TECHNICAL EVALUATION REPORT

CONTROL OF HEAVY LOADS (C-10)

WISCONSIN ELECTRIC POWER COMPANY

POINT BEACH NUCLEAR PLANT UNITS 1 AND 2

NRC DOCKET NO. 50-266, 50-301

NRC TAC NO. 07727, 08074

NRC CONTRACT NO. NRC-03-81-130

FRC PROJECT C5506

FRC ASSIGNMENT 13

FRC TASKS 382, 383

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March 2, 1984

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FOREWORD

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

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1. INTRODUCTION

1.1 PURPOSE OF REVIEW

This technical evaluation report documents an independent review of general load handling policy and procedures at Wisconsin Electric Power Company's (WEPC) Point Beach Nuclear Plant Units 1 and 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 concluded from this evaluation that existing measures to control the handling of heavy loads at operating plants provide protection from certain potential problems, but 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 with a two-part objective. The first part of the objective, to be achieved through a set of general guidelines expressed 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 appropriately small for the critical tasks in which they are employed. The second part of the staff's objective, to be achieved through guidelines expressed in NUREG-0612, Section 5.1.2.5, is to ensure that, for load handling systems used 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 make the potential for a load drop 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 probability of failure is appropriately small. The intent of the guideline 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 ensure reliable operation of the handling system

Staff guidelines resulting from the foregoing are tabulated in Section 5 of NUREG-0612; Section 6 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 WEPC, the Licensee for Point Beach Units 1 and 2, requesting that the Licensee review and evaluate provisions for the handling and control of heavy loads, evaluate these provisions with respect to the guidelines of NUREG-0612, and provide certain additional information to be used for an independent determination of conformance to these guidelines. WEPC provided responses on September 30, 1981 [4] and January 11, 1982 [5].

Based on this information, a draft Technical Evaluation Report (TER) was prepared and discussed with WEPC. Following these discussions, WEPC provided supplemental responses on June 30, 1982 [6] and September 28, 1983 [7] addressing issues identified in the draft TER. This final TER is based on information provided in References 4, 5, 6, and 7.

2. EVALUATION AND RECOMMENDATIONS

This section presents a point-by-point evaluation of load handling provisions at Point Beach Nuclear Plant Units 1 and 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 to provide the defense-in-depth approach to safe handling of heavy loads. They 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 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.

2.1.1 Overhead Heavy Load Handling Systems

a. Summary of Licensee Statements and Conclusions

The Licensee has performed a survey of cranes and hoists at Point Beach Units 1 and 2 to identify those overhead handling systems from which a load

Table 2.1. Point Beach Nuclear Plant/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. Containment Polar Crane	110/15	--	--	C	--	--	C	C	--	C
Reactor Coolant Pump	20	C	R	--	--	C	--	--	--	C
RCP Motor	38	C	R	--	R	--	--	--	--	C
RCP Flywheel	7	C		--	--	C	--	--	--	C
Containment Vent Fans	2.5	C	R	--	--	C	--	--	--	C
Control Rod Cooling Fan	1.2	C	R	--	--	C	--	--	--	C
Reactor Vessel Head	102.5	C	R	--	R	--	--	--	--	C
RVH Stud Rock	3	C	R	--	--	C	--	--	--	C
Stud Tensioner	1.3	C	R	--	--	C	--	--	--	C
RVH Missile Shield Plug	7.6	C	R	--	--	C	--	--	--	C
PAR Vessel Inspection Device	1.9	C	R	--	--	C	--	--	--	C
RCP Missile Shield Planks	5.8	C	R	--	--	C	--	--	--	C

C = Licensee action complies with NUREG-0612 Guideline.
R = Licensee has proposed revisions/modifications designed to comply 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
Pzr. Missile Shield Planks	4.4	C	R	--	--	C	--	--	--	C
Steam Generator Snubber	2	C	R	--	--	C	--	--	--	C
Vessel Internals	27.5	C	R	--	R	--	--	--	--	C
RVH H&V Ducts	1	C	R	--	--	C	--	--	--	C
Crane Hook and Bottom Block	3.4	C	R	--	--	C	--	--	--	C
2. Auxiliary Bldg. Main Crane	130/20	--	--	C	--	--	C	C	C	--
Charging Pump	4.8	C	R	--	--	C	--	--	C	--
RHR Pump	3.5	C	R	--	--	C	--	--	C	--
CCW Pump	1.6	C	R	--	--	C	--	--	C	--
Spent Fuel Pump	0.9	C	R	--	--	C	--	--	C	--
Containment Spray Pump	2.7	C	R	--	--	C	--	--	C	--
Safety Injection Pump	5.1	C	R	--	--	C	--	--	C	--
Auxiliary Bldg. Stack Exhaust Fan	1.2	C	R	--	--	C	--	--	C	--

