TECHNICAL EVALUATION REPORT

# CONTROL OF HEAVY LOADS (C-10)

NORTHEAST NUCLEAR ENERGY COMPANY

MILLSTONE POINT NUCLEAR POWER STATION UNIT 2

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# FOREWORD

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

Mr. C. R. Bomberger 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 a review of general load handling policy and procedures at the Northeast Nuclear Energy Company's (NNECO) Millstone Point Nuclear Power Station Unit 2. 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 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 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 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.

A defense-in-depth approach was used to develop the staff guidelines to ensure that all load handling systems are designed and operated so that their probabilities of failure are appropriately small. The intent of the guidelines is to ensure that licensees of all operating nuclear power plants perform the following:

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

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 the Millstone Point Nuclear Power Station Unit 2, requesting that the Licensee review provisions for handling and control of heavy loads at the Millstone Unit 2 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. NNECO responded to this request on June 25, 1981 [4], July 20, 1981 [5], and April 16, 1982 [6]. Based upon this information, a draft Technical Evaluation Report was prepared and informally transmitted to the Licensee for review and comments.

On October 6, 1982, a telephone conference call was held between the NRC and NNECO to discuss the draft TER concerning control of heavy loads at Millstone Unit 2. In response to this telephone call, NNECO provided additional information on November 12, 1982 [7], July 21, 1983 [8], and June 29, 1984 [9], which has been incorporated into this final technical evaluation.

# 2. EVALUATION

This section presents a point-by-point evaluation of load handling provisions at Millstone Point Nuclear Power Station Unit 2 with respect to NRC staff guidelines provided in NUREG-0612. Separate subsections are provided for both the general guidelines of NUREG-0612, Section 5.1.1 and the interim measures of NUREG-0612, Section 5.3. In each case, the guideline or interim measure is presented, Licensee-provided information is summarized and evaluated, and a conclusion as to the extent of compliance, including recommended additional action where appropriate, is presented. These conclusions are summarized in Table 2.1.

## 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:

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

Table 2.1. Millstone Point Nuclear Power Station Unit 2/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. Spent Fuel Cask Crane | 100/15 | -- | -- | C | -- | -- | C | C | -- | C |
| Spent Fuel Shipping Cask and Lifting Rig | Varies | C | C | -- | C | -- | -- | -- | C | C |
| Spent Resin Cask and Sling Assembly | 32 | C | C | -- | -- | C | -- | -- | C | C |
| Spent Fuel Transfer Gates and Sling Assembly | 2.5 | C | C | -- | -- | C | -- | -- | C | C |
| Crane Load Block | 4 | C | C | -- | -- | C | -- | -- | C | C |
| Miscellaneous Plant Equipment and Sling Assemblies | Varies | C | C | -- | -- | C | -- | -- | C | C |
| 2. Containment Polar Crane | 160/35 | -- | -- | C | -- | -- | C | C | -- | C |
| Reactor Head and Lifting Rig | 135 | C | C | -- | C | -- | -- | -- | C | C |

C = Licensee action complies with NUREG-0612 guideline.
-- = Not applicable.

Table 2.1 (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 |
|---|---|---|---|---|---|---|---|---|---|---|
| Upper Guide Structure Lifting Rig | 55 | C | C | -- | C | -- | -- | -- | C | C |
| RCP Motor and Sling Assembly | 46.5 | C | C | -- | -- | C | -- | -- | C | C |
| RCP Pump and Sling Assembly | 37 | C | C | -- | -- | C | -- | -- | C | C |
| Crane Load Block | 4.5 | C | C | -- | -- | -- | -- | -- | C | C |
| Miscellaneous Plant Equipment and Sling Assembly | Varies | C | C | -- | -- | C | -- | -- | C | C |
| 3. Intake Structure Monorail | 5 | -- | -- | C | -- | -- | C | C | -- | C |
| Service Water Pump and Sling Assembly | 3 | C | C | -- | -- | C | -- | -- | C | C |
| Service Water Pump Motor and Sling Assembly | 7.5 | C | C | -- | -- | C | -- | -- | C | C |

