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TECHNICAL EVALUATION REPORT

CONTROL OF HEAVY LOADS (C-10)

JERSEY CENTRAL POWER AND LIGHT COMPANY
OYSTER CREEK NUCLEAR POWER PLANT

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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.

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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 the Jersey Central Power & Light Company's (JCP&L) Oyster Creek Nuclear Power Plant. This evaluation was performed with the following objectives:

- o 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
- o 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 in 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-part 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 so 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 is summarized as follows:

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 JCP&L, the Licensee for the Oyster Creek plant, requesting that the Licensee review provisions for handling and control of heavy loads at the Oyster Creek plant, 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 September 22, 1981, JCP&L provided the initial response [4] to this request.

2. EVALUATION AND RECOMMENDATIONS

The evaluation of load handling at the Oyster Creek plant is divided into two categories. These categories deal separately with the general guidelines of Section 5.1.1 and the recommended interim protection measures of Section 5.3 of NUREG-0612. Applicable guidelines are referenced in each category. The conclusion 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 the evaluation of this verification are contained in Sections 2.1.1 through 2.1.8 of this report.

2.1.1 NUREG-0612, Heavy Loads Overhead Handling Systems

a. Summary of Licensee Statements and Conclusions

The Licensee has stated that a review of load handling systems at the Oyster Creek plant indicates the following load handling systems are subject to NUREG-0612:

- o Reactor building crane
- o Recirculation pump monorail
- o Drywell air lock monorail.

The Licensee has also identified other load handling devices that have been excluded from satisfying the criteria of the general guidelines of NUREG-0612 due to physical separation from safe shutdown equipment or irradiated fuel; these devices include:

- o Machine shop monorail
- o Turbine building crane
- o Equipment handling monorail (outside CRD rebuild room at 75 ft elevation)
- o Filter and demineralizer monorail
- o Equipment handling monorail (adjacent to reactor building equipment hatch at 95 ft elevation)
- o Hatch bay crane
- o CRD rebuild room monorail
- o Railroad bay monorail
- o Jib crane (located 23' from reactor building equipment hatch)
- o Maintenance building crane
- o Radwaste building crane.

A second jib crane located adjacent to the reactor building equipment hatchway has been excluded from NUREG-0612 guidelines due to separation from the torus by the railroad bay floor. A conservative analysis shows that a heavy load drop by this crane will not result in perforation or scabbing of this floor.

The intake gantry crane has been excluded from NUREG-0612 applicability due to removal from service. If at some time in the future this crane is placed back into service, an evaluation will be performed to assure that NUREG-0612 criteria are satisfied.

Fuel pool jib cranes (3) and the refueling platform auxiliary hoists (3) are being evaluated for potential derating so that heavy loads cannot be handled by these load handling systems.

b. Evaluation

The Licensee's conclusions regarding the applicability of NUREG-0612 are acceptable with the exception of the jib crane located outside of the reactor building hatchway. The general guidelines of NUREG-0612 are to be satisfied for all load handling systems which carry heavy loads in the vicinity of safe shutdown equipment or irradiated fuel regardless of the fact that detailed structural analyses may indicate that a system safety function could continue following a load handling accident. Consequently, although the detailed structural analysis may exclude the jib crane from Phase II of NUREG-0612, the rationale is not suitable for exclusion from the Phase I general guidelines and interim actions.

c. Conclusions and Recommendations

The Oyster Creek plant partially complies with NUREG-0612 concerning heavy load overhead handling system applicability. In order to fully comply, the Licensee should evaluate the 3-ton jib crane located adjacent to the reactor building equipment hatchway relative to NUREG-0612 general guidelines and interim actions. In addition, the Licensee should provide the final determinations on the ratings of the fuel pool jib crane and the refueling platform auxiliary hosit for review.

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 addressed the handling of heavy loads by defining four safety class designations. Each heavy load is assigned one or more safety classes. The safe load path/procedural requirements corresponding to the assigned safety class have been added to the appropriate plant operating or maintenance procedures. When more than one safety class assignment was made for a particular load, the safe load path/procedural requirements of all safety class assignments were included in the procedures. Safety class definitions and their respective handling requirements are listed in Table 1, and loads contained in each safety class are listed in Table 2. These safety classes, by procedure, limit lift height and time over areas of concern for the most critical loads (Safety Class 1), define areas over which loads shall not be carried (Safety Class 2), or define safe load paths that follow, to the extent practical, structural floor members, using the minimum practical lift height (Safety Class 3).