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
	Carbon Exhaust Fan	1.8	C	R	--	--	C	--	--	C	--
	Supply Air Fan	1.6	C	R	--	--	C	--	--	C	--
	Reactor Head Stud Tensioner	1.3	C	R	--	--	C	--	--	C	--
	Resin Cask	24	C	R	--	--	C	--	--	C	--
	Filter Cask	1.9	C	R	--	--	C	--	--	C	--
	New Fuel Shipping Cask	3.5	C	R	--	--	C	--	--	C	--
	Watergate	1.5	C	R	--	--	C	--	--	C	--
	Concrete Hatch Covers	9.4	C	R	--	--	C	--	--	C	--
	Small Filter Cask	[illegible].0	C	R	--	--	C	--	--	C	--
	Crane Load Block	5.2	C	R	--	--	C	--	--	C	--
3.	Turbine Bldg. Main Crane	125/20	--	--	C	--	--	C	C	--	--
	Moisture Separator Reheater Bundle	53.5	C	R	--	--	C	--	--	--	--
	Condensate Pump	17	C	R	--	--	C	--	--	--	--
	Steam Gen. Feed Pump	1.3	C	R	--	--	--	--	--	--	--

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
S/G Feed Pump Base Plate	4.1	C	R	--		C	--	--	--	--
S/G Pump Fly-wheel	2.9	C	R	--	--	C	--	--	--	--
S/G FW Pump Motor	8.5	C	R	--	--	C	--	--	--	--
AFW Pump	2.2	C	R	--	--	C	--	--	--	--
Common Vacuum Priming Pump	0.8	C	R	--	--	C	--	--	--	--
Vacuum Priming Pump	0.8	C	R	--	--	C	--	--	--	--
Generator Rotor	118	C	R	--	--	C	--	--	--	--
Generator Hydrogen Cooler	2.1	C	R	--	--	C	--	--	--	--
Generator Bearing Bracket	7.8	C	R	--	--	C	--	--	--	--
Generator Bearing	1	C	R	--	--	C	--	--	--	--
Exciter Rotor		C	R	--	--	C	--	--	--	--
Exciter Stator	2.8	C	R	--	--	C	--	--	--	--
Exciter Pedestal	1.2	C	R	--	--	C	--	--	--	--
Exciter Seat-ing Plate	11	C	R	--	--	C	--	--	--	--

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
Exciter Housing and Outboard Cooler	7.8	C	R	--	--	C	--	--	--	--
HP Turbine Outer Cover	40.8	C	R	--	--	C	--	--	--	--
HP Turbine Rotor	35.0	C	R	--	--	C	--	--	--	--
HP Turbine Blade Ring	1.6	C	R	--	--	C	--	--	--	--
LP Turbine Outer Cover	61.2	C	R	--	--	C	--	--	--	--
LP Turbine Cylinder	2[illegible]	C	R	--	--	C	--	--	--	--
LP Turbine Rotor	80	C	R	--	--	C	--	--	--	--
LP Turbine Blade Ring	2.5	C	R	--	--	C	--	--	--	--
LP Inlet Flow Guide	2.5	C	R	--	--	C	--	--	--	--
LP Bearings	1.7	C	R	--	--	C	--	--	--	--
LP Crossover Adapter	3.3	C	R	--	--	C	--	--	--	--
LP Turbine Crossover Pipe (Kewaunee)	16	C	R	--	--	C	--	--	--	--
LP Turbine Crossover Piece (Pt. Beach)	6	C	R	--	--	C	--	--	--	--

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
LP Turbine Lifting Gear	5	C	R	--	--	C	--	--	--	--
Crane Hook and Load Block	5.2	C	R	--	--	C	--	--	--	--
Crane Top Block	1.0	C	R	--	--	C	--	--	--	--
4. Unit 2 Containment Polar Crane	100/15	--	--	C	--	--	C	C	--	C
Reactor Coolant Pump	20	C	R	--	--	C	--	--	--	C
RCP Motor	18	C	R	--	R	C	--	--	--	C
RCP Flywheel	7	C	R	--	--	C	--	--	--	C
Containment Vent. Fans	2.5	C	R	--	--	C	--	--	--	C
Control Rod Cooling Fan	1.2	C	R	--	--	C	--	--	--	C
Reactor Vessel Head	102.5	C	R	--	R	--	--	--	--	C
RVH Stud Rack	3	C	R	--	--	C	--	--	--	C
Stud Tensioner	1.4	C	R	--	--	C	--	--	--	C
RVH Missile Shield Plug	7.6	C	R	--	--	C	--	--	--	C
P/R Vessel Inspection Device	1.9	C	R	--	--	C	--	--	--	C