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 containment polar crane, spent fuel cask crane, and intake structure monorail as the 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 diesel generator room monorails
- o charging pump area monorails
- o HPSI pump room monorails
- o LPSI pump area miscellaneous rigging
- o auxiliary feedwater pump monorail
- o service water strainer monorail.

b. Evaluation and Conclusions

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 between 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 2712 B1, "Control of Heavy Loads." This procedure provides

necessary administrative controls which ensure that load handling operations remain within safe load paths, establishes locations for these paths, delineates responsibility for moving loads over 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 those areas. In addition, the Licensee indicated that Millstone Unit 2 is currently revising procedures to comply with the requirement for specific load paths for substantial loads. Restricted areas will be retained for smaller loads. The revised procedures will require a load director for all heavy load lifts who will be knowledgeable regarding safe load paths and will have procedures available for use as necessary. The load director will be in charge of the lift and will function as a signalman to assist crane operators in adhering to the established load path. The plant safety review committee will approve a written alternative when deviation from an established load path is necessary. In addition, NNECO stated that it does not intend to mark permanent 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 painted paths would not be visible to load handlers.

b. Evaluation

The Licensee's response indicates that specific load paths have been developed for substantial loads, will be defined in procedures, and will be incorporated into drawings. Use of restricted areas for smaller loads is an acceptable alternative to specific load paths since these lifts are usually minor maintenance lifts, with no clearly established laydown areas. It is noted, however, that load paths drawings and specific loads requiring load paths have not been identified or provided by the Licensee for review. On the basis of the Licensee's statement that load paths have been developed for substantial loads, Millstone Unit 2 satisfies the requirements of this guideline.

Although the Licensee states that load paths will not be permanently marked, the use of a knowledgeable load director (who functions as a signalman

with duties clearly defined in procedures) is a reasonable alternative which provides the crane operator with suitable visual aids to ensure that load movement adheres to the established load path. In addition, 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 Recommendation

Development of safe load paths at Millstone Unit 2 satisfies the intent of Guideline 1.

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 and Conclusion

Procedures implemented by NNECO meet the intent of Guideline 2.

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

"Crane operators should be trained, qualified and conduct themselves in accordance with Chapter 2-3 of ANSI B30.2-1976 'Overhead and Gantry Cranes' [10]."

a. Summary of Licensee Statements and Conclusions

The Licensee stated that a training program covering the requirements of this guideline has been instituted for all new crane operators at Millstone Unit 2.

b. Evaluation and Conclusion

NNECO meets the intent of Guideline 3 for Millstone Unit 2 on the basis of the Licensee's verification that all new crane operators are 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' [11]. This standard should apply to all special lifting devices which carry heavy loads in areas as defined above. For operating plants certain inspections and load tests may be accepted in lieu of certain material requirements in the standard. In addition, the stress design factor stated in Section 3.2.1.1 of ANSI N14.6 should be based on the combined maximum static and dynamic loads that could be imparted on the handling device based on characteristics of the crane which will be used. This is in lieu of the guideline in Section 3.2.1.1 of ANSI N14.6 which bases the stress design factor on only the weight (static load) of the load and of the intervening components of the special handling device."

a. Summary of Licensee Statements and Conclusions

The Licensee identified the following special lifting devices in use at Millstone Unit 2 to be subject to compliance with the criteria of ANSI N14.6-1978:

- o reactor head lifting rig
- o upper guide structure lifting rig.

The Licensee stated that the reactor head lifting rig and the upper guide structure lifting 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 one exception. The Licensee stated that, during the review of the upper guide structure lifting rig, it was noted that the cables on the ICI plate lifting rig sling assembly did not have the required factor of safety and a new sling was fabricated and the old sling replaced. In addition, due to the fact that a spent fuel cask lifting rig does not exist at Millstone Unit 2, verification of compliance for this lifting device cannot be accomplished.

