Enclosure

(DRAFT)

TECHNICAL EVALUATION REPORT

CONTROL OF HEAVY LOADS (C-10)

NORTHEAST NUCLEAR ENERGY COMPANY
MILLSTONE POINT NUCLEAR POWER STATION UNIT 1

NRC DOCKET NO. 50-245

NRC TAC NO. 08060

NRC CONTRACT NO. NRC-03-79-118

FRC PROJECT C5257

FRC ASSIGNMENT 3

FRC TASK 451

Prepared by

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

Author: T. Hofkin

FRC Group Leader: I. H. Sar

Prepared for

Nuclear Regulatory Commission
Washington, D.C. 20555

Lead NRC Engineer: F. Cler

July 27, 1982

Franklin Research Cent
A Division of The Franklin Institute

CONTENTS

TABLES

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. T. Hofkin and Mr. I. H. Sargent 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 an independent review of general load-handling policy and procedures at the Northeast Nuclear Energy Company's (NNECO) Millstone Point Nuclear Power Station Unit 1. 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 Nuclear Regulatory Commission (NRC) staff to systematically examine staff licensing criteria and the adequacy of measures in effect at operating nuclear power plants to ensure 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 provided to control the handling 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 part 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 part 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 ensure 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 NNECO, the Licensee for Millstone Unit 1, requesting that the Licensee review provisions for handling and control of heavy loads at Millstone Unit 1, 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. NNECO responded to this request on June 25, 1981 [4], on July 20, 1981 [5], and April 16, 1982 [6].

2. EVALUATION AND RECOMMENDATIONS

The evaluation of load handling at Millstone Unit 1 is divided into two categories. These categories deal separately with the general guidelines of Section 5.1.1 and the recommended interim measures of Section 5.3 of 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 by all overhead handling systems and procedures used to 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 this verification are contained in the succeeding paragraphs.

2.1.1 Overhead Heavy Load Handling Systems

a. Summary of Licensee Statements and Conclusions

The Licensee's review of overhead handling systems identified the reactor building crane and the intake structure monorail as cranes subject to the criteria of NUREG-0612.

The following handling systems were excluded on the basis that no safety-related equipment or irradiated fuel is located in close proximity:

- o core spray pump area miscellaneous rigging
- o FWCI pump area miscellaneous rigging
- o shutdown cooling pump miscellaneous rigging
- o fuel pool cooling pump area miscellaneous rigging.

b. Evaluation and Conclusion

The Licensee's exclusion of the above-mentioned systems from compliance with NUREG-0612 is acceptable on the basis of NNECO's justification that there is sufficient physical separation of any load impact point and any safety-related component.

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 stated that safe load paths have been defined in plant procedure MP 790.4, "Control of Heavy Loads." This procedure provides administrative controls which ensure that load handling operations remain within safe load paths, establishes the location of these paths and the responsibility for moving loads over the safe load paths, and specifies the manner in which deviations from these paths can be made. The Licensee approach is to define restricted areas and administratively prohibit crane operation in these areas. In addition, NNECO stated that it does not intend to permanently mark load paths on the floors in areas where loads are handled as these areas are frequently covered with clean synthetic canvas during crane operation periods, and therefore painted paths would not be visible to load handlers.

b. Evaluation

The Licensee's response indicates that load paths have been developed, defined in procedures, and incorporated into drawings. Use of restricted areas in lieu of specific load pathways, however, does not meet the intent of this guideline, particularly for heavy loads in the vicinity of the reactor vessel head. 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 avoids safe shutdown equipment and irradiated fuel and is not the responsibility of individual crane operators or maintenance supervisors who may not be knowledgeable about the functions or locations of this safety-related equipment. The use of restricted areas and administrative controls by the Licensee does not accomplish this objective.

Although the Licensee states that load paths will not be permanently marked, some equivalent means should be devised to provide the crane operator with suitable visual aids to ensure that load movement adheres to the established load path. Such aids may consist of tape, temporary stanchions, rope guidelines, or merely having a supervisor walk the path to verify it clear of obstructions. In addition, no verification has been provided by the Licensee that deviations from established load paths require written alternatives that must be approved by the plant safety review committee.

c. Conclusion and Recommendations

Millstone Unit 1 does not comply with Guideline 1. To comply, the following Licensee action is required:

1. designate specific load paths for the movement of those heavy loads identified by the Licensee.

2. provide suitable visual aids to assist crane operators when moving heavy loads along designated load paths.