For the reactor building crane load block, shipping casks, fuel channel crates, and new fuel containers, the Licensee stated that the primary concern is the potential for dropping these loads the full length of the equipment hatch located in the southeast quadrant. For these lifts, the crane will be oriented so that the crane hoist is directly over the main structural members for the track bay floor when moving these loads up or down the equipment hatch, in order to assure maximum available resistance-to-impact in the event of a load drop. In addition, the Licensee added that safe load paths will be defined for movement of shipping casks on the refueling floor prior to their use, including definition of load paths in specific procedures covering movement to and from the equipment hatch, spent fuel pool, and cask washdown area. These load paths will be defined by establishing boundaries around the floor area over which the cask may travel, will be shown on a drawing included in the procedure, and will be marked temporarily using tape on the refueling floor. Within these boundaries, move height will not exceed 6 inches above the floor (or small obstructions) and movement will follow structural members to the extent practical.

Each heavy load lift will be controlled by a designated individual who will be responsible for enforcing procedural requirements. Deviations from these procedures require a revision to procedures or a Temporary Procedure Change, either of which must be reviewed and approved by the Plant Operations Review Committee and the resident manager.

Table 1. Load Safety Classes and Safe Load Path Actions

Heavy Handling Situations	Safe Load Path/Procedural Actions Required
Safety Class 1: Load must be carried directly over (i.e., there are no intervening structures such as floors) spent fuel, the reactor vessel, or safe shutdown equipment.	Procedurally limit time and height load is carried over the area of concern; define laydown area, show on drawings included in the procedure the prescribed laydown area.
Safety Class 2: Load could be carried directly over spent fuel, the reactor vessel, or safe shutdown equipment, i.e., load can be handled during the time when spent fuel or the reactor vessel is exposed or safe shutdown equipment is required to be operable and there are no physical means (such as interlocks or mechanical stops) available to restrict load movement over these objects.	Procedurally limit time and height that load is carried over area of concern; define laydown area, show on drawings attached to procedure the prescribed safe load path and laydown area
Safety Class 3: Load could be carried over spent fuel or safe shutdown equipment, but the fuel or equipment is not directly exposed to the load drop, i.e., intervening structures such as floors provide some protection.	See 3A and 3B below.
Safety Class 3A: Preliminary evaluation indicated that intervening structures protect spent fuel or safe shutdown equipment.	No load travel path is required at this time. General precaution limiting load travel height is prudent.
Safety Class 3B: Preliminary evaluation cannot conclusively demonstrate that intervening structures will protect fuel or safe shutdown equipment.	Define safe load paths that follow, to the extent practical, structural floor members. Define laydown areas. Limit load travel height to minimum height practical. Load paths and laydown areas shown on drawings attached to procedures.
Safety Class 4: Load cannot be carried over spent fuel or over safe shutdown equipment when such equipment is required to be operable, i.e., design or operational limitations prohibit movement.	No safe load path or special procedural actions required.

Table 2. Heavy Load Safety Classification

Safety Classification	Heavy Load	Additional Safety Classes
1	Drywell head	3B
	Reactor vessel head	3B
	Steam dryer	3A
	Steam separator	3A
2	Fuel pool gates	-
	Spent fuel casks	3B
	Fuel transfer shield	-
	Equipment storage pool shield plugs	3B
	Dryer/separator sling assembly	-
	Fuel storage pool shield plugs	3B
	Head strongback	-
	Stud tensioner assembly	-
3A	Reactor vessel head insulation	-
3B	Plant equipment	
	New fuel and shipping containers	

b. Evaluation

The Licensee's response has been evaluated with respect to the NRC's objective, as discussed in Section 1.2 of this evaluation, which is to achieve a defense-in-depth approach for the handling of heavy loads. Two distinct phases of implementation are to be accomplished to achieve this goal:

- o first phase - overall improvement of procedures, training, maintenance, and verification of crane and lifting device design, as well as establishment of safe travel paths which avoid irradiated fuel and safe shutdown equipment, as a means to assure reliable operation of handling systems.
- o second phase - implementation of additional safeguards by satisfying single-failure-proof crane criteria; or installation of mechanical or electrical interlocks; or performance of analyses that substantiate the Licensee's contention that damage to irradiated fuel will not exceed limits for criticality or release of radioactivity, or that damage to redundant or dual safe shutdown systems will not result in loss of required safety functions.