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
RCP Missile Shield Planks	5.1	C	R	--	--	C	--	--	--	C
Pzr. Missile Shield Planks	4.4	C	R	--	--	C	--	--	--	C
S/G Snubber	1.0	C	R	--	--	C	--	--	--	C
Vessel Internals	27.5	C	R	--	R	--	--	--	--	C
RVH H&V Ducts	1.0	C	R	--	--	C	--	--	--	C
Crane Hook and Bottom Block	3.4	C	R	--	--	C	--	--	--	C
5. CW Pumphouse Monorails (E-W/N-S)	3	C	R	C	--	--	C	--	--	--
6. RPVH Circular Monorails	?	C	R	C	--	--	C	--	--	C
7. Containment Buttress Jib Cranes	--	C	R	C	--	--	C	--	--	--
8. Main Shop Crane	3	C	R	C	--	--	C	--	--	--
9. Jib Cranes over Core Instrumentation	--	C	R	C	--	--	C	--	--	C

drop could result in damage to any safe shutdown equipment. These cranes and hoists have been reviewed without consideration for the following:

a. electrical or mechanical interlocks
b. operating procedures controlling load movements
c. location in the plant (e.g., normally unoccupied areas)
d. handling systems used for lifts only during shutdown or refueling.

The Licensee's evaluation has also been based on the assumption that loads, if dropped, would be capable of penetrating floors and causing substantial damage to safe shutdown equipment located on lower floors. In Table 2.2, the Licensee has identified those handling systems which cannot be excluded on the basis of these assumptions and therefore must satisfy the requirements of NUREG-0612. Table 2.3 identifies those handling systems which have been excluded, as well as the reason for excluding each handling system.

b. Evaluation and Conclusion

WEPC's identification of those load handling systems in Table 2.2 which are subject to compliance with the guidelines of NUREG-0612 is consistent with NUREG-0612 guidance. Similarly, exclusion of those handling systems listed in Table 2.3, Items A, B, and C, is reasonable based upon the rationale provided.

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 states that safe load paths have been defined only for those cranes whose interactions could not be eliminated due to separation and redundancy or for those that carry loads over safe shutdown equipment.

Table 2.2. List of Overhead Heavy Load* Handling Systems That Must Comply with NUREG-0612 Description

Licensee Item No.	Handling System
5	Containment Polar Crane (Unit 1)
8	Auxiliary Building Main Crane
16	Turbine Building Main Crane
25	Containment Polar Crane (Unit 2)
	Circulating Water Pumphouse Monorails (N-S and E-W)
	Reactor Pressure Vessel Head Monorails
	Containment Buttress Jib Cranes
	Main Shop Crane
	Jib Crane Over Core Instrumentation Seal Tables

*Heavy load defined as 1750 lb or greater.

Table 2.3. Overhead Handling Systems Excluded from NUREG-0612 Compliance

A. Cranes excluded due to physical separation from safe shutdown equipment and irradiated fuel:

1. Personnel Access Hatch Monorails (Units 1 and 2)
2. Seal Water Injection Filters Jib Cranes (Units 1 and 2)
3. Drumming Station Jib Crane

B. Cranes excluded due to the fact that lifted loads, if dropped, would not result in damage to equipment required for safe shutdown or decay heat removal or cause a radioactive release in excess of 10CFR20 limits:

1. Ready Stores Monorail
2. Feedwater Heaters Monorail
3. Water Treatment Area Monorail
4. Monorail, East Wall in Circulating Water Pumphouse
5. Clean Side Maintenance Shop Crane

C. Cranes excluded because loads lifted are not heavy loads:

1. Reactor Cavity Fuel Manipulator (Units 1 and 2)
2. Control Building Electrical Equipment Room Monorail
3. Spent Fuel Handling Device
4. Main Steam Relief Valve Jib Crane (Units 1 and 2)
5. Jib Cranes over Reactor Coolant Pumps (Units 1 and 2)
6. Facade Monorails (L-8, L-15, L-16)

Therefore, load paths have been developed for only the turbine building crane, both containment polar cranes, and the auxiliary building crane. These load paths have been identified on equipment drawings and referenced in load handling procedures. Although interim load paths were defined for each of the five different handling systems listed in Section D of Table 2.3, use of these load paths was discontinued following completion of the safety evaluation.

