staff's conclusion from this evaluation was that existing measures to control the handling of heavy loads at operating plants, although providing protection from certain potential problems, do not adequately cover the major causes of load handling accidents and should be upgraded.

In order to upgrade measures for the control of heavy loads, the staff developed a series of guidelines designed to achieve a two-phase objective using an accepted approach or protection philosophy. The first portion of the objective, achieved through a set of general guidelines identified in NUREG-0612, Section 5.1.1, is to ensure that all load handling systems at

nuclear power plants are designed and operated such that their probability of failure is uniformly small and appropriate for the critical tasks in which they are employed. The second portion of the staff's objective, achieved through guidelines identified in NUREG-0612, Sections 5.1.2 through 5.1.5 is to ensure that, for load handling systems in areas where their failure might result in significant consequences, either (1) features are provided, in addition to those required for all load handling systems, to ensure that the potential for a load drop is extremely small (e.g., a single-failure-proof crane) or (2) conservative evaluations of load handling accidents indicate that the potential consequences of any load drop are acceptably small. Acceptability of accident consequences is quantified in NUREG-0612 into four accident analysis evaluation criteria.

The approach used to develop the staff guidelines for minimizing the potential for a load drop was based on defense-in-depth and the intent of the guidelines is to ensure that licensees of all operating nuclear power plants perform the following:

1. provide sufficient operator training, handling system design, load handling instructions, and equipment inspection to assure reliable operation of the handling system

2. define safe load travel paths through procedures and operator training so that, to the extent practical, heavy loads are not carried over or near irradiated fuel or safe shutdown equipment

3. provide mechanical stops or electrical interlocks to prevent movement of heavy loads over irradiated fuel or in proximity to equipment associated with redundant shutdown paths.

Staff guidelines resulting from the foregoing are tabulated in Section 5 of NUREG-0612. Section 6 of NUREG-0612 recommended that a program be initiated to ensure that these guidelines are implemented at operating plants.

1.3 PLANT-SPECIFIC BACKGROUND

On December 22, 1980, the NRC issued a letter [3] to PECO, the Licensee for the Peach Bottom Atomic Power Station, requesting that the Licensee review provisions for handling and control of heavy loads, evaluate these provisions

with respect to the guidelines of NUREG-0612, and provide certain additional information to be used for an independent determination of conformance to these guidelines. On June 18, 1981, PECO provided the initial response [4] to this request. Additional information was provided by the Licensee on December 22, 1981 [5].

2. EVALUATION AND RECOMMENDATIONS

FRC's evaluation of load handling at the Peach Bottom Units 2 and 3 is divided into two categories. These categories deal separately with the general guidelines of NUREG-0612, Section 5.1.1 and the recommended interim measures of Section 5.3 or their equivalents from NUREG-0612. Applicable guidelines are referenced in each category. Conclusions and recommendations are provided in the summary for each guideline.

2.1 GENERAL GUIDELINES

The NRC has established seven general guidelines which must be met in order to provide the defense-in-depth approach for the handling of heavy loads. These guidelines consist of the following criteria from Section 5.1.1 of NUREG-0612:

- o Guideline 1 - Safe Load Paths
- o Guideline 2 - Load Handling Procedures
- o Guideline 3 - Crane Operator Training
- o Guideline 4 - Special Lifting Devices
- o Guideline 5 - Lifting Devices (Not Specially Designed)
- o Guideline 6 - Cranes (Inspection, Testing, and Maintenance)
- o Guideline 7 - Crane Design.

These seven guidelines should be satisfied for all overhead handling systems that handle heavy loads in the vicinity of the reactor vessel, near spent fuel in the spent fuel pool, or in other areas where a load drop may damage safe shutdown systems. The Licensee's verification of the extent to which these guidelines have been satisfied and an evaluation of the Licensee's verification are contained in the succeeding paragraphs.

2.1.1 Heavy Load Overhead Handling Systems

a. Summary of Licensee Statements and Conclusions

The Licensee has performed a detailed review and evaluation of load handling systems at Peach Bottom Units 2 and 3 and has determined that the following load handling systems are within the scope of NUREG-0612:

- reactor building crane
- turbine building crane
- diesel generator cranes
- recirculation pump motor - generator hoist
- pump structure crane
- recirculation pump motor hoist
- control rod drive (CRD) removal platform winch hoist
- CRD removal hoist
- equipment access lock removal hoist
- personnel lock hoist
- torus equipment removal hoist
- 15-ton yard crane
- precoat material handling hoist (Unit 2 only)
- emergency cooling tower jib crane and hoist
- CRD transport jib crane
- CRD maintenance jib crane.

The remaining load handling systems were eliminated from further consideration under NUREG-0612. These load handling systems and the respective criteria by which they were excluded are as follows:

Criterion A: The crane or hoist is located in a structure which does not contain systems or equipment required for safe shutdown or decay heat removal. Buildings and structures that do not contain systems required for safe shutdown or decay heat removal are the administration building, screen structure, off-gas recombiner building, off-gas filter building, and off-gas stack. The following handling systems are located in these structures:

- machine shop crane
- off-gas filter trolley
- recombiner building hoist
- off-gas stack hoist jib crane
- screen structure trash handling equipment hoist.