The intent of the first phase of NUREG-0612 is to ensure that all cranes operating in the vicinity of irradiated-fuel or safe shutdown equipment meet the requirements of the general guidelines (Section 5.1.1) with no regard or credit given for system redundancy, mechanical or electrical interlocks, administrative procedures, or single-failure-proof cranes. The intent of Guideline 1 is to ensure the existence of preconceived and defined load paths, developed by knowledgeable engineering staff familiar with overall plant arrangement and equipment functions, so that the direction of load movements is not the responsibility of individual crane operators or maintenance supervisors who may not be knowledgeable of various functions or locations of safety-related equipment.

The Licensee's method of identifying safety classes and differentiating the relative safety significance of the identified loads is satisfactory.

As noted by the Licensee for Class 1, 2, and 3B loads, the most direct route to the laydown area is most likely to be an acceptable load path. Other precautions taken by the Licensee (defining laydown areas and incorporating drawings into plant procedures) are adequate to meet the intent of Guideline 1.

In addition to these, however, the Licensee should provide suitable visual assistance to the crane operator (i.e., tape, stanchions, or other suitable temporary markings).

For loads with Class 3A designation, the Licensee's position that load paths are not required on the basis of a preliminary evaluation of protection is not consistent with the requirements of NUREG-0612. As previously discussed, such an evaluation could be performed during implementation of the second phase of NUREG-0612, but does not preclude compliance with the general guidelines of Section 5.1.1. Since these loads are handled directly over irradiated fuel in the reactor vessel, the Licensee should implement the same precautions as for Class 1, 2 and 3B loads, i.e., safe load path definitions, laydown areas, incorporation into load handling procedures, and use of visual assistance for the crane operator.

c. Conclusions and Recommendations

The Oyster Creek plant partially complies with Guidelines 1. To fully comply, the Licensee should perform the following:

1. For Class 1, 2, and 3B loads, provide the crane operator with a suitable means of visual assistance while moving the load.
2. For Class 3A loads, implement the same procedures for safe load paths that have been met by other load classes at the Oyster Creek plant.

2.1.3 Load Handling Procedures, [Guideline 3, 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 indicated that the following lifting procedures are used at the Oyster Creek plant:

219.1 - NAC-1 spent fuel cask handling procedure for non-fueling bearing components

219.2 - Handling of the GE series 200 cask

219.4 - NAC-1 spent fuel cask handling procedures

205.0 - Reactor refueling

701.1.001 - Reactor vessel head removal and replacement

701.1.002 - Reactor vessel steam dryer and steam separator removal and replacement

701.1.003 - Reactor vessel insulation removal and replacement

704.1.002 - Drywell head removal and replacement

756.1.002 - Fuel transfer shield installation and removal

756.1.003 - Shield plugs removal and replacement

756.1.004 - Fuel pool gates removal and installation.

The Licensee has stated that, with the exception of 205.0 and 219.2, all lifting procedures have been revised to satisfy the requirements of Section 5.1.1(2) of NUREG-0612 including:

1. description of the safety concern in the handling of heavy loads with the reactor building bridge crane
2. safe load paths
3. precautions
4. prerequisites
5. identification of proper handling equipment
6. training and qualification requirements for crane operators
7. verification that required detailed inspections have been performed
8. sling selection criteria
9. required crane inspecton by operator prior to load handling

10. supervision of work involving a heavy load lift by a designated job supervisor

11. critical steps in order to perform the lift.

In addition, the Licensee has indicated that new procedures pertaining to operation of the reactor building bridge crane are being developed.

b. Evaluation

The implementation of procedural controls on load handling at the Oyster Creek plant meets the intent of Guideline 2 of NUREG-0612 based on the Licensee's description of Oyster Creek plant lifting procedures. Although not clearly stated, the Licensee should ensure that lifting procedures 205.0 and 219.2 meet the criteria of NUREG-0612, Section 5.1.1(2). These procedures and the revised reactor building bridge crane operation procedures should be available for NRC site review.

c. Conclusions and Recommendations

The Oyster Creek plant complies with Guideline 2 of NUREG-0612.