The two special lifting devices of concern (the reactor head lifting rig and the upper guide structure lifting 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, and therefore 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. Since critical loads at Millstone Unit 2 have not been determined, Section 6 of ANSI N14.6-1978 will be addressed after determination of the critical loads.

A stress analysis has been performed on both the reactor vessel lift rig and the upper guide structure (UGS) lift rig used at Millstone Unit 2. The results of analysis demonstrate that allowable stress design factors specified in ANSI N14.6 were met. Drawings and specifications are also available for each device identifying welding procedures and requirements for quality assurance and nondestructive examination (NDE) of all structural welds. An initial load test was not documented as having been done on either of these devices, but information is provided to indicate that devices were properly fabricated and assembled. The devices are simplistic enough in design so that an assembly error is highly unlikely. In addition, the Licensee indicated that future repairs and replacements will be made in accordance with ANSI N14.6-1978.

The Licensee stated that this guideline requires the implementation of a periodic testing schedule and appropriate inspections prior to initial use of the lifting devices. Special lifting devices are visually inspected prior to each refueling or use. In addition, a procedure is being developed to perform NDE of critical welds and areas on a rotating basis every 10 years.

b. Evaluation

Although not originally designed and fabricated in accordance with the criteria of ANSI N14.6-1978, it is apparent from the Licensee's responses, and from drawings provided, that these devices will provide a degree of load handling reliability consistent with the ANSI standard. Results of analyses performed by the Licensee demonstrate that the devices were designed with appropriate design margins for yield and ultimate stress. Review of original drawings and specifications clearly identifies requirements for fabrication, quality assurance, welding, and NDE, all of which demonstrate adequate proof of workmanship. Lastly, the Licensee performs visual inspections prior to use and is developing a systematic program of NDE inspections of critical welds over a 10-year period. Such a program of periodic NDE is felt warranted, based upon the limited frequency of use of these devices, as well as their sole use and storage in a controlled environment. Such a program of testing and inspection is consistent with that documented in ANSI N14.6-1978 to ensure the continued reliability of these devices.

c. Conclusion and Recommendation

Design and fabrication of special lifting devices, as well as programs to ensure their continued reliability, are consistent with those specified in Guideline 4.

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' [12]. 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 with which they may be used."

a. Summary of Licensee Statements and Conclusions

The Licensee states that slings are used in accordance with ANSI B30.9-1971 and are being marked with the static load in accordance with this guideline. The potential routine dynamic loading of slings has been determined to be a relatively small fraction of the static load, on the basis that all crane speeds are less than 30 fpm, and therefore no specially marked slings are in use.

b. Evaluation

Millstone Unit 2 satisfies the requirements of this guideline on the basis of compliance with ANSI B30.2-1976. In addition, information has been provided to demonstrate that dynamic loading of these slings is relatively small (less than 15% based on crane speeds less than 30 fpm) and may be disregarded.

c. Conclusion and Recommendations

Selection and use of slings at Millstone Unit 2 is consistent with Guideline 5.

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

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

performed daily or monthly. For such cranes having limited usage, the inspections, test, and maintenance should be performed prior to their use)."

a. Summary of Licensee Statements and Conclusions

The Licensee 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 polar and spent fuel cask cranes have been inspected on an annual or "before use" basis. Their inspection conforms to or exceeds ANSI B30.2-1976.

b. Evaluation and Conclusion

NNECO complies with Guideline 6 for Millstone Unit 2 on the basis of 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' [13]. 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 containment polar crane and spent fuel cask crane have been reviewed for compliance with the guidelines of CMAA-70 and ANSI B30.2-1976, Chapter 2-1. The Licensee stated that one item of specific noncompliance was identified as a result of this review, but that equivalency to these standards does exist. Discussion of this item follows:

"Containment Polar Crane and Spent Fuel Cask Crane - CMAA Specification 70, Item 5.5.1, requires that 'resistors (except those in permanent sections) shall have a thermal capacity of not less than Class 150 series for CMAA crane service classes A, B, and C and not less than Class 160 series for CMAA service classes D and E.'