Criterion B: No equipment required for safe shutdown or decay heat removal is located in the load path for the crane or hoist. The load path is defined on the load drawings. Equipment in the area was checked against revision 13 of the Q-list and the list of equipment required for safe shutdown contained in FSAR Supplement 2 to determine if the equipment is

required for safe shutdown or decay heat removal. The following handling systems are in this category:

- o reactor feed pump crane
- o condensate pump hoist and auxiliary
- o CRD transfer/removal winch
- o condensate demineralizer hoist and auxiliary
- o 5000 lb escapement door lift hoist
- o 2500 lb escapement door lift hoist
- o radwaste building hoist
- o fuel pool filter demineralizer hoist
- o circulating water (CW) pump structure trash handling equipment hoist
- o radwaste building equipment hoist
- o CRD jib crane
- o CRD storage jib crane.

The table provided by the Licensee indicates that irradiated fuel and safety-related equipment at all plant elevations were considered in the evaluation.

b. Evaluation, Conclusions, and Recommendations

The Licensee's contention that NUREG-0612 is not applicable to lifting devices that are adequately separated from irradiated fuel and safety-related equipment (as verified by inspection) is acceptable.

2.1.2 Safe Load Paths [Guideline 1, NUREG-0612, Section 5.1.1(1)]

"Safe load paths should be defined for the movement of heavy loads to minimize the potential for heavy loads, if dropped, to impact irradiated fuel in the reactor vessel and in the spent fuel pool, or to impact safe shutdown equipment. The path should follow, to the extent practical, structural floor members, beams, etc., such that if the load is dropped, the structure is more likely to withstand the impact. These load paths should be defined in procedures, shown on equipment layout drawings, and clearly marked on the floor in the area where the load is to be handled. Deviations from defined load paths should require written alternative procedures approved by the plant safety review committee."

a. Summary of Licensee Statements and Conclusions

The Licensee has provided drawings detailing the locations of safe load paths, spent fuel, and safety-related equipment. Operation of the overhead handling systems in question is governed by one or more of the following procedures:

M17.2 - Reactor Building Crane Operation
MA7 - Procedure for Handling Q-Listed Items (Maintenance Division)
CD13.1 - Procedure for Handling Q-Listed Items (Construction Division).

Procedures MA7 and CD13.1 are reviewed by responsible individuals in the appropriate divisions before any changes or deviations are made. Changes to or deviations from other procedures must be reviewed by the Plant Operations Review Committee.

The Licensee has taken exception to the requirement that safe load paths be marked on the floors. It is felt that training, procedures, interlocks, and other indications, such as signs, provide a sufficient level of safety.

b. Evaluation

The Licensee has adequately defined safe load paths for the movement of heavy loads to minimize the potential for heavy loads, if dropped, to impact irradiated fuel in the reactor vessel and in the spent fuel pool, or to impact safe shutdown equipment. However, from the information provided by the Licensee, it cannot be determined if these load paths are adequately defined in plant procedures. The procedures referenced above only generically address safe load paths.

Although marking safe load paths on the floor is not the only acceptable method of providing visual aids to the operator, from the information provided by the Licensee, it cannot be determined if the methods in use at Peach Bottom Units 2 and 3 (i.e., other indications) meet the intent of this guideline.

Finally, the method of handling deviations from established safe load paths is unclear. Clarification by the Licensee is necessary before it can be

determined if deviations from defined safe load paths satisfy the intent of Section 5.1.1(1) of NUREG-0612.

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.

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

"Procedures should be developed to cover load handling operations for heavy loads that are or could be handled over or in proximity to irradiated fuel or safe shutdown equipment. At a minimum, procedures should cover handling of those loads listed in Table 3-1 of NUREG-0612. These procedures should include: identification of required equipment; inspections and acceptance criteria required before movement of load; the steps and proper sequence to be followed in handling the load; defining the safe path; and other special precautions."

a. Summary of Licensee Statements and Conclusions

The Licensee has stated that procedures governing the movement of heavy loads handled by each crane include:

M17.2 - Reactor Building Crane Operation
MA7 - Procedure for Handling Q-Listed Items (Maintenance Division)
CD13.1 - Procedure for Handling Q-Listed Items (Construction Division).

Additional procedures may be developed a result of future investigations.

Procedures MA7 and CD13.1 classify handling activities into one of three categories based on ANSI N45.2.2-1972 (Packaging, Shipping, Receiving and Handling of Items for Nuclear Power Plants):

Category A: Load requires 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:

- o reactor vessels
- o steam generators
- o major components of reactor vessel internals
- o spent fuel casks.

Category B: Load is handled with conventional handling equipment but requires detailed procedures because of weight, size, susceptibility to shock damage, high nil ductility transition temperature, or any similiar conditions. Examples of items that may be assigned to this category are:

- o primary and intermediate coolant pumps and their internals
- o safety-related instrument cabinets and control boards
- o control rod drive mechanisms
- o fuel handling equipment
- o purification equipment
- o fuel
- o core components (small)
- o reactor vessel head.

Category C: Load is handled with conventional equipment using standard rigging practice. Construction and permanent plant materials not included in Categories A or B are included in this category.