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' [5]."

a. Summary of Licensee Statements and Conclusions

The Licensee has stated that the current practices for qualifications and training of crane operators essentially cover the provisions of ANSI B30.2-1976, Chapter 2-3. These practices are not in the form of an approved procedure. Portions of the training are performed by the maintenanace supervisor and other portions are performed by the plant training staff. A new pr :edure with qualification records has been developed and implemented in order .o formalize the program for crane operator qualification for the reactor building crane.

The Licensee has taken an exception to ANSI B30.2-1976 with respect to Section 2-3.1.7, "Conduct of Operators, Part F." The standard requires that "before leaving the crane unattended, the operator shall land any attached load, place the controllers in the "off" position, and open the main line device of the specific crane." However, during reactor disassembly at the Oyster Creek plant, it is necessary to keep the steam separator covered with water during handling to maintain exposure levels as low as practicable. Consequently, the separator is raised incrementally, and then left suspended until the water level rises sufficiently to allow additional raising of the separator. The separator may stay suspended at one level as long as 1 1/2 hours while flooding is proceeding. During these periods when the separator is left suspended, the crane operator may leave the cab until recalled. However, prior to leaving the crane, the operator places the controller in the "off" position and opens the main line device.

b. Evaluation

Crane operator training at the Oyster Creek plant is considered acceptable based on the Licensee's verification that the program meets the provisions of ANSI B30.2-1976 and that a new procedure has been developed to formalize the program. The Licensee's exception to Chapter 2-3, Section 2.-3.1.7 concerning leaving the crane unattended while load is acceptable based upon the specified manner in which the crane is secured. However, it should be noted that the refueling practice of leaving a charge load suspended directly over the core or moved incrementally over a long period of time appears to be an unnecessary risk to the safety of the reactor core and vessel.

c. Conclusions and Recommendations

Oyster Creek Nuclear Station complies with Guideline 3 of NUREG-0612 concerning crane operator training. However, consideration should be given to revising the refueling procedure to reduce the time that the separator is suspended above the core.

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' [6]. 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 stress design factor on only the weight (static load) of the load and of the intervening components of the special handling device [NUREG-0612, Guideline 5.1.1(4)]."

a. Summary of Licensee Statements and Conclusions

The Licensee has indicated that there are six handling devices made up for special applications and currently used in handling heavy loads:

1. dryer/separator sling
2. head strongback
3. cask yokes and slings
4. fuel transfer shield slings
5. cavity shield plug lifting beam
6. equipment storage pool plug lifting beam.

The comparison of these special lifting devices to ANSI N14.6-1978 was limited to Sections 3.2 and 5 of the standard. The Licensee's review indicated the following exception to ANSI N14.6-1978:

1. Sections 3.1 (Designer's Responsibilities), 3.3 (Design Considerations), 4.1 (Fabricator's Responsibilities), 4.2 (Inspector's Responsibilities), and 4.3 (Fabricator's Considerations) are difficult to apply in retrospect. However, information on drawings indicates that sound engineering practices were placed on the fabricator and the inspector for the purpose of ensuring that the designer's intent was accomplished.

2. Sections 1.0 (Scope), 2.0 (Definitions), 3.4 (Design Considerations to Minimize Decontamination Effects in Special Lifting Device Use), 3.5 (Castings), and 3.6 (Lubricants) are not pertinent to load handling reliability.

3. Section 6, Special Lifting Devices for Critical Loads, is not applicable at the Oyster Creek plant because none of the loads lifted by these devices has been identified to be a critical load.

4. Plant procedures do not specify a visual inspection by maintenance or other non-operating personnel at intervals of 3 months or less as required by Section 5.3.7 of ANSI N14.6-1978. Procedures have been revised so that these devices are inspected by a qualified personnel prior to each usage and so that a thorough testing and nondestructive examination is performed prior to each refueling.