3. verify that deviations from established load paths require written alternatives 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 stated that existing procedures have been revised and new procedures established which meet the intent of Guideline 2.

b. Evaluation, Conclusion, and Recommendation

NNECO complies with Guideline 2 for Millstone Unit 1 on the basis of the Licensee's verification.

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' [7]."

a. Summary of Licensee Statements and Conclusions

The Licensee stated that a training program for crane operators has been developed and will be implemented for new crane operators prior to being allowed to operate the cranes. Experienced crane operators have been qualified to operate particular overhead cranes based on their previously demonstrated skills. It is planned that experienced crane operators will also participate in the training program. No exceptions are being taken to the requirements of ANSI B30.2-1976 with respect to operator training, qualification, and conduct.

b. Evaluation, Conclusion, and Recommendations

NNECO complies with Guideline 3 for Millstone Unit 1 on the basis of the Licensee's verification that all crane operators will be trained in accordance with the requirements of this guideline, and that no exceptions were taken to ANSI B30.2-1976, Chapter 2-3.

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' [8]. 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 stated that the reactor head lifting rig and the dryer/separator slings and spreader rig have been analyzed for compliance with the requirements of Sections 3.2.1, 3.2.4, and 3.2.5 of ANSI N14.6-1978 and were found to satisfy these requirements with no exceptions. Also, due to the fact that a spent fuel cask lifting rig does not exist at Millstone Unit 1, verification of compliance for this lifting device cannot be accomplished.

The two special lifting devices, the reactor head lifting rig and dryer/separator spreader rig, were designed and manufactured prior to the existence of ANSI N14.6-1978. Upon review of ANSI N14.6-1978, the Licensee indicated that Sections 1, 2, and 7 are informational in nature and require no compliance. Sections 3.4, 3.5, and 3.6 do not relate to heavy load lifting reliability so verification of compliance has not been addressed for these sections. Sections 3.1, 3.2.2, 3.2.3, 3.2.6, 3.3, and 4 refer to fabrication requirements that are difficult to apply in retrospect. However, review of

design drawings and material specifications indicates that sound engineering practices were used and that the designer's intent was accomplished during fabrication. Section 5 remains under review to determine how the listed requirements can be applied to heavy load lifting reliability. Since critical loads at Millstone Unit 1 have not been determined, Section 6 of ANSI N14.6-1978 will be addressed after determination of the critical loads.

b. Evaluation

The information provided by the Licensee is not sufficient to allow a determination of compliance with Guideline 4 at Millstone Unit 1.

It is acknowledged that a strict interpretation of compliance of existing special lifting devices with the criteria of ANSI N14.6-1978 cannot be made. Accordingly, the Licensee's position that only those sections directly related to load handling reliability of the lifting devices need be addressed is within the intent of this guideline. As noted by the Licensee, several sections of ANSI N14.6-1978 do not contain requirements affecting load handling reliability: Scope (Section 1), Definitions (2), Design Considerations to Minimize Decontamination Efforts (3.4), Coatings (3.5), Lubrication (3.6), Inspector's Responsibilities (4.2), and Fabrication Considerations (4.3). In addition, evaluation of compliance with Section 6 (Special Lifting Devices for Critical Loads) need not be included in this review since no load has been determined to be a "critical load."

Several sections of ANSI N14.6-1978 contain requirements important to load handling reliability, including those sections that, due to insufficient documentation, the Licensee did not address, except to state that "sound engineering practices" were used in the design and construction of the lifting devices. Sections not addressed by the Licensee, as well as those which have been addressed, identify important information that should be readily available or requirements to which the Licensee should adhere in order to adequately substantiate the load handling reliability of the special lifting devices. Although this standard did not exist when lifting devices were designed and manufactured, it is not anticipated that obtaining information or complying with the standard's requirements will create undue hardship since

criteria of the standard are akin to established industry practices and this standard merely codifies such practices for special lifting devices. These special lifting devices are used for infrequent lifts of the plant's largest components, generally in the direct vicinity of irradiated fuel, which makes the reliability of design, fabrication, and continued testing of those special lifting devices a relatively sensitive concern for both the Licensee and the NRC.

A determination of compliance with Guideline 4 requires that the following specific sections of ANSI N14.6 be addressed:

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 strength (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 ensure 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 practices (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. Conclusion and Recommendation

From tne information provided, it cannot yet be determined whether special lifting devices at Millstone Unit 1 comply with Guideline 4. To fully comply, the Licensee should review actual design, fabrication, and the continuing testing program of all special lifting devices, addressing the specific sections of ANSI N14.6 identified in the independent evaluation.

