TECHNICAL EVALUATION REPORT

CONTROL OF HEAVY LOADS

NIAGARA MOHAWK POWER CORPORATION

NINE MILE POINT UNIT 1

NRC DOCKET NO. 50-220

NRC TAC NO. 08063

NRC CONTRACT NO. NRC-03-81-130

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Washington, D.C. 20555

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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. 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 an independent review of general load handling policy and procedures at Niagara Mohawk Power Corporation's Nine Mile Point Unit 1. 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 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 for the control of heavy loads, the staff developed a series of guidelines designed to achieve a two-phase objective using an accepted approach or protection philosophy. The first portion of the objective, achieved through a set of general guidelines identified in NUREG-0612, Section 5.1.1, is to ensure that all load handling systems at

nuclear power plants are designed and operated 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 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 probability of failure is appropriately small. The intent of the guidelines is to ensure that licensees of all operating nuclear power plants perform the following:

1. 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

2. provide sufficient operator training, handling system design, load handling instructions, and equipment inspection to ensure 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 Niagara Mohawk Power Corporation, the Licensee for Nine Mile Point Unit 1, requesting that the Licensee review provisions for handling and control of heavy loads at Nine Mile Point 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. On May 22, 1981, Niagara Mohawk Power Corporation submitted the initial response [4] to this request. Additional information provided by the Licensee on July 28, 1981 [5], September 22, 1981 [6], September 30, 1983 [7], and November 15, 1983 [8] is included in this final technical evaluation report.

2. EVALUATION

This section presents a point-by-point evaluation of load handling provisions at Nine Mile Point Unit 1 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 to provide the defense-in-depth appropriate for the safe handling of heavy loads. They are identified under the following topics in 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 by all overhead handling systems and programs 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 independent evaluation of this verification are contained in the succeeding paragraphs.

Table 2.1. Nine Mile Point 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 Crane	125/25	--	--	C	--	--	C	C	C	--
a. Shield Plugs (except No. 9)	9.5-121	NC	C	--	--	C	--	--	--	C
b. Drywell Head	54	NC	C	--	NC	--	--	--	--	C
c. Curtain Shield Support Structure	8.25	NC	C	--	--	C	--	--	--	--
d. Rx Head Insulation #1	Less than 5	NC	C	--	--	C	--	--	--	C
e. Reactor Head	80	NC	C	--	NC	--	--	--	--	C
f. Shield Platform	27.5	NC	C	--	NC	--	--	--	--	--
g. Steam Dryer	23	NC	C	--	NC	--	--	--	--	C
h. Shield Plug #9	9.75	NC	C	--	--	C	--	--	--	--
i. Portable Rad Shield	Less than 3	NC	C	--	--	C	--	--	--	--
j. Steam Separator	39	NC	C	--	NC	--	--	--	--	C
k. LPRMs	--	NC	NC	--	--	C	--	--	--	C
l. New Fuel	--	NC	NC	--	--	C	--	--	--	C
m. Control Blades	--	C	C	--	--	C	--	--	--	C
n. Waste Debris Shipping Casks	--	C	C	--	NC	--	--	--	--	--
2. Turbine Building Crane	150/35	NC	C	C	--	--	C	R	--	--

C = Licensee action complies with NUREG-0612 Guideline.
NC = Licensee action is not in compliance with NUREG-0612 Guideline.
-- = Not applicable.

2.1.1 NUREG-0612, Overhead Heavy Load Handling Systems

a. Summary of Licensee Statements and Conclusions

The Licensee's review of overhead load handling systems identified the following systems from which a load drop may result in damage to a system required for plant shutdown or decay heat removal:

- o reactor building 125/25-ton overhead traveling crane
- o turbine building 150/35-ton overhead traveling crane.

The Licensee also identified other load handling systems that have been excluded from satisfying the criteria of the general guidelines of NUREG-0612, Section 5.1.1, based on the following criteria:

Load Handling System	Exclusion Criteria
Reactor building 1/2-ton overhead hoist	Handling device capacity
Reactor building jib crane (1/2-ton hoist)	Physical separation from reactor core or safety-related components/handling device capacity
Refueling bridge 1-ton hoists (2)	Handling device capacity

b. Evaluation

Evaluation of those handling systems subject to compliance with the general guidelines is consistent with the guidance of NUREG-0612.

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 procedures in the reactor building have been revised to identify safe load paths for heavy loads. The procedures have equipment layout drawings attached which indicate proper travel paths, but the floor has not been marked in the area where loads are handled. The refueling area is a confined area, and marking the floor for all loads may only confuse the crane operators. The Licensee feels that the layout drawings attached to the procedures is the most feasible means of assuring safe travel paths.