5. Section 5.3.3 of ANSI N14.6-1978 requires that special lifting devices be load tested according to Section 5.2.1 to 150% of maximum load following any incident in which any load-bearing component may have been subjected to stresses substantially in excess of those for which it was qualified by previous testing, or following an incident that may have caused permanent distortion of load bearing parts. Since distortion may already have occurred or since defects may have already developed due to the overstressed condition, it seems more prudent and practical to perform the dimensional examinations for deformation and the NDE for defects to determine whether the device is still acceptable for use rather than subject the device to 150% load testing. If defects or deformation are detected, then the device shall be repaired or modified and the tested to 150% load followed by examination for defects or deformation.

During the Licensee's review of special lifting devices against Sections 3.2 and 5 of ANSI N14.6-1978, the following results were obtained:

1. The dryer/separator sling design exceeds the criteria in ANSI B30.9 and ANSI N14.6. In addition, a preventive maintenance procedure has been developed for inspection of this lifting device in accordance with ANSI B30.9 and ANSI N14.6.

2. The head strongback drawings are available showing dimensional and material requirements and types of welds to be used for each weldment. However, information on stress analyses that may have been performed, design safety factors used, load tests performed, or processes and standards used in fabrication are not available. Accordingly, the Licensee has agreed to perform a stress analysis and design evaluation to demonstrate the adequacy of the design. A preventive maintenance procedure including visual and NDE examination and inspections prior to each refueling has been developed to comply with ANSI N14.6 criteria.

3. For casks (including NAC-1) having unique special lifing devices or yokes, the lifting devices are the property of the cask owner. Accordingly, procedures have been revised to require that a certification be obtained from the cask owner, prior to handling the

cask on-site, that verifies the cask lifting device or yoke design satisfies the criteria of ANSI N14.6, Section 3.2, and that the device has been inspected and maintained in accordance with ANSI N14.6, Section 5.0.

4. The fuel transfer shield sling is used for the shield and the GE200 cask. The design of the sling assembly was compared to ANSI B30.9 and found to exceed the criteria in this standard. In addition, a new preventive maintenance procedure [illegible] omplies with ANSI B30.9 criteria requires inspections ofthe slings prior to each refueling.

5. The cavity shield plug and equipment storage pool plug lifting beams have insufficient documentation to evaluate the beams against the criteria of ANSI N14.6. Therefore, the Licensee has agreed to perform a stress analysis and design evaluation of these lifting beams if the documentation cannot be located. A preventive maintenance program that includes examination and inspection to satisfy ANSI N14.6 has been developed.

A new lifting device for the core spray sparger will be evaluated against the design criteria of ANSI N14.6 when the design of the sparger and strongback are finalized.

b. Evaluation

The Oyster Creek plant satisfies the criteria of ANSI N14.6-1978 Section 3.2 (Design Criteria) for the dryer/separator sling and the fuel transfer shield sling based upon verification by the Licensee that the design meets or exceeds the criteria in ANSI N14.6 and /or ANSI B30.9. The head strongback, cavity shield plug lifting beam, and the equipment storage pool plug lifting beam will require additional analyses (i.e., stress analysis and design evaluations) before a proper evaluation can be performed.

The preventive maintenance program referenced by the Licensee appears to address the need for continuing compliance testing in Section 5 of ANSI N14.6. However, insufficient information has been provided to ensure that [illegible]oper initial acceptance testing was performed.

The Licensee's response that Subsections 3.4, 3.5, and 3.6, Section 4, and Section 6 of ANSI N14.6-1978 are not applicable or pertinent is acceptable. However, evaluation of Section 3.1 and 3.3 indicates that the Licensee should verify that the criteria listed in these sections are satisfied. This verification should include evidence that the information required in Section 3.1 is available and that the design considerations specified in Section 3.3 have been complied with for existing lifting devices.

The Licensee's decision to require visual inspection by non-operating or maintenance personnel prior to each use is acceptable. However, the Licensee's proposal to perform only nondestructive and dimensional examinations to identify deformations or overstressed members in lieu of the combination of load test and examination specified by Section 5.3.3 is not equivalent to the requirements of ANSI N14.6. Any overstress condition would probably result from an uncontrollable event and, as such, the amount and duration of the stress applied in excess of the rated load would not necessarily be known to the personnel responsible for the lifting device. Therefore, the Licensee should perform the 150% load test of the lifting devices, as specified in ANSI N14.6-1978. By applying a known load in a controlled fashion for a specified duration, the integrity of the lifting device will be demonstrated and the design margins established; merely performing the nondestructive examinations will not demonstrate or provide these assurances.