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' [9] 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' that 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 wi which they may be used."

a. Summary of Licensee Statements and Conclusions

The Licensee made no statements regarding compliance of non-special lifting devices with the guidelines of ANSI B30.9-1971.

b. Evaluation

An evaluation of this item must be deferred until information is provided regarding compliance with the requirements of ANSI B30.9-1971, as supplemented by NUREG-0612, for any sling assemblies used to carry heavy loads at Millstone Unit 1.

c. Conclusion and Recommendations

Insufficient information has been provided to determine compliance with Guideline 5 for Millstone Unit 1. In order to satisfactorily comply with the guideline, NNECO should provide information to verify that:

1. installation and use of slings is in accordance with ANSI B30.9-1971.
2. selection of slings is based upon the sum of the static and maximum dynamic loads.
3. slings are marked with the static load in accordance with this guideline.
4. slings restricted in use to only certain cranes are clearly marked to so indicate.

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 stated that crane testing and maintenance is conducted by plant personnel and generally conforms to or exceeds the requirements of ANSI B30.2-1976. In addition, the reactor building crane and the turbine bridge crane have been inspected on an annual or "before use" basis. This inspection conforms to or exceeds ANSI B30.2-1976.

b. Evaluation, Conclusion, and Recommendation

NNECO complies with Guideline 6 for Millstone Unit 1 on the basis of the Licensee's verification that programs for crane inspection, testing, and maintenance meet or exceed the requirements of ANSI B30.2-1976.

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 Travelling Cranes' [10]. 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 reactor building bridge crane has been reviewed for compliance with the guidelines of CMAA-70 and ANSI B30.2-1976, Chapter 2-1. The Licensee stated that as a result of this review, no areas of non-compliance were noted with respect to CMAA-70. For ANSI B30.2-1976, the Licensee stated that Item 2-1.10.5 (power supply to the runway conductors to be controlled by a disconnect located on a fixed structure, locked open, and accessible from the floor) is the only item which is in non-compliance and will be corrected.

b. Evaluation

The requirements of Guideline 7 are substantially satisfied based on the Licensee's verification that only one item of non-compliance was noted in comparison of existing design with requirements of CMAA-70 and ANSI B30.2-1976.

c. Conclusion and Recommendation

NNECO will fully comply with Guideline 7 upon elimination of the noted item of noncompliance.

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. Evaluation

Review of Technical Specifications for Millstone Unit 1 indicates that Technical Specification 3.10.e (Crane Travel) prohibits the movement of the spent fuel cask over irradiated fuel in the spent fuel pool. This specification does not satisfy the current criteria to prohibit movement of all heavy loads over irradiated fuel in the spent fuel pool.

b. Conclusion and Recommendation

Millstone Unit 1 does not comply with Interim Protection Measure 1 and should implement the criteria of this interim measure as specified.

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. Evaluation

The specific requirements for load-handling administrative controls are contained in NUREG-0612, Section 5.1.1, Guidelines 1, 2, 3, and 6. The Licensee's compliance with these guidelines has been evaluated in Sections 2.1.2, 2.1.3, 2.1.4, and 2.1.7, respectively, of this report.

b. Conclusions and Recommendations

Conclusions and recommendations concerning the Licensee's compliance with these administrative controls are contained in Sections 2.1.2, 2.1.3, 2.1.4, and 2.1.7 of this report.

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 ensure 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

The Licensee stated that procedures for handling heavy loads over the core have been reviewed for detail, clarity, and conciseness with regard to installation of rigging or lifting devices and load movement. Also, a visual inspection is planned of load bearing components of cranes, slings, and special lifting devices to identify flaws or deficiencies that could lead to failure of the component prior to use. If required, appropriate repairs will be made. In addition, a training program will be implemented for crane operators to familiarize them with specific procedures used in handling loads over the core prior to crane use.

b. Evaluation

Millstone Unit 1 satisfies the criteria of this interim protection measure on the basis of the Licensee's verification that specific requirements are completed or will be completed prior to the handling of heavy loads over the core.

c. Conclusion and Recommendation

NNECO complies with Interim Protection Measure 6.

3. CONCLUDING SUMMARY

This summary is provided to consolidate the conclusions and recommendations of Section 2 and to document an overall evaluation of the handling of heavy loads at Millstone Unit 1. 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 Millstone Unit 1. 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. Designate specific load paths for the movement of those heavy loads identified by the Licensee.
	b. Provide suitable visual aids to assist crane operators when moving heavy loads along designated load paths.
	c. Verify that deviations from established load paths require a written alternative approved by the plant safety review committee.
2, 3	(Millstone Unit 1 complies with these guidelines.)