The Licensee stated that a safe load path for the turbine building is being defined which will be incorporated into the training program but not into load handling procedures. It is the Licensee's opinion that the training program, when used in conjunction with maintenance procedures, will provide sufficient assurance that a load drop will not occur. This opinion is based upon the following reasons:

1. Safety-related cables and mechanical equipment are located beneath the turbine floor; cable runs in affected crane pickup areas are separated by more than 200 ft, so that a single load drop would not disable both trains of redundant systems and the ability to safely shut down would be maintained.

2. The crane is normally used when the plant is shut down; the crane is used infrequently during power operation, and therefore safe load paths are deemed to be unnecessary during this period.

The crane training program is being expanded to identify allowable load paths when handling heavy loads. Due to the redundancy of systems, this training is considered adequate to mitigate adverse consequences of a load drop.

Deviations from safe load paths are controlled by Administrative Procedure APN-1. Temporary changes are approved by at least two members of the plant supervisory staff; these temporary changes must be reviewed by the Site Operations Review Committee within 7 days and approved by the Station Superintendent and the General Superintendent.

b. Evaluation

A review of the Licensee's responses and drawings indicates that safe load paths in the reactor building have been developed in accordance with Guideline 1 recommendations. For the turbine building, however, it is not agreed that mere identification of a general safe load path during operator training is sufficient to ensure adherence to the load path. In addition, reliance upon system redundancy is an alternative which may be used as a response to Phase II of NUREG-0612 in lieu of hardware modifications, but redundancy is not an appropriate rationale for not developing safe load paths to satisfy the requirements of the general guidelines. Therefore, safe load paths (or a general load path) should be formally developed and incorporated into load handling procedures. Formal incorporation into procedures is necessary to provide visual reinforcement of actual load paths each time the procedures are used (since cranes are infrequently used and no requirements exist to ensure that operators are periodically retrained) and to document the engineering evaluation upon which the load paths are based.

In addition, the use of a signalman as standard plant practice satisfies, to a large degree, the need for visual aids to assist the crane operator in following safe load paths. However, as noted previously, requirements and direction for these individuals should be formally included in load handling procedures to ensure that duties and responsibilities are clearly understood.

Deviations from safe load paths are administered in a manner consistent with this guideline.

c. Conclusion and Recommendations

Safe load paths at Nine Mile Point Unit 1 are, to a large degree, developed in a manner consistent with that required by Guideline 1. Additional action by the Licensee is required on the following items to fully satisfy this guideline:

- The general safe load path which has been developed in the turbine building should be formalized and incorporated into appropriate load handling procedures for ready reference during handling operations.

- o Duties and responsibilities of signalmen should be formally incorporated into load handling procedures.

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 identified heavy loads and related procedures that govern movement of each load. Verification is also provided that each of these procedures includes the following:

a. identification of required equipment
b. inspections and acceptance criteria
c. procedural steps for movement of the load
d. safe load path sketches.

b. Evaluation and Conclusions

Implementation of procedures at Nine Mile Point Unit 1 is consistent with 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' [9]."

a. Summary of Licensee Statements and Conclusions

The Licensee stated that a lesson guide is in place which is used to train crane operators. The intent of this lesson guide is assure proper and safe operation of floor-operated overhead cranes in accordance with ANSI B30.2-1976.

The current crane operator training program includes the requirement for a practical operating exam. This practical examination is given after the operator undergoes detailed classroom instruction. In addition, the operator is required to meet certain physical qualifications before qualifying to train as a crane operator. These physical qualifications are consistent with ANSI B30.2-1976.

b. Evaluation and Conclusion

Training and qualification of crane operators at Nine Mile Point Unit 1 is performed in a manner consistent with the recommendations of ANSI B30.2-1976 and NUREG-0612, Guideline 2.

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 [10], "Standard for Special Lifting Devices for Shipping Containers Weighing 10,000 pounds (4500 kg) or More for Nuclear Materials." 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 leiu 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 (stactic 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 to be subject to compliance with the recommendations of this guideline:

- o reactor vessel head lifting rig
- o drywell head lifting assembly
- o dryer/separator sling assembly
- o shield platform strongback
- o underwater lifting rig
- o cask yokes.

Evaluations of the design adequacy of these lifting devices and interfacing lift points have been performed, with appropriate consideration of

the maximum static and dynamic loads. The Licensee stated that, based upon these design evaluations, the vessel head lifting rig and the Vandenburgh cask yoke adaptor have been found to be in compliance with with criteria of NUREG-0612, Section 5.1.6 (Single-Failure-Proof Handling Systems). The remaining handling systems are not in strict compliance with the design safety factors of Section 5.1.6; actual factors are listed below:

Lifting Device	Component	Design Safety Factors	
		Yield	Ultimate
Drywell head lifting assembly	Wire rope link	-	6.33
	Anchor shackle	-	4.8
	Lifting arms	3.6	4.0
Shield platform strongback	Lifting arms	6.32	7.37
	Turnbuckles	-	9.05
Dryer/separator sling assembly	Wire rope	-	9.4
	Forged ring	-	5.95
	Lifring plates	5.1	8.2
	Clevis and rod	-	5.6
Underwater lifting rig	Bolts B_1 and B_2	4.6	7.3

The Licensee noted, however, that device safety factors are essentially in compliance with current industrial standards. Design safety factors of the industrial standards are based upon lifting devices that experience frequent use, harsh environments, and infrequent inspections; such assumptions are not applicable for these special lifting devices. Therefore, these devices, when used with approved inspection and maintenance procedures and properly trained crane operators, provide sufficient assurances that a load drop will not occur.

b. Evaluation

In order to determine that design and use of special lifting devices are consistent with the criteria of ANSI N14.6-1978, the following items must be addressed by the Licensee for each lifting device:

- verification that design procedures, stress design factors, and fabrication controls were performed in a manner consistent with ANSI N14.6-1978

- performance of a proof load test to document proof of workmanship of the device

- implementation of a program of periodic load testing or detailed inspections to provide continued assurances that the lifting device will perform its intended task.

The Licensee provided design details of several lifting devices, including the drywell head, shield platform, dryer/separator, and underwater lifting rigs. Based upon the Licensee's statement that the components identified are the most limiting load-bearing components, it is reasonable to conclude that these devices were designed, and possess safety factors, consistent with those recommended by ANSI N14.6-1978. Although similar design details have not been provided for the reactor vessel head lifting rig and the Vandenburgh cask yoke adapter, it is assumed that similar analyses are available and that the devices' design is therefore also in accordance with ANSI N14.6-1978, based upon the Licensee's conclusion that both lifting devices comply with the single-failure-proof criteria of NUREG-0612, Section 5.1.6.

Insufficient information has been provided, however, to document the existence of an initial proof load test or inspection programs which ensure the continued load handling reliability of these devices. The Licensee is therefore requested to provide details of load tests of these devices, as well as assurances that programs for continued compliance exist and are in accordance with the criteria of Section 5 of ANSI N14.6-1978.

c. Conclusion and Recommendation

Design of special lifting devices at Nine Mile Point Unit 1 is consistent with the requirements of Guideline 4. Additional information is requested, however, in order to verify that proof load tests of these devices were performed and that programs to ensure continuing compliance exist and are in accordance with Section 5 of ANSI N14.6-1978.

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" [11]. However, in selecting the proper sling, the load used should be the sum of the static and maximum dymnamic load. The rating identified on the sling should be in terms of the "static load" which produces the maximum static and dynamic load. Where this restricts slings to use on only certain cranes, the slings should be clearly marked as to the cranes with which they may be used."

a. Summary of Licensee Statements and Conclusions

Installation and use of slings in the turbine building essentially comply with the applicable guidelines of ANSI B30.9-1971, including the requirements of Sections 9-2.2, 9-5.2, and 9-5.3. The rigging and lifting training program is being revised to incorporate additional ANSI guidance, including (1) minimum factors of safety (5), (2) temperature effects, (3) minimum sling length, (4) end attachments, (5) storage, (6) inspection and replacement, and (7) general safe operating practices. Personnel involved with sling use refer to a rigging handbook and Niagara Mohawk's Accident Prevention Rules, Section 20, which contains information similar to that included in the training program. Wire rope slings do not have ratings identified on the slings, since it is the Licensee's position that tagging or marking the slings is not necessary based on the training program and available aids.

Slings in the reactor building that are restricted in use to specific loads are identified in the appropriate handling procedure. Procedures provide a sketch of the sling, identification of the load, and a checkoff sheet to ensure that the sling is acceptable for use. Sling selection was based upon analysis which considered both static and dynamic loads. The Licensee stated that slings are not marked because marking is not required by ANSI B30.9-1971 and procedural detail is an acceptable alternative.

b. Evaluation and Conclusion

Selection and use of slings at Nine Mile Point Unit 1 satisfy the requirements of this guideline on the basis that procedures and programs in use or currently being revised are consistent with ANSI guidelines.

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

a. Summary of Licensee Statements and Conclusions

Inspections of cranes at Nine Mile Point Unit 1 are governed by the following procedures:

- NI-MPM-SA4, "Inspection of Reactor Building Crane"
- NI-MPM-SA5, "Inspection of Turbine Building Crane."

Both cranes are classified as cranes not in regular use according to ANSI B30.2-1976, Section 2-2.1.4, but are inspected on a semiannual, rather than an annual, basis. Reinspections are performed prior to use if either crane has been idle for longer than one month. To date, no load test has been performed or required for the turbine building crane; a rated load test was performed for the reactor building crane following a major modification (to include a redundant hoisting system) as reported previously to the NRC.