Finally, the Licensee's intention of requiring cask owners to meet the requirements of ANSI N14.6 Sections 3.2 and 5.0, prior to handling the cask on-site is acceptable.

c. Conclusions and Recommendations

The Oyster Creek plant substantially complies with Guideline 4 of NUREG-0612. In order to fully comply, the following Licensee action is recommended:

1. Verify that the criteria identified in Sections 3.1 and 3.3 of ANSI N14.6-1978 have been complied with for special lifting devices at Oyster Creek.

2. Verify that initial acceptable testing in accordance with Section 5.2 of ANSI N14.6 was accomplished for each special lifting device.

3. Provide stress analysis and design evaluations for the head strongback, cavity shield plug lifting beam, and the equipment storage pool plug lifting beam.

4. Perform the load test and necessary inspections required by Section 5.3.3

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, [1] "Slings." 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 certian cranes, the slings should be clearly marked as to the cranes with which they may be used.

a. Summary of Licensee Statements and Conclusions

The Licensee has stated that, to assure that appropriate slings are selected for use in handling miscellaneous loads and that slings are properly maintained, the following program changes have been made:

1. Load handling procedures require the use of ANSI B30.9 criteria for sling selection and rigging techniques.

2. A new preventive maintenance procedures has been developed for annual inspection of slings.

3. Load handling procedures require a visual inspection of slings for damage prior to making a lift.

4. A tagging procedure has been developed for slings to identify sling rating, application, last examination, and expiration date of examination.

b. Evaluation

Sling installation and usage at the Oyster Creek plant substantially complies with NUREG-0612, Section 5.1.1(5). Insufficient information has been provided by the Licensee to verify that sling rating is based on the static load which produces the maximum static and dynamic load. In addition, no mention was made of marking slings for restricted use when applicable.

c. Conclusions and Recommendations

The Oyster Creek plant substantially complies with Guideline 5 of NUREG-0612. In order to fully comply, the following Licensee action is recommended:

1. Verify that sling rating is based on the static load which produces the maximin static and dynamic load.

2. Verify that slings restricted in use to certain loads are so marked.

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 when 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, tests, and maintenance should be performed prior to their use)."

a. Summary of Licensee Statements and Conclusions

The Licensee has stated that new procedures for inspection, testing, and maintenance of the reactor building crane are being developed. In addition, provisions were included in the new crane operation procedures, to include appropriate operator inspections prior to load movement. With these revisions and additions, the procedures satisfy the criteria in ANSI B30.2-1976, Chapter 2-2 with no exceptions.

b. Evaluation

Oyster Creek Nuclear Station complies with Section 5.1.1(6) of NUREG-0612 based on the Licensee's commitment to develop new procedures in compliance with ANSI B30.2-1971, Chapter 2-2.

c. Conclusions and Recommendations

The Oyster Creek plant complies with Guideline 6 of NUREG-0612.

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 [8], "Specifications for Electric Overhead Travelling Cranes". 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 reactor building crane was designed and fabricated by Whiting Corporation to the specifications in EOCI 61 [9], "Specifications for Electric Overhead Traveling Cranes-1961" and in accordance with additional requirements specified by the architect-engineer. At present, the Licensee is performing a review of the original specifications versus CMAA-70 (1975) and ANSI B30.2-1976.

b. Evaluation

The reactor building crane at the Oyster Creek plant substantially complies with the criteria specified in Guideline 7 because the original procurement specification was based on EOCI-61. A comparison of the recommendations of CMAA-70 with those of EOCI-61 has identified several areas where revisions incorporated into CMAA-70 may affect crane safety. The following is a summary of these differences:

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 crane 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. 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 to be 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 on crane safety margins of this variation 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 good engineering practice which should 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 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 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 procured when EOCI-61 was the standard. 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 ends 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. The Licensee stated that bumpers were selected based upon the manufacturer's experience and acceptability demonstrated by satisfactory performance in use; however, additional information should be provided to indicate that suitable precautions are taken to prevent operation of the bridge or trolley at substantial speed and under load near the end of travel.