In the auxiliary building, all heavy loads, with the exception of the spent fuel shipping cask and the resin cask, are carried over the north pool and the spent fuel pool heat exchanger, since all fuel is stored in the south pool. Loss of pool cooling as a result of a load drop has been previously reviewed and deemed acceptable by the NRC in previous WEPC submittals covering re-racking of the spent fuel pool.

Due to the congestion of equipment inside containment, the Licensee reports that priority was given to developing load paths around safe shutdown equipment as opposed to over structural members. The Licensee states that these load paths will be kept in locations convenient to the applicable cranes; however, the load paths will not be marked on floors or structures since such markings would be unduly confusing and hinder safe crane operation. As an alternative to marking load paths on the floor, the Licensee proposes to use large signs (3 ft by 4 ft) which will be strategically located in the turbine hall, control building wall, auxiliary building, and containments. These signs, which are also referenced in load handling procedures, contain information such as safe load paths, heavy loads and weights, sling capacity tables, and an example of proper sizing and use of slings. In addition, current load handling procedures will be reviewed to require the presence of a second individual to assist the crane operator in ensuring that prescribed safe load paths are followed.

Deviations from the prescribed safe load paths are not permitted without prior approval of the manager's supervisory staff which constitutes an onsite Safety Review Committee.

b. Evaluation

Review of safe load paths developed by the Licensee indicates that load paths have been satisfactorily developed for those cranes which the Licensee currently considers to be within the scope of NUREG-0612. In both the auxiliary building and the turbine building, load paths developed around areas containing irradiated fuel or safety-related equipment meet the intent of this guideline. The load paths that have been developed in the containment are reasonable. Assigning a higher priority to protection of safety-related equipment than to following structural members is in keeping with the intent of this guideline. As previously indicated in Section 2.1.1.C, this approach should be extended to other cranes which the Licensee has prepared to eliminate on the basis of system redundancy.

The Licensee's commitment to provide a second individual whose duties are defined by procedure and whose responsibility is to ensure that the crane operator follows approved load paths is an acceptable alternative to permanent marking of these load paths.

The proposed method of handling of load path deviations by requiring approval by the onsite Safety Review Committee meets the intent of this guideline.

c. Conclusion

The designation of safe load paths at Point Beach Units 1 and 2 is consistent with 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

WEPC states that procedures are used at Point Beach Units 1 and 2 to control the handling of loads by the turbine building, containment, and auxiliary building cranes to ensure that the loads remain within the safe load paths. WEPC further states that Point Beach Nuclear Plant administrative procedure PBNP 9.3, "Special Structural Limitations on the Lifting of Heavy Loads," has been reviewed and revised to incorporate the findings of the review of Sections 5.1.2 through 5.1.5 of NUREG-0612.

The Licensee's subsequent submittal [6] reiterated that all overhead handling systems in use at Point Beach Units 1 and 2 are covered by load handling procedures. The Licensee considers these procedures to be adequate for safe load handling. One such procedure (Procedure SLP-6, "Wire Rope Sling Sizing") was submitted as an example. Control of these load movements is accomplished through use of a limited number of generic procedures, which the Licensee believes to be preferable to a myriad of specific procedures for each possible lift. However, specific procedures containing the information required by Guideline 2 will be developed for the following lifts:

1. spent fuel shipping cask
2. resin cask
3. reactor vessel head
4. reactor vessel internals.

b. Evaluation and Conclusion

The Licensee's commitment to develop load-specific procedures for major loads in addition to the generic procedures which have been developed to control other nonspecified loads is consistent with the intent of Guideline 2 based upon Licensee assurances that these procedures contain the information required by this guideline.

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' [8]."

a. Summary of Licensee Statements and Conclusions

The Licensee states that all overhead handling systems are operated by trained operators. In addition, WEPC states that the existing Point Beach Nuclear Plant Training Program (TRNG 2.1) meets the requirements of ANSI B30.2-1976, Chapter 2-3, "Qualifications for Operators," with the following exceptions:

1. (Item 2-3.1.7e) The warning bell will be actuated only as required to advise personnel of crane movement, rather than continuously during crane motion.