Procedures MA7 and CD13.1 are not applicable to Category A items. Separate procedures will be prepared for each Category A item.

When the quality control (QC) inspector has determined that CD13.1 shall be invoked, an "Item Handling Report" shall be prepared which includes:

- o sketch of the proposed rigging arrangement
- o size of the rigging tools to be used
- o specific lift points
- o center of gravity of the item
- o size, length, and angle of all chokers, slings, and chain hoists.

b. Evaluation

The procedures referenced in, and provided with, the Licensee's response do not appear to provide the protection against load handling accidents intended by Guideline 2 of NUREG-0612. Although these procedures do address the safe handling of equipment, neither the organization nor content of the procedures clearly satisfies the requirements of the guideline. The titles (i.e., Procedures for Handling Q-Listed Items) and basis (i.e., ANSI N45.2.2-1976) suggest that these procedures and their requirements are oriented toward load protection rather than protection against damage to equipment or components that may be struck. Specifically, it cannot be determined that all loads that could be dropped on irradiated fuel or equipment required for safe shutdown or decay heat removal will be either subject to these procedures or properly categorized. Further, these procedures only generically address load handling operations.

The referenced procedures do provide for detailed individual procedures for loads classified as Category A or B. This approach, i.e. a general procedure referencing detailed procedures for specific loads, is reasonable and will meet the intent of Guideline 2 provided:

- all loads that could be dropped on installed fuel or essential equipment are classified as Category A or B, and
- the detailed procedures currently provided or those prepared contain the information specified in Guideline 2.

The Licensee's discussion of the "Item Handling Report" prepared pursuant to CD13.1 indicates that several Guideline 2 information requirements are presently addressed.

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.

2.1.4 Crane Operator Training [Guideline 3, NUREG-0612, Section 5.1.1(3)]

"Crane operators should be trained, qualified and conduct themselves in accordance with Chapter 2-3 of ANSI B30.2-1976, 'Overhead and Gantry Cranes' [6]."

a. Summary of Licensee Statements and Conclusions

The Licensee has stated that procedures MA20, CD2.1, and CD10.2 describe operator training, qualification, and conduct. Although no exceptions are taken to ANSI B30.2-1976, procedures do not presently invoke the standard. However, revisions have been initiated to rectify this matter. Steps have been taken to assure that crane operators meet ANSI B30.2-1976 requirements.

b. Evaluation

When revised, PECO's procedures for crane operator training, qualification, and conduct will satisfy Guideline 3 of NUREG-0612 on the basis of the Licensee's verification that the program will be based on ANSI B30.2-1976. However, it should be noted that MA20, CD2.1, and CD10.2 apply primarily to personnel indoctrination and rigger training. Consequently, significant revisions will be necessary to meet the ANSI B30.2-1976 training, qualification, and conduct requirements for crane operators.

c. Conclusions and Recommendations

Peach Bottom Units 2 and 3 will comply with Guideline 3 when crane operator training, qualification, and conduct requirements are revised to satisfy the requirements of ANSI B30.2-1976. When revision is complete,

procedures and records should be made available for review and inspection by the NRC staff.

2.1.5 Special Lifting Devices [Guideline 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).

The Licensee has stated that special lifting devices are not certified to ANSI N14.6-1978 as supplemented by NUREG-0612. However, the Licensee has stated that the RPV-drywell head strongback and the shipping cask yokes are designed to be single-failure proof, which is superior to directly fulfilling the requirements of the ANSI specification. Additional information will be provided on the status of the remaining special lifting devices.

b. Evaluation

The Licensee's statement that these devices are not certified to ANSI N14.6-1978 does not provide adequate information for a determination of compliance with this guideline. The Licensee's statement that special lifting devices have been designed as "single-failure proof" does not provide an adequate basis for a technical evaluation on this issue. To satisfy this guideline, the Licensee should collect information establishing the reliability of the design and fabrication of the device (i.e., ANSI N14.6-1978, Sections 3 and 4) supplemented by provisions for assuring continued reliability (i.e., ANSI N14.6-1978, Section 5); this may be sufficient to establish that a particular device will provide load handling reliability equivalent to that provided by full compliance with, or certification to, an industrial standard. The superiority of a single-failure-proof design cannot be determined in the absence of information regarding the criteria by which it has been determined that the device is single-failure proof.

The Licensee should address the following criteria from sections of ANSI N14.6-1978 in evaluating load handling reliability or special lifting devices at Peach Bottom Units 2 and 3:

Section 3.1:

a. limitations on the use of the lifting devices (3.1.1)
b. identification of critical components and definition of critical characteristics (3.1.2)
c. signed stress analyses which demonstrate appropriate margins of safety (3.1.3)
d. indication of permissible repair procedures (3.1.4)

Section 3.2:

a. use of stress design factors of 3 for minimum yield strength and 5 for ultimate strengtn (3.2.1)
b. similar stress design factors for load bearing pins, links, and adapters (3.2.4)
c. slings used comply with ANSI B30.9-1971 (3.2.5)
d. subjecting materials to dead weight testing or Charpy impact testing (3.2.6)

Section 3.3:

a. consideration of problems related to possible lamellar tearing (3.3.1)
b. design shall assure even distribution of the load (3.3.4)
c. retainers fitted for load carrying components which may become inadvertently disengaged (3.3.5)
d. verification that remote actuating mechanisms securely engage or disengage (3.3.6)