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 consequence 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

The Oyster Creek plant complies with 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 the reactor building crane 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 crane

2. either longitudinal stiffeners were not used or their design and installation substantially conform to the requirements of CMAA-70, and allowable h/t ratios in box girders using longitudinal stiffeners do not exceed those 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

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

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

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

8. gear horsepower ratings were based on design allowables and calculation methodology equivalent to those incorporated in 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 bridge or trolley travel is not allowed or is compensated for by bumpers and stops in substantial conformance with the requirements 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 pushbutton 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 cover the following criteria:

1. Heavy load technical specifications
2. Special review for heavy loads handled over the core.

Licensee implementation and evaluation of these interim protection measures are contained 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 Building,' for PWR's and Standard Technical Specification 3.9.6.2, 'Crane Travel,' for BWR'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 [of NUREG-0612]."

a. Summary of Licensee Statements and Conclusions

A review of the Oyster Creek Technical Specifications indicates that Section 5.3.1(d) prohibits the movement of loads greater than the weight of one fuel assembly over irradiated fuel in the fuel pool.

b. Evaluation, Conclusions, and Recommendations

Oyster Creek Nuclear Station complies with Interim Protection Measure 1.

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 Licensee 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

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 Review for Heavy Loads Handled Over the Core [Interim Protection Measure 6, NUREG-0612, Section 5.3(6)]

"...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 operation, and content of procedures."

a. Summary of Licensee Statements and Conclusions

With regard to the implementation of interim actions, the Licensee has stated that the required changes to procedures have been developed and are currently being reviewed and approved. Full immplementation of the approved procedures will be effected prior to the next refueling outage.

b. Evaluation

The Licensee has adequately addressed the requirement for a review of all load handling procedures. However, insufficient information has been provided to determine if load bearing components of cranes, slings, and special lifting devices were visually inspected to identify flows or deficiencies that could lead to a failure of a component was performed, or if appropriate repairs or replacements have been accomplished. In addition, although the Guideline 3 response indicates the basis of an acceptable crane operator training program, the Licensee has not provided sufficient information to determine that a review of present crane operator qualifications has been performed.

c. Recommendations and Conclusions

Oyster Creek Nuclear Station partially complies with Interim Protection Measure 6 based on the Licensee's commitment to review and revise existing load handling procedures. In order to fully comply, the following Licensee action is recommended:

1. Verify that 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 have been performed, and the repair/replacement of identified components accomplished.

2. Verify that the crane operators have been properly trained and are familiar with specific procedures used in handling heavy loads over the core.

3. CONCLUDING SUMMARY

This summary is provided to consolidate the conclusions and recommendations of Section 2 and to document the overall evaluation of the handling of heavy loads at the Oyster Creek Nuclear Power Plant. It is divided into two sections, one dealing with general provisions for load handling at nuclear power plants (NUREG-0612, Section 5.1.1) and the other with staff recommendations for interim protection, pending complete implementation of the guidelines of NUREG-0612 (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 appropriately small for the critical functions and potential consequences of failures of cranes at nuclear power plants. These guidelines are partially satisfied at the Oyster Creek Nuclear Power Plant. This conclusion is presented in tabular form as Table 3.1. Specific recommendations for achieving full compliance with these guidelines are provided as follows:

Guideline	Recommendations
1	a. Provide visual aids which indicate safe load paths.
	b. Implement safe load path criteria for Class 3A loads consistent with those in existence for Class 1, 2, and 3B loads.
	c. Provide supporting information to verify that deviations from safe load paths require written alternatives approved by the plant safety review committee.
2	(The Oyster Creek plant complies with this guideline.)

Table 3. Oyster Creek Nuclear Station/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	100/5	--	--	--	--	--	C	I	--	--
a. Drywell Head	62	P	C	--	I	--	--	--	--	--
b. Reactor Vessel Head	52	P	C	--	I	--	--	--	--	I
c. Cavity Shield Plugs (8)	85 ea.	P	C	--	I	--	--	--	C	--
d. Reactor Vessel Head Insulation	5	P	C	--	--	I	--	--	C	--
e. Steam Dryer	26	P	C	--	I	--	--	--	--	I
f. Steam Separator	44	P	C	--	I	--	--	--	--	I
g. Fuel Pool Gates (2)	Approx. 1	P	C	--	--	I	--	--	C	--
h. Spent Fuel Cask	30/5	P	I	--	I	--	--	--	C	--
i. Fuel Transfer Shield	16.5	P	I	--	--	I	--	--	C	--

C = Licensee action complies with NUREG-0612 Guideline.
I = Insufficient information provided by the Licensee.
P = Licensee information indicates partial compliance.
-- = Not applicable.
R = Licensee has proposed revisions/modifications designed to comply with NUREG-0612 guidelines.