2. (Item 2-3.1.7g) The main line disconnect switch will not be left open. Present operating practice is to leave it shut on some cranes, whether or not they are in use, thus reducing the delay when placing the crane in service. WEPC's subsequent submittal indicated that although the main disconnect switches are left closed, local disconnect switches allow the crane to be deenergized for servicing.

3. (Item 2-3.1.7n) The cranes will not be deenergized for normal maintenance since some maintenance requires that the power be on. Contrary to the requirements of this section, certain maintenance and testing operations specifically require that crane be energized. WEPC uses common sense safety practices when servicing cranes and recognizes that appropriate safety practices must be followed while maintaining equipment that is energized.

4. (Item 2-3.1.7o) Crane controls will be not be tested at the beginning of each shift. They will be tested at the beginning of each lifting operation.

5. (Item 2-3.1.2b, 1 and 2) Existing WEPC medical examinations assure compliance with physical requirements as specified in Section 2-3.1.2b, 3 through 6. Future medical examinations, to be scheduled as soon as practicable, will include eye examinations to meet the requirements of Sections 2-3.1.2b, 1 and 2.

b. Evaluation

Point Beach Units 1 and 2 satisfy the criteria of this guideline based upon the Licensee's certification that the existing training program meets the requirements of ANSI B30.2-1976, Chapter 2-3, except where noted. An evaluation of the exceptions noted by WEPC follows:

Exception 1. The action proposed by the Licensee is reasonable. Item 2-3.1.7e of the standard states that the warning device "shall be activated each time before traveling, and intermittently when approaching workpersons." The Licensee's intent to activate the device "as required to advise personnel" satisfies the intent of the standard.

Exception 2. The Licensee's action is reasonable and appropriate for the operation of pendant or radio-controlled cranes. This possible deviation from the specific wording of ANSI B30.2-1976 cannot be assessed to result in a measurable departure from the load handling reliability goals of NUREG-0612.

Exception 3. The Licensee's practices for controlling power to cranes during normal maintenance, although not in strict compliance with the wording of ANSI B30.2-1976, is a reasonable approach to the protection of personnel during crane maintenance. This approach is not expected to result in a measurable departure from the load handling reliability goals of NUREG-0612.

Exception 4. The Licensee's intent to test crane controls only at the beginning of each lifting operation is reasonable and is consistent with the guidance of NUREG-0612.

Exception 5. The intent to perform future medical examinations with the required eye examinations of Section 2-3.1.2b is reasonable. The Licensee should ensure that all presently qualified crane operators are tested for visual acuity.

c. Conclusion and Recommendations

Crane operator training, qualification, and conduct during load handling operations at Point Beach Units 1 and 2 is expected to be consistent with the objectives of NUREG-0612.

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' [9]. 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 states that Westinghouse, the supplier of most of the special lifting devices, has performed a review of lifting device design to determine compliance with ANSI N14.6-1978 as supplemented by NUREG-0612, Guideline 4. The special lifting devices reviewed were:

- o reactor head lifting device
- o upper internals lifting device
- o reactor coolant pump motor lifting device

The Licensee's evaluation of these lifting rigs for compliance with the requirements of ANSI N14.6-1978 has been provided; this evaluation addresses only those sections which are directly related to the load handling reliability of the lifting rig. The Licensee has provided the following information regarding these lifting devices.

1. Design - Proper consideration was made of design considerations (Section 3.3) and designer's responsibilities (Section 3.1) in the design of the lifting devices. Regarding stress design factors, the Licensee states that, due to the inherent elasticity of the multiple-reeved hoisting system, the dynamic factor would be minimal. In the Licensee's opinion, no compensation need be made for dynamic loads since the ANSI factor of 3 certainly includes consideration of suddenly applied loads for cases where the impact factor may be as high as 2.

   In addition, however, it is noted that all other components of those lifting rigs evaluated meet or exceed ANSI stress design factors of 3 and 5 with the following exceptions noted for the reactor vessel internals lift rig: the adaptor pin, lift lug pin, side lug pin, and sling leg pin. For each of these pins, it is noted that bending stresses exceed material allowable stresses, whereas bearing and shear stresses are well below the ANSI requirements. The Licensee states that calculated bending stresses are overestimated and the pin shear stresses are the governing parameter for pin strength; therefore, all pins satisfy the ANSI stress design criteria.