Table 3.1 Millstone Point Nuclear Power Station Unit 1/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 Bridge Crane	I	--	--	C	--	--	C	P	--	C
Spent Fuel Cask and Lifting Rig	Varies	NC	C	--	I	--	--	--	N	C
Drywell Head and Lifting Rig	64	NC	C	--	I	--	--	--	N	C
Reactor Vessel Head and Lifting Rig	81	NC	C	--	I	--	--	--	N	C
Dryer/Separator with Sling Assembly and Spreader Rig	21	NC	C	--	I	I	--	--	N	C
Refuel Canal Plugs and Gate with Sling Assembly	80	NC	C	--	--	I	--	--	N	C
Concrete Shielding with Sling Assembly	76	NC	C	--	--	I	--	--	N	C
"Cattle Shoot" with Sling Assembly	24	NC	C	--	--	I	--	--	N	C

C = Licensee action complies with NUREG-0612 Guideline.

NC = Licensee action does not comply with NUREG-0612 Guideline.

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
Service Platform Support and Flange Protector with Sling Assembly	5	NC	C	--	--	I	--	--	N	C
Load Block	10	NC	C	--	--	I	--	--	N	C
Miscellaneous Plant Equipment with Sling Assembly	Varies	NC	C	--	--	I	--	--	N	C
2. Intake Structure Monorail	I	--	--	C	--	--	C	--	--	C
Emergency Service Water Pumps and Sling Assembly	2	NC	C	--	--	I	--	--	N	C
Service Water Pumps and Sling Assembly	5.5	NC	C	--	--	I	--	--	N	C

Guideline	Recommendations
4	Review actual design, fabrication, and the continuing testing programs of all special lifting devices and evaluate all differences with respect to the requirements of ANSI N14.6-1978 identified in this evaluation.
5	a. Verify that installation and use of slings is in accordance with ANSI B30.9-1971.
	b. Verify that selection of slings is based upon the sum of the static and maximum dynamic loads.
	c. Verify that slings are marked with the static load.
	d. Verify that those slings restricted in use to only certain cranes bear markings to so indicate.
6	(Millstone Unit 1 complies with this guideline.)
7	Verify that the power supply to runway conductors is controlled by a disconnect located on a fixed structure, locked open, and accessible from the floor.

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 NRC staff's measures for interim protection at Millstone Unit 1 are taken:

Interim Measure	Recommendation
1	Verify that plant technical specifications prohibit movement of heavy loads over the spent fuel pool or implement the technical specification identified in the interim protection measure.
2	Implement the recommendations concerning Guideline 1 identified in Section 3.1.
3, 4, 5, 6	(Millstone Unit 1 complies with these interim measures.)

3.3 SUMMARY

The NRC's general guidelines and interim protection measures established in NUREG-0612 have not been fully satisfied at NNECO's Millstone Unit 1. Several programs have been implemented which comply with staff guidelines, in particular, those for load handling procedures, crane operator training, and crane inspection, testing, and maintenance. Guidelines for crane design have been substantially complied with and only a minor modification is needed for full compliance. The Licensee's response indicates that several items must still be resolved before full compliance can be determined for the special and non-special lifting devices. Licensee's action is also required for compliance with Interim Protection Measures 1 and 2.

4. REFERENCES

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

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. D. G. Eisenhut (NRC)
Letter to all operating reactors
Subject: Control of Heavy Loads
22 December 1980

4. W. G. Counsil (NNECO)
Letter to D. G. Eisenhut (NRC)
Subject: Control of Heavy Loads
25 June 1981

5. W. G. Counsil (NNECO)
Letter to D. G. Eisenhut (NRC)
Subject: Control of Heavy Loads
20 July 1981

6. W. G. Counsil (NNECO)
Letter to D. G. Eisenhut (NRC)
Subject: Control of Heavy Loads
16 April 1982

7. American National Standards Institute
"Overhead and Gantry Cranes"
New York: 1976
ANSI B30.2-1976

8. American National Standards Institute
"Standard for Lifting Devices for Shipping Containers Weighing 10,000 Pounds (4500 kg) or More for Nuclear Materials"
ANSI N14.6-1978

9. American National Standards Institute
"Slings"
ANSI B30.9-1971

10. Crane Manufacturers Association of America
"Specifications for Electric Overhead Travelling Cranes"
Pittsburgh, PA
CMAA-70

11. Electric Overhead Crane Institute
"Specifications for Electric Overhead Traveling Cranes"
EOCI-61