Procedures have also been developed governing maintenance for each of these cranes. These procedures have been reviewed and include crane maintenance requirements of ANSI B30.2-1976, where appropriate.

b. Evaluation and Conclusion

Implementation of programs governing crane maintenance, inspection, and testing for the reactor and turbine building cranes is consistent with Guideline 6 on the basis that the Licensee has incorporated applicable provisions of ANSI B30.2-1976.

2.1.8 Command Design [Guideline 7, NUREG-0612, Section 5.1.1(7)]

"The crane should be designed to meet the applicable criteria and guidelines of Chapter 2-1 of ANSI B30.2-1976, "Overhead and Gantry Cranes" and of CMAA-70, "Specifications for Electric Overhead Traveling Cranes."[12]. 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 stated that the turbine building crane, which is non-safety-related, was originally designed to EOCI-61, which has been superseded by CMAA-70. An independent review has been performed comparing the original design with the latest CMAA revision; the Licensee stated that, based upon review of the applicable recommendations, the turbine building crane satisfies the intent of Guideline 7 of NUREG-0612.

b. Evaluation

Based upon the Licensee's certification that the design of the turbine building crane has been independently evaluated against the more restrictive requirements of CMAA-70 and has been found to satisfy the intent of CMAA-70, the design of the turbine building crane is found to be consistent with the criteria of this guideline.

c. Conclusion and Recommendation

Design of the reactor and turbine building cranes at Nine Mile Point Unit 1 is consistent with Guideline 7 of NUREG-0612.

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 is 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."

a. Summary of Licensee Statements and Conclusions

The Nine Mile Point Unit 1 reactor building cranes meet single-failure-proof crane requirements.

b. Evaluation, Conclusions, and Recommendations

Nine Mile Point Unit 1 complies with Interim Protection Measure 1 because the reactor building cranes used to carry loads in the fuel storage pool area meet single-failure-proof crane requirements (NUREG-0612, Table 3.2-1).

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 Reviews for Heavy Loads 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 the identified interim actions have been performed with the exception of safe load path markings and revising certain fuel handling procedures.

b. Evaluation, Recommendations, and Conclusions

The Nine Mile Point plant complies with this interim action based on the Licensee's verification of completion.

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 Nine Mile Point Unit 1. 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 Nine Mile Point Unit 1 can be expected to be conducted in a highly reliable manner consistent with the staff's objectives as expressed in these guidelines.

In only two areas was the need for further Licensee action identified:

- Niagara Mohawk should revise appropriate load handling procedures to identify duties and responsibilities of signalmen and to provide necessary sketches identifying the general safe load paths in the turbine building.

- Niagara Mohawk is requested to provide information to verify the performance of initial load tests for all special lifting devices, as well as programs that ensure the continued compliance of these devices.

3.2 INTERIM PROTECTION MEASURES

The NRC staff has established in NUREG-0612, Section 5.3, certain measures that should be initiated to provide reasonable assurance that handling of heavy loads will be performed in a safe manner until final implementation of the general guidelines of NUREG-0612, Section 5.1 is complete. Specified measures include the implementation of a technical specification to prohibit the handling of heavy loads over fuel in the storage pool; compliance with Guidelines 1, 2, 3, and 6 of NUREG-0612, Section 5.1.1; a review of load handling procedures and operator training; and a visual inspection program, including component repair or replacement, as necessary, of cranes, slings, and special lifting devices to eliminate deficiencies that could lead to component failure. Evaluation of information provided by the Licensee indicates that such measures have been implemented at Nine Mile Point Unit 1.

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
   NRC, 17 May 1978

3. NRC
   Letter to Niagara Mohawk Power Corporation (NMC)
   Subject: Request for Review of Heavy Load Handling at Nine Mile Point-Unit 1
   22 December 1980

4. D. P. Dise (NMPC)
   Letter to D. G. Eisenhut (NRC)
   Subject: Control of Heavy Loads - Nine Mile Point Unit 1
   22 May 1981

5. D. P. Dise (NMPC)
   Letter to D. G. Eisenhut (NRC)
   Subject: Control of Heavy Loads - Nine Mile Point Unit 1
   28 July 1981

6. D. P. Dise (NMPC)
   Letter to D. G. Eisenhut (NRC)
   Subject: Control of Heavy Loads - Nine Mile Point Unit 1
   22 September 1981

7. T. E. Leuipjes (NMPC)
   Letter to D. G. Eisenhut (NRC)
   Subject: Control of Heavy Loads - Nine Mile Point Unit 1
   September 30, 1983

8. T. E. Leuipjes (NMPC)
   Letter to D. G. Eisenhut (NRC)
   Subject: Control of Heavy Loads - Nine Mile Point Unit 1
   November 15, 1983

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

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

11. ANSI B30.9-1971
"Slings"

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