2. Fabrication - Although a formal quality assurance program was not required, the Licensee states that the vendor reviewed all aspects of the manufacturing process, including material selection, welders, and welding procedures; conformance with drawing requirements is assured by the Westinghouse quality release program.

3. Testing, Inspection, and Continued Compliance - The reactor pressure vessel (RPV) lift rig was load tested to 100% prior to initial use. The RPV internals lift rig was not load tested prior to use, but this rig has lifted the lower internals, which is a load substantially in excess (300%) of the weight of the upper internals (the heavy load of concern). A 150% proof load test of the reactor coolant pump lift rig has not been performed and was not required at the time of manufacture. Load tests have been performed of individual components, however, including the master link (to 200%) and individual wire rope slings (to 250%). The triangular spreader assembly was not load tested but was nondestructively examined with acceptable results. Design review of this lifting device indicates that it is a simple spreader beam assembly with substantial design stress margins, and welds in the assembly have been nondestructively examined. These factors are sufficient to assure the adequacy of the device in lieu of performing a 150% load test. Regarding annual inspection requirements, the Licensee states that 150% load tests are impractical to perform and that such testing would exceed the crane capacity for the RPV and internals lifting rigs.

   The requirements of the annual visual inspection of special lifting devices will be modified to incorporate the NDE of critical welds. Surface examination of the welds will take place after a 10-year period and will be performed in a manner consistent with ASME Section XI. In addition to weld inspections, visual examinations of lifting rigs will be performed during each outage to check for defects and deformation.

   In the event of major maintenance or application of substantial stresses, tests will be performed by lifting the designated loads a short distance for ten minutes, and visually inspecting critical welds of concern.

b. Evaluation

For those lifting devices evaluated by the Licensee, adequate information has been provided to verify that appropriate considerations were observed in the design and fabrication of these devices. The Licensee's observation that dynamic impact forces are accommodated in the ANSI stress design factors is not consistent with this guideline; the intent as perceived by staff discussions is to account for known routine dynamic loads so that the safety factor is reserved for uncontrollable factors such as aging, harsh environments, or unexpected dynamic loads (e.g., load hangup). However, it is also noted that, with limited exceptions, lift rig components satisfy ANSI stress design requirements. In addition, crane speeds used to lift these devices and associated loads are slow (6 feet per minute), and resulting dynamic loads are minimal and may be disregarded.

For those pins noted to exceed ANSI stress design factors in bending stress, it is not agreed that shear stress is the critical parameter. Shear stress is the critical parameter when considering secured mechanical connectors as bolts and rivets; bending stress should be considered for nonsecured connectors such as pins. However, it is noted that this lifting rig is conservatively designed and has lifted the lower internals (202,000 lbs), which is over 300% of the weight of the heavy load of concern, the upper internals. Therefore, the existing design of this device, combined with a lift significantly in excess of the load of concern without consequence, adequately demonstrates the design and fabrication reliability of this device for lifting the upper internals.

The intent of Guideline 4, in addition to verifying the design adequacy of these special lifting devices, is also to ensure that the Licensee inspects and maintains these devices in a manner which assures their continued reliability. An integral part of this program includes performance of an initial or periodic load test to a load sufficiently in excess of the rated load. The performance of a load test in excess of the load subject to NUREG-0612 is an important contributor to the ability to assess the overall reliability of a device. Such a test supplements design reliability by demonstrating that the device was properly fabricated or assembled and that a portion of the design safety margin has been demonstrated. Such proof of workmanship is particularly important for a fairly complicated device. It is recognized, however, that the specification of a 150% overload test is somewhat arbitrary and that, in some cases, the nature of the device is such that the likelihood of workmanship shortcomings is remote. In addition, ANSI N14.6-1978 specifies that an annual program of either load tests or thorough nondestructive examination (NDE) should be performed to demonstrate continued reliability.

A lift of the lower internals by the RPV internals lifting rig is more than sufficient to satisfy the ANSI requirement. However, information provided by the Licensee indicates that the RPV head and the reactor coolant pump motor lifting rigs have not been load tested in excess of the rated load of these devices.

Evaluation of the RPV head lifting device by the Licensee, however, indicates that the design stress margins are substantial, that the device is uncomplicated, that it is principally assembled with mechanical joints such that an assembly error is unlikely, and lastly, that it has been weight tested to 100% of rated load. In addition, the use of welded joints appears to be minimized, and documentation has been provided to substantiate the NDE performed on each of these welds. Therefore, design, fabrication, and initial 100% load testing of the head lift rig was performed in a manner that results in load handling reliability consistent with the 150% test specified in ANSI N14.6-1978.