Section 4.1:

a. verify selection and use of material (4.1.3)
b. compliance with fabrication practice (4.1.4)
c. qualification of welders, procedures, and operators (4.1.5)
d. provisions for a quality assurance program (4.1.6)
e. provisions for identification and certification of equipment (4.1.7)
f. verification that materials or services are produced under appropriate controls and qualifications (4.1.9)

Section 5.1:

a. implementation of a periodic testing schedule and a system to indicate the date of expiration (5.1.3)
b. provisions for establishing operating procedures (5.1.4)
c. identification of subassemblies which may be exchanged (5.1.5)
d. suitable markings (5.1.6)
e. maintaining a full record of history (5.1.7)
f. conditions for removal from service (5.1.8)

Section 5.2:

a. load test to 150% and appropriate inspections prior to initial use (5.2.1)
b. qualification of replacement parts (5.2.2)

Section 5.3:

a. satisfying annual load test or inspection requirements (5.3.1)
b. testing following major maintenance (5.3.2)
c. testing after application of substantial stresses (5.3.4)
d. inspections by operating (5.3.6) and non-operating or maintenance personnel (5.3.7).

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."

2.1.6 Lifting Devices (Not Specially Designed) [Guideline 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

All slings used at Peach Bottom Units 2 and 3 to handle components of Q-listed systems by the Construction Division will meet ANSI N45.2.2-1972 requirements. The Maintenance Division is in the process of upgrading all slings to the level of ANSI N45.2.2-1972. The Licensee states that none of the slings specifically meets the requirements of ANSI B30.9-1971 as supplemented by NUREG-0612, Section 5.1.1(5).

b. Evaluation

On the basis of the Licensee's response, it has been determined that the criteria of Guideline 5 have not been satisfied. ANSI N45.2.2-1972 is not considered an adequate substitute for ANSI B30.9-1971.

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.

2.1.7 Cranes (Inspection, Testing, and Maintenance) [Guideline 6, NUREG-0612, Section 5.1.1(6)]

"The crane should be inspected, tested, and maintained in accordance with Chapter 2-2 of ANSI B30.2-1976, 'Overhead and Gantry Cranes,' with the exception that tests and inspections should be performed prior to use where it is not practical to meet the frequencies of ANSI B30.2 for periodic inspection and test, or where frequency of crane use is less than the specified inspection and test frequency (e.g., the polar crane inside a PWR containment may only be used every 12 to 18 months during refueling operations, and is generally not accessible during power operation. ANSI B30.2, however, calls for certain inspections to be performed daily or monthly. For such cranes having limited usage, the inspections, test, and maintenance should be performed prior to their use)."

a. Summary of Licensee Statements and Conclusions

The Licensee has stated that current maintenance procedures covering crane inspection, testing, and maintenance are based on ANSI B30.2-1967, which PECO believes satisfies the NRC's requirements for equivalence to ANSI B30.2-1976.

b. Evaluation

The Licensee's evaluation of crane inspection, testing, and maintenance at Peach Bottom Units 2 and 3 is acceptable. The changes to ANSI B30.2 since the 1967 version are not significant and compliance with ANSI B30.2-1967 is considered equivalent to compliance with ANSI B30.2-1976. Therefore, the requirements of Guideline 6 of NUREG-0612 are satisfied.

c. Conclusions and Recommendations

PECO complies with Guideline 6 of NUREG-0612 at Peach Bottom Units 2 and 3 based on the Licensee's verification of program compliance with ANSI B30.2-1967.

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

The Licensee has stated that the procurement specifications for the reactor building cranes, turbine building cranes, pump structure crane, and diesel generator cranes stipulate compliance with the requirements of EOCI-61 [9]. At the time of manufacture of the above cranes, EOCI-61 was the accepted standard for crane design. As such, the Licensee considers EOCI-61 to be in compliance with the intent of CMAA-70.

The Licensee also stated that the procurement documents for the above cranes did not specifically require compliance with ANSI standards. However, a review of the procurement documents indicates that the crane specifications exceed the scope of the mandatory safety features required by ANSI B30.2-1967. The Licensee believes that ANSI B30.2-1967 complies with the NRC requirement for equivalence to ANSI B30.2-1976.

Since CMAA-70 and B30.2-1976 apply to top running, overhead bridge and gantry cranes, the balance of the cranes listed in Section 2.1.1 of this report are not covered by these specifications. In addition, the miscellaneous cranes and hoists purchased for Peach Bottom Units 2 and 3 were industry standard hoists and monorails required to comply with portions of EOCI-61.

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.

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 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 nonsymmetrical girder sections (e.g., channels).

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) requirements 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.

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.

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).

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.

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.

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.

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.

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 cranes subject to this review.

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 conjunction 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.

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.

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.

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.