Also CMAA Specification 70, Item 5.5.2, requires that 'resistors used with power electrical braking systems on hoists not equipped with mechanical load brakes shall have a thermal capacity of not less than Class 160 series.'

The resistors for the containment polar crane and the spent fuel cask crane are Class 90. The resistors have been through a number of duty cycles since the cranes have been in service. The resistors were visually inspected and they are in excellent condition with no visible degradation or failures. Therefore, the Class 90 resistors are deemed adequate for continued service."

In addition, the Licensee has made a commitment to include provisions in the periodic crane inspection program to monitor the class 90 resistors currently used on the containment polar and spent fuel cask cranes.

b. Evaluation

The requirements of Guideline 7 are satisfied on the basis of the Licensee's verification that the cranes have been reviewed for compliance with CMAA-70 and ANSI B30.2-1976. For the one item of non-compliance noted, current use of Class 90 resistors is adequate in view of the Licensee's commitment to include provisions in the periodic crane inspection program to specifically monitor these resistors.

c. Conclusion and Recommendations

Design of cranes at Millstone Unit 2 was performed in a manner consistent with Guideline 7.

## 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 general 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 Pool 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 Statement and Conclusion

Millstone Unit 2 Technical Specifications prohibit the movement of heavy loads over irradiated fuel assemblies in the storage pool.

b. Evaluation and Conclusion

Millstone Unit 2 complies with Interim Protection Measure 1.

2.2.2 Administrative Controls [Interim Protection Measures 2, 3, 4, and 5, NUREG-0612, Section 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 Reviews 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 operations, 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, it is intended to make visual inspection 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 of crane, sling, or lifting device. If required, appropriate repairs will be made. In addition, it is intended that crane operators will be trained and made familiar with specific procedures used in handling loads over the core prior to crane use.

b. Evaluation and Conclusion

Millstone Unit 2 satisfies the criteria of this interim protection measure on the basis of the Licensee's verification that specific required actions are completed or will be completed prior to the handling of heavy loads over the core.

# 3. CONCLUSION

This summary is provided to consolidate the results of the evaluation contained in Section 2 concerning individual NRC staff guidelines into an overall evaluation of heavy load handling at Millstone Point Nuclear Station Unit 2. Overall conclusions and recommended Licensee actions, where appropriate, are provided with respect to both general provisions for load handling (NUREG-0612, Section 5.1.1) and completion of the staff recommendations for interim protection (NUREG-0612, Section 5.3).

## 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 equipment required for safe shutdown or decay heat removal. The intent of these guidelines is twofold. A plant conforming to these guidelines will have developed and implemented, through procedures and operator training, safe load travel paths such that, to the maximum extent practical, heavy loads are not carried over or near irradiated fuel or safe shutdown equipment. A plant conforming to these guidelines will also have provided sufficient operator training, handling system design, load handling instructions, and equipment inspection to ensure reliable operation of the handling system. As detailed in Section 2, it has been found that load handling operations at Millstone Point Nuclear Station Unit 2 can be expected to be conducted in a highly reliable manner consistent with the staff's objectives as expressed in these guidelines.

## 3.2 INTERIM PROTECTION

The NRC staff has established certain measures (NUREG-0612, Section 5.3) 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. The evaluation of information provided by the Licensee indicates that Millstone Unit 2 complies with the staff's measures for interim protection.

# 4. REFERENCES


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7. W. G. Counsil (NNECO)
   Letter to D. M. Crutchfield (NRC)
   Subject: Control of Heavy Loads
   12 November 1982

8. W. G. Counsil (NNECO)
   Letter to D. M. Crutchfield (NRC)
   Subject: Control of Heavy Loads
   July 21, 1983

9. W. G. Counsil (NNECO)
   Letter to D. M. Crutchfield (NRC)
   Subject: Control of Heavy Loads
   June 29, 1984

10. American National Standards Institute
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11. American National Standards Institute
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