The reactor coolant pump motor lift rig has been analyzed in a manner similar to the RPV head lift rig, and supporting documentation has been provided by the Licensee. Information provided by the Licensee indicates that this device is of simple design, that the use of welded joints is minimized, and that NDE has been performed on all critical welds and major structural members. Therefore, as in the case of the RPV head lifting device, the design, fabrication, and l ad tests of key components of the reactor coolant pump lifting rig were pe rmed in a manner that provides reasonable assurances of the load handling reliability of this device.

Descriptions of the periodic inspection program that will be performed by the Licensee adequately address the recommendations of ANSI N14.6-1978. Further, the decision to conduct critical weld inspections over a 10-year period is consistent with ASME guidelines and the limited use of these devices.

c. Conclusion and Recommendations

Design, fabrication, and programs that ensure continuing compliance are consistent with the criteria of Guideline 4 for the following lifting devices:

- o reactor vessel head lift rig
- o reactor vessel internals lift rig
- o reactor coolant pump motor lift sling.

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 guideline of ANSI B30.9-1971, 'Slings' [10]. However, in selecting the proper sling, the load used should be the sum of the static and maximum dynamic load. The rating identified on the sling should be in terms of the 'static load' which produces the maximum static and dynamic load. Where this restricts slings to use on only certain cranes, the slings should be clearly marked as to the cranes with which they may be used."

a. Summary of Licensee Statements and Conclusions

WEPC states that a review of other lifting devices was conducted to determine compliance with the design, fabrication, and proof-testing requirements of ANSI B30.9-1971 and NUREG-0612, Section 5.1.1(5). The Licensee further states that all slings in use (except for those used in the turbine building south of column line 10 and north of column line 13 and those used in the transport of the turbine rotors) will be replaced with slings meeting the requirements of ANSI B30.9-1971. In the interim, the old slings will be used after being derated by a factor of two, assuming the lowest value for a particular wire diameter.

The Licensee takes exception to the inspection requirements of Section 9-2.8.1 of ANSI B30.9-1971, which requires inspection on a regular basis. Inspections are performed prior to each use; therefore, further inspections on a regular basis would be redundant.

WEPC's subsequent submittal [6] reiterated the Licensee's previous position that all slings used at Point Beach Nuclear plant meet the criteria developed by WEPC to satisfy requirements for adequate factors of safety and dynamic loading considerations.

b. Evaluation

Programs for slings at Point Beach Units 1 and 2 are consistent with this guideline on the basis of the Licensee's certification that slings are being replaced with slings that satisfy the criteria of ANSI B30.9-1971. It is also reasonable to derate slings currently in use until replacements are procured. The Licensee's current inspection plan, which requires a detailed inspection of slings prior to use in a load handling operation and sling rejection in cases where ANSI inspection criteria are not satisfied, can be expected to provide a degree of sling reliability consistent with the objectives of Guideline 5.

c. Conclusion and Recommendations

The design and use of slings at Point Beach Units 1 and 2 will provide a level of load handling reliability consistent with the objectives of 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

Point Beach Nuclear Plant inspection, testing, and maintenance operations and procedures have been reviewed by the Licensee against the requirements of ANSI B30.2-1976, Chapter 2-2, and are in compliance, with the exception of the containment polar cranes. The Licensee states that "these (polar) cranes are given an initial inspection in accordance with OSHA requirements prior to use." The major annual inspection, fulfilling the requirements of Chapter 2-2, is performed by the Licensee during the annual refueling outages as time permits.

b. Evaluation

Procedures in use at Point Beach Nuclear Plant satisfy the requirements of this guideline on the basis of the Licensee's certification that these procedures are in compliance with ANSI B30.2-1976, Chapter 2-2. It is acceptable for the Licensee to use OSHA inspection requirements, since applicable ANSI standards have been incorporated into OSHA guidelines. Further, the major annual inspections may be deferred but should be performed prior to use (as opposed to "as time permits" as recommended by the Licensee), as noted in NUREG-0612.

c. Conclusion

Inspection, testing, and maintenance procedures at Point Beach Nuclear Plant are performed in a manner consistent with Guideline 6.

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

> "The crane should be designed to meet the applicable criteria and guidelines of Chapter 2-1 of ANSI B30.2-1976, 'Overhead and Gantry Cranes,' and of CMAA-70, 'Specifications for Electric Overhead Traveling Cranes' [11]. 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 Point Beach auxiliary building crane will be modified by the Licensee to provide adequate redundant lifting features and will take into consideration ANSI B30.2-1976, CMAA-70, and Regulatory Guide 1.13.