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:

1. nonsymmetrical girder sections were not used in construction of the cranes

2. any longitudinal stiffeners in use conform to the requirements of CMAA-70, and allowable h/t ratios in box girders using these stiffeners do not exceed ratios specified in CMAA-70

3. girders with b/c ratios in excess of 38 were not used

4. fatigue failure was considered in crane design and the number of design loading cycles at or near rated load was less than 20,000 cycles

5. the sum of maximum crane load weight and the weight of the bottom block, divided by the number of parts of rope, does not exceed 20% of the manufacturer's published rope breaking strength

6. drum design calculations were based on the combination of crushing and bending loads

7. drum groove depth and pitch conform to the recommendations of CMAA-70

8. gear horsepower ratings were based on design allowables and calculation methodology equivalent to that incorporated into CMAA-70

9. cab-control, cab-on-trolley configurations were not used

10. mechanical load brakes or hoist holding brakes with torque ratings of approximately 125% of the hoist motor torque were used

11. crane operation under load near the end of the bridge or trolley travel is not allowed or is compensated for by bumpers and stops which satisfy the intent of CMAA-70

12. any static control systems in use conform to the requirements of CMAA-70

13. controllers used were of the spring-return or momentary-contact push button type.

2.2 INTERIM PROTECTION MEASURES

The NRC has established six interim protection measures to be implemented at operating nuclear power plants to provide reasonable assurance that no heavy loads will be handled over the spent fuel pool and that measures exist to reduce the potential for accidental load drops to impact on fuel in the core or spent fuel pool. Four of the six interim measures of the report consist of Guideline 1, Safe Load Paths; Guideline 2, Load Handling Procedures; Guideline 3, Crane Operator Training; and Guideline 6, Cranes (Inspection, Testing, and Maintenance). The two remaining interim measures encompass the following criteria:

1. heavy load technical specifications

2. special review for heavy loads handled over the core.

The Licensee's implementation of these interim protection measures is summarized and evaluated in the succeeding paragraphs of this section.

2.2.1 Technical Specifications [Interim Protection Measure 1, NUREG-0612, Section 5.3(1)]

> "Licenses for all operating reactors not having a single-failure-proof overhead crane in the fuel storage pool area should be revised to include a specification comparable to Standard Technical Specification 3.9.7, 'Crane Travel - Spent Fuel Storage Pool Building,' for PWR's and Standard Technical Specification 3.9.6.2, 'Crane Travel,' for PWR's, to prohibit handling of heavy loads over fuel in the storage pool until implementation of measures which satisfy the guidelines of Section 5.1."

a. Summary of Licensee Statements and Conclusions

Although the Licensee did not make a specific statement regarding Interim Protection Measure 1, Special Precaution 2 of Procedure M17.2 (Reactor Building Crane Operation) states the following:

> "Loads of 1000 lbs or greater shall not be moved over fuel assemblies in the fuel pool at any time, per Tech. Spec. 3.10.D."

b. Evaluation, Conclusions, and Recommendations

Peach Bottom Units 2 and 3 comply with Interim Protection Measure 1 based on the limitations contained in Technical Specification 3.10.D.

2.2.2 Administrative Controls [Interim Protection Measures 2, 3, 4, and 5, NUREG-0612, Sections 5.3(2)-5.3(5)]

> "Procedural or administrative measures [including safe load paths, load handling procedures, crane operator training, and crane inspection]... can be accomplished in a short time period and need not be delayed for completion of evaluations and modifications to satisfy the guidelines of Section 5.1 of [NUREG-0612]."

a. Summary of Licensee Statements and Conclusions

Summaries of the Licensee's statements and conclusions are contained in discussions of the respective general guidelines in Sections 2.1.2, 2.1.3, 2.1.4, and 2.1.7.

b. Evaluations, Conclusions, and Recommendations

FRC's evaluations, conclusions, and recommendations are contained in discussions of the respective general guidelines in Sections 2.1.2, 2.1.3, 2.1.4, and 2.1.7.

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

"Special attention should be given to procedures, equipment, and personnel for the handling of heavy loads over the core, such as vessel internals or vessel inspection tools. This special review should include the following for these loads: (1) review of procedures for installation of rigging or lifting devices and movement of the load to assure that sufficient detail is provided and that instructions are clear and concise; (2) visual inspections of load bearing components of cranes, slings, and special lifting devices to identify flaws or deficiencies that could lead to failure of the component; (3) appropriate repair and replacement of defective components; and (4) verify that the crane operators have been properly trained and are familiar with specific procedures used in handling these loads, e.g., hand signals, conduct of operations, and content of procedures."

a. Summary of Licensee Statements and Conclusions

The Licensee made no statements regarding implementation of the requirements of Interim Protection Measure 6 of 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.

3. CONCLUDING SUMMARY

This summary is provided to consolidate the conclusions and recommendations of Section 2 and to document FRC's overall evaluation of the handling of heavy loads at PECO's Peach Bottom Units 2 and 3. It is divided into two sections dealing with (1) general provisions for load handling at nuclear power plants (NUREG-0612, Section 5.1.1) and (2) the staff recommendations for interim protection, pending complete implementation of the guidelines of NUREG-0612, Section 5.3. In each case, recommendations are made for additional Licensee action and, where appropriate, for additional NRC staff action.