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Table 3 (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. Equipment Storage Pool Shield Plugs (4)	37.5-39	P	C	--	I	--	--	--	--	--
k. Dryer/Separator Sling Assembly	1.5	P	C	--	--	I	--	--	--	I
l. Fuel Storage Pool Shield Plugs (4)	4.5 ea.	P	C	--	--	I	--	--	C	--
m. Plant Equipment	Less than 20	P	R	--	--	I	--	--	C	--
n. New Fuel and Shipping Containers	1	P	R	--	--	I	--	--	--	--
o. Head Strongback	3.2	P	C	--	--	I	--	--	--	--
p. Stud Tensioner Assembly	10	P	R	--	--	I	--	--	--	--

Guideline	Recommendations
3	(The Oyster Creek plant complies with this guideline.)
4	a. Verify that the criteria identified in Sections 3.1 and 3.3 of ANSI N14.6-1978 have been complied with for special lifting devices.
	b. Verify that initial acceptance testing in accordance with Section 5.2 of ANSI N14.6-1978 was accomplished for each special lifting device.
	c. Provide stress analysis and design evaluations for the strongback, cavity shield plug lifting beam, and the equipment storage pool plug lifting beam.
	d. Perform the load test and necessary inspections as required inspections of Section 5.3.3.
5	a. Verify that sling rating is based on the states load which produces the maximum static and dynamic load.
	b. Verify that slings restricted in use to certain cranes are so marked.
6	(The Oyster Creek plant complies with this guideline.)
7	a. Provide data referenced in Section 2.1.8(c) to compare EOCI-61 and CMAA-70 for the reactor building crane.

In addition, the Licensee should consider the following recommendations:

1. Review the jib crane located outside the reactor building hatchway for inclusion under the guidelines of NUREG-0612.
2. Review the refueling procedures for alternative steps to reduce the time that the separator is suspended over the core.

3.2 INTERIM PROTECTION

The NRC staff has established (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. Evaluation of information provided by the Licensee indicates that the following actions are necessary to ensure that the staff's measures for interim protection at the Oyster Çreek Nuclear Power Plant:

Interim Measure	Recommendation
1	(The Oyster Creek plant complies with this protection measure.)
2	Implement the requirements of Guideline 1.
3, 4, 5	(The Oyster Creek plant complies with these protection measures.)
6	Implement the requirements of this interim protection measure as specified in Section 2.2.3(c).

3.3 SUMMARY

The NRC's general guidelines and interim protection measures outlined in NUREG-0612 have been substantially complied with at the Oyster Creek Nuclear Power Station. The evaluation has noted four areas (procedures, operator training, technical specifications and inspection, testing and maintenance) in which the Licensee has provided sufficient information to allow a definitive evaluation of compliance with NUREG-0612 criteria. Licensee action is required on the remaining general guidelines and interim protection measures.

4. REFERENCES

1. NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants"
NRC, July 1980

2. V. Stello, Jr. (NRC)
Letter to all Licensees
Subject: Request for Additional Information on Control of Heavy Loads Near Spent Fuel
17 May 1978

3. NRC
Letter to Jersey Central Power and Light Company (JCP&L)
Subject: Request for Review of Heavy Load Handling at Oyster Creek Nuclear Power Station
22 December 1980

4. J. T. Carroll (JCP&L)
Letter to D. G. Eisenhut (NRC)
Subject: Control of Heavy Loads
22 September 1981

5. ANSI B30.2-1976
"Overhead and Gantry Cranes

6. ANSI N14.6-1978
"Standard for Special Lifting Deivces for Shipping Containers Weighing 10,000 Pounds (4500 kg) or More for Nuclear Materials

7. ANSI B30.9-1971
"Slings"

8. CMAAA-70
"Specifications for Electric Overhead Traveling Cranes"
Crane Manufacturers Association of America, 1975

9. EOCI-61
"Specifications for Electric Overhead Traveling Cranes"
Electric Overhead Crane Institute, 1961