3.1 GENERAL PROVISIONS FOR LOAD HANDLING

The NRC staff has established seven guidelines concerning provisions for handling heavy loads in the area of the reactor vessel, near stored spent fuel, or in other areas where an accidental load drop could damage safe shutdown systems. Compliance with these guidelines is necessary to ensure that load handling system design, administrative controls, and operator training and qualification are such that the possibility of a load drop is very small for the critical functions performed by cranes at nuclear power plants. These guidelines are partially satisfied at Peach Bottom Units 2 and 3. This conclusion is summarized in Table 3.1. Specific recommendations for achieving full compliance with these guidelines are as follows:

Guideline		Recommendation
1	a.	Verify that safe load paths are detailed in load handling procedures.
	b.	Verify that safe load paths are adequately marked to meet the intent of NUREG-0612, Section 5.1.1(1).
	c.	Verify that deviations from established safe load paths require written alternatives that are approved by the plant safety review committee.

Table 3.1 Peach Bottom/NUREG-0612 Compliance Matrix

Heavy Loads	Weight or Capacity (tons)	Guideline 1 Safe Load Paths	Guideline 2 Procedures	Guideline 3 Crane Operator Training	Guideline 4 Special Lifting Devices	Guideline 5 Slings	Guideline 6 Crane - Test and Inspection	Guideline 7 Crane Design	Interim Measure 1 Technical Specifications	Interim Measure 6 Special Attention
1. Reactor Building Crane	I	--	--	C	--	--	C	I	--	--
a. Shield Plug	95	I	P	--	--	NC	--	--	--	I
b. Pool Plug	44	I	P	--	--	NC	--	--	C	--
c. Slot Plug (Fuel Pool)	5.5	I	P	--	--	NC	--	--	C	--
d. Drywell Head	6.5	I	P	--	I	--	--	--	--	I
e. RV Head	100	I	P	--	I	--	--	--	--	I
f. Steam Dryer	31	I	P	--	--	NC	--	--	--	I
g. Steam Separator	52	I	P	--	--	NC	--	--	--	I
h. Fuel Cask	100/37.1	I	P	--	I	--	--	--	C	--
i. Fuel Pool Gate No. 1	3.25	I	P	--	--	NC	--	--	C	--
j. Fuel Pool Gate No. 2	3.25	I	P	--	--	NC	--	--	C	--
k. Refueling Channel Shield	22	I	P	--	--	NC	--	--	C	--
l. Personnel Basket	4	I	P	--	--		--	--	-	--

C = Licensee action complies with NUREG-0612 Guideline.
P = Licensee action partially complies with NUREG-0612 Guideline.
NC = Licensee action does not comply with NUREG-0612 Guideline.
I = Insufficient information provided by the Licensee.
-- = Not applicable.

Table 3.1 (Cont.)

Heavy Loads	Weight or Capacity (tons)	Guideline 1 Safe Load Paths	Guideline 2 Procedures	Guideline 3 Crane Operator Training	Guideline 4 Special Lifting Devices	Guideline 5 Slings	Guideline 6 Crane - Test and Inspection	Guideline 7 Crane Design	Interim Measure 1 Technical Specifications	Interim Measure 6 Special Attention
m. Fuel Bundle	0.35	I	P	--	I	--	--	--	--	I
n. Spent Fuel Storage Rack	0.86	I	P	--	I	--	--	--	C	--
o. Equipment Handling Platform	2	I	P	--	--	NC	--	--	--	I
p. RPV-Drywell Head Strong-back	3.1	I	P	--	--		--	--	--	I
q. Fuel Cask Yoke	1.41	I	P	--	I	--	--	--	C	--
r. Hydraulic Tensioner	3.1	I	P	--	I	--	--	--	--	--
s. Dryer-Separator Sling	1.75	I	P	--	--	NC	--	--	--	I
t. Crane Hook	0.9	I	P	--	--	NC	--	--	C	I
u. Load Block	7.2	I	P	--	--	NC	--	--	C	I
v. Head Stud Rack	1.5	I	P	--	--	NC	--	--	--	I
w. Service Platform	2	I	P	--	I	--	--	--	--	I
x. In-Service Shielding	70	I	P	--	--	NC	--	--	--	--
y. In-Vessel Hydrolyzer	0.45	I	P	--	--	NC	--	--	--	I
z. Flange Protector	0.10	I	P	--	--	NC	--	--	--	--
aa. Hatch Cover	I	I	I	--	--	NC	--	--	--	--

Table 3.1 (Cont.)

Heavy Loads	Weight or Capacity (tons)	Guideline 1 Safe Load Paths	Guideline 2 Procedures	Guideline 3 Crane Operator Training	Guideline 4 Special Lifting Devices	Guideline 5 Slings	Guideline 6 Crane - Test and Inspection	Guideline 7 Crane Design	Interim Measure 1 Technical Specifications	Interim Measure 6 Special Attention
2. Turbine Bldg. Crane	I	--	--	C	--	--	C	I		
a. Gen. Wound Rotor	205	I	P	--	I	--	--	--	--	--
b. Gen. Outer End Sect.	44	I	P	--	--	NC	--	--	--	--
c. Gen. Trunnion	8	I	P	--	--	NC	--	--	--	--
d. Gen. Outer Shield (Upper)	10.3	I	P	--	--	NC	--	--	--	--
e. Gen. Outer Shield (Lower)	10.8	I	P	--	--	NC	--	--	--	--
f. Gen. Inner Shield	1	I	P	--	--	NC	--	--	--	--
g. Gen. Terminal Box	10.3	I	P	--	--	NC	--	--	--	--
h. HP Turbine Outer Shell (Upper)	72	I	P	--	--	NC	--	--	--	--
i. HP Turbine Outer Shell (Lower)	68	I	P	--	--	NC	--	--	--	--
j. HP Turbine Rotor	64	I	P	--	I	--	--	--	--	--
k. LP Turbine Exhaust Hood	63	I	P	--	--	NC	--	--	--	--
l. LP Turbine Inner Casing	60	I	P	--	--	NC	--	--	--	--
m. LP Turbine A-Rotor	144	I	P	--	I	--	--	--	--	--

Table 3.1 (Cont.)

Heavy Loads	Weight or Capacity (tons)	Guideline 1 Safe Load Paths	Guideline 2 Procedures	Guideline 3 Crane Operator Training	Guideline 4 Special Lifting Devices	Guideline 5 Slings	Guideline 6 Crane - Test and Inspection	Guideline 7 Crane Design	Interim Measure 1 Technical Specifications	Interim Measure 6 Special Attention
n. LP Turbine B-Rotor	149	I	P	--	I	--	--	--	--	--
o. LP Turbine C-Rotor	153	I	P	--	I	--	--	--	--	--
p. LP Turbine Diaphragm	6	I	P	--	--	NC	--	--	--	--
q. Lifting Bar (Tandem)	I	I	P	--	--	NC	--	--	--	--
r. Lifting Bar (Rotor)	I	I	P	--	--	NC	--	--	--	--
3. Diesel Generator Crane	I	--	--	C	--	--	C	I	--	--
a. Gen. Rotor	8.15	I	P	--	--	NC	--	--	--	--
b. Gen. Stator	6.5	I	P	--	--	NC	--	--	--	--
c. Crank Shaft	1.4	I	P	--	--	NC	--	--	--	--
d. Exhaust Silencer	1.83	I	P	--	--	NC	--	--	--	--
e. Compressed Air Cylinder	0.75	I	P	--	--	NC	--	--	--	--
f. Lube Oil Pump/Motor	1.2	I	P	--	--	NC	--	--	--	--
g. Cooling Water Heat Exchanger	1.61	I	P	--	--	NC	--	--	--	--
h. Lube Oil Heat Exchanger	0.7	I	P	--	--	NC	--	--	--	--
i. Air Cooler Coolant Heat Exchanger	1.9	I	P	--	--	NC	--	--	--	--

Table 3.1 (Cont.)

Heavy Loads	Weight or Capacity (tons)	Guideline 1 Safe Load Paths	Guideline 2 Procedures	Guideline 3 Crane Operator Training	Guideline 4 Special Lifting Devices	Guideline 5 Slings	Guideline 6 Crane - Test and Inspection	Guideline 7 Crane Design	Interim Measure 1 Technical Specifications	Interim Measure 6 Special Attention
j. Fuel Tank	0.73	I	P	--	--	NC	--	--	--	--
k. Local Control Board	1	I	P	--	--	NC	--	--	--	--
4. Recirculation Pump MG Hoist	I	--		--	--	--	--	--	--	--
a. Motor Rotor	7.63	I	P	--	--	NC	--	--	--	--
b. Motor Bearings	2	I	P	--	--	NC	--	--	--	--
c. Gen. Rotor	7.9	I	P	--	--	NC	--	--	--	--
d. Gen. Bearings	2	I	P	--	--	NC	--	--	--	--
e. Fluid Drive (Dry)	17.5	I	P	--	--	NC	--	--	--	--
f. Fluid Drive (Wet)	21	I	P	--	--	NC	--	--	--	--
5. Pump Structure Crane	I	--		C	--	--	C	I	--	--
a. HP SW Pump	3.5	I	P	--	--	NC	--	--	--	--
b. HP SW Pump Motor	3.75	I	P	--	--	NC	--	--	--	--
c. HP SW Pump Base	2	I	P	--	--	NC	--	--	--	--
d. Emergency SW Pump	2.75	I	P	--	--	NC	--	--	--	--
e. Emergency SW Pump Motor	1.5	I	P	--	--	NC	--	--	--	--
f. Fire Pump	1.15	I	P	--	--	NC	--	--	--	--

Table 3.1 (Cont.)

Heavy Loads	Weight or Capacity (tons)	Guideline 1 Safe Load Paths	Guideline 2 Procedures	Guideline 3 Crane Operator Training	Guideline 4 Special Lifting Devices	Guideline 5 Slings	Guideline 6 Crane - Test and Inspection	Guideline 7 Crane Design	Interim Measure 1 Technical Specifications	Interim Measure 6 Special Attention
g. Fire Pump Motor	C.6	I	P	--	--	NC	--	--	--	--
h. Fire Pump Diesel Drive	1.6	I	P	--	--	NC	--	--	--	--
i. Circ. Water Pump	17	I	P	--	--	NC	--	--	--	--
j. Circ. Water Pump Motor	18.8	I	P	--	--	NC	--	--	--	--
k. Service Water Pump & Motor	7.6	I	P	--	--	NC	--	--	--	--
6. Recirculation Pump Motor Hoist	I	--	--	--	--	--	--	--	--	--
a. Recirc. Pump Motor	21.5	I	P	--	--	NC	--	--	--	--
b. Recirc. Pump	13.6	I	P	--	--	NC	--	--	--	--
7. CRD Removal Platform Winch Hoist	1	I		--	--	--	--	--	--	--
8. CRD Removal Hoist	0.25	I		--	--	--	--	--	--	--
9. Equipment Access Lock Removal Hoist	I	--	--	--	--	--	--	--	--	--
a. Hatch Cover	3.5	I	P	--	--	NC	--	--	--	--
b. Concrete Shielding Block	0.8	I	P	--	--	NC	--	--	--	--
c. Concrete Plug	0.5	I	P	--	--	NC	--	--	--	--

Table 3.1 (Cont.)

Heavy Loads	Weight or Capacity (tons)	Guideline 1 Safe Load Paths	Guideline 2 Procedures	Guideline 3 Crane Operator Training	Guideline 4 Special Lifting Devices	Guideline 5 Slings	Guideline 6 Crane - Test and Inspection	Guideline 7 Crane Design	Interim Measure 1 Technical Specifications	Interim Measure 6 Special Attention
10. Personnel Lock Hoist	I	--		--	--	--	--	--	--	--
a. Recirc. Pump	13.6	I		--	--	NC	--	--	--	--
b. Recirc. Pump Motor	21.5	I	P	--	--	NC	--	--	--	--
c. Air Lock	24	I	P	--	--	NC	--	--	--	--
d. Concrete Shielding	0.8	I	P	--	--	NC	--	--	--	--
e. Concrete Plug	0.5	I	P	--	--	NC	--	--	--	--
11. Torus Equipment Removal Hoist	I	--	P	--	--	--	--	--	--	--
a. Access Hatch		I	P	--	--	NC	--	--	--	--
12. 15 Ton Yard Crane	15	--	P	C	--	--	C	I	--	--
a. Misc. Loads	15	I	P	--	--	NC	--	--	--	--
13. Precoat Materials Handling Hoist (Unit 2 only)	I	--	P	--	--	--	--	--	--	--
a. Misc. Loads	0.5	I	P	--	--	NC	--	--	--	--
14. Emergency Cooling Tower Jib Crane and Hoist	I	--	--	C	--	--	C	--	--	--
a. Misc. Loads	0.5	I	P	--	--	NC	--	--	--	--
15. CRD Transport Jib Crane	I	--	--	C	--	--	C	--	--	--
a. Misc. Loads	3	I	P	--	--	NC	--	--	--	--
16. CRD Maintenance Bridge Crane	I	I	P	C	--	NC	C	I	--	--

Guideline		Recommendation
2	a.	Verify that procedures in use for load handling equipment cover handling of site-specific loads equivalent to those listed in Table 3-1.1 of NUREG-0612.
	b.	Verify that procedures contain the information required by this guideline (i.e., identification of equipment inspection and acceptance criteria, sequence to be followed, safe load paths, and precautions).
3		Peach Bottom Units 2 and 3 will comply with this guidline when revised procedures are implemented.
4		Provide information relative to Sections 3, 4, and 5 of ANSI N14.6-1978.
5		Verify that slings conform to ANSI B30.9-1971.
6		Crane maintenence procedures at Peach Bottom Units 2 and 3 satisfy the requirements of this guideline.
7		Provide the information identified in Sections 2.1.8(b) and (c) of this report.

3.2 INTERIM PROTECTION MEASURES

The NRC staff has established in NUREG-0612, Section 5.3, certain measures that should be initiated to provide reasonable assurance that handling of heavy loads will be performed in a safe manner until final implementation of the general guidelines of NUREG-0612, Section 5.1 is complete. Specified measures include the implementation of a technical specification to prohibit the handling of heavy loads over fuel in the storage pool; compliance with Guidelines 1, 2, 3, and 6 of NUREG-0612, Section 5.1.1; a review of load handling procedures and operator training; and a visual inspection program, including component repair or replacement, as necessary, of cranes, slings, and special lifting devices to eliminate deficiencies that could lead to component failure. At Peach Bottom Units 2 and 3, the following actions are necessary to ensure that the NRC staff's measures for interim protection are met:

Interim Measure	Recommendation
1	(Peach Bottom Units 2 and 3 comply with this interim protection measure.)

Interim Measure	Recommendation (Cont.)
2, 3	Implement the recommendations of Guidelines 1 and 2.
4, 5	(Peach Bottom Units 2 and 3 comply with these interim protection measures.)
6	Provide sufficient information to allow an evaluation of compliance with Interim Protection Measure 6.

3.3 SUMMARY

The NRC's general guidelines and interim protection measures outlined in NUREG-0612 have not been fully satisfied at Peach Bottom Units 2 and 3. In three areas (crane operator training, crane testing and inspection, and restriction on heavy load handling over the fuel storage pool), the Licensee has provided information sufficient to verify compliance with the requirements of NUREG-0612. Licensee action is required on the remaining general guidelines and interim protection measures in order for Peach Bottom Units 2 and 3 to fully comply with NUREG-0612.

4. REFERENCES

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