The containment, auxiliary, and turbine building cranes were designed to comply with EOCI-61 [12], which was superseded by CMAA-70. As a basis for its evaluation, WEPC states the following:

"It is to be noted that the Franklin Research Center, a division of The Franklin Institute, conducted a comparison of the recommendations of CMAA-70 with those contained in EOCI-61. Generally, the requirements of CMAA-70 represented the codification of good engineering practice which should have been incorporated in cranes built to EOCI-61 specification although specific requirements were not contained in EOCI-61. The Franklin Research Center study is addressed in 'Technical Evaluation Report,' NRC Docket No. 50-334, dated September 24, 1981 performed under NRC Contract No. NRC-03-79-118."

The differences between EOCI-61 and CMAA-70 that affect the safe handling of heavy loads by the containment and turbine building cranes are addressed in the succeeding paragraphs.

1. Impact allowance. CMAA-70, Article 3.3.2.1.1.3, requires that crane design calculations include an impact allowance of 0.5% of the load per foot per minute (fpm) of hoisting speed but not less than 15%. EOCI-61 specifies only a minimum allowance of 15%. Consequently, for cranes with hoist speeds in excess of 30 fpm, it is possible that the impact allowance applied under EOCI-61 will be less than that required by CMAA-70. Except for the containment building crane auxiliary hoist speed of 35 fpm, the overhead cranes subject to this review operate with hoist speeds not in excess of 30 fpm. A modification is deemed unnecessary since all critical loads are handled by the the main hoist.

2. Torsional forces. CMAA-70, Article 3.3.2.1.3, requires that twisting moments due to overhanging loads and lateral forces acting eccentric to the horizontal neutral axis of a girder be calculated on the basis of the distance between the center of gravity of the load, or force center line, and the girder shear center measured normal to the force vector. EOCI-61 states that such moments are to be calculated with reference to girder center of gravity. For girder sections symmetrical about each principal central axis (e.g., box section or I-beam girders), the shear center coincides with the centroid of the girder section and there is no difference between the two requirements. Box section girders are used for the containment building and turbine building cranes.

3. Bending stress. CMAA-70, Article 3.3.2.2, requires that bending stress calculations include a wind load of 5 pounds per square foot in design

stress calculations based on the sum of dead and live loads. EOCI-61 requires that the design of outdoor cranes include a wind load of 10 pounds per square foot of projected area but is not specific concerning the combination of wind loads with other dead and live loads. Although the combination of a wind load with other design loading calculations constitutes a codification of the same good engineering practice that would have been used in the cranes built to EOCI-61 specifications, the containment building and turbine building cranes are installed indoors and therefore are not subject to wind loading.

4. Longitudinal stiffeners. CMAA-70, Article 3.3.3.1, specifies (1) the maximum allowable web depth/thickness (h/t) ratio for box girders using longitudinal stiffeners and (2) requirements concerning the location and minimum moment of inertia for such stiffeners. EOCI-61 allows the use of longitudinal stiffeners but provides no similar guidance. The requirements of CMAA-70 represent a codification of the girder design practice and the design standards employed in the containment building and turbine building cranes built to EOCI-61 specifications.

5. Allowable compressive stress. CMAA-70, Article 3.3.3.1.3, identifies allowable compressive stresses to be approximately 50% of yield strength of the recommended structural material (A-36) for girders, where the ratio of the distance between web plates to the thickness of the top cover plate (b/c ratio) is less than or equal to 38. Allowable compressive stresses decrease linearly for b/c ratios in excess of 38. EOCI-61 provides a similar method for calculating allowable compressive stresses except that the allowable stress decreases from approximately 50% of yield only after the b/c ratio exceeds 41. Consequently, structural members with b/c ratios in the general range of 38 to 52 designed under EOCI-61 will allow a slightly higher compressive stress than those designed under CMAA-70. The b/c ratios of structural members for the containment building and turbine building cranes are 20 and 20.7, respectively.

6. Fatigue considerations. CMAA-70, Article 3.3.3.1.3, provides substantial guidance with respect to fatigue failure by indicating allowable stress ranges for various structural members in joints under repeated loads. EOCI-61 does not address fatigue failure. The requirements of CMAA-70 are not

of consequence for the containment building and turbine building cranes since these cranes are not generally subjected to frequent loads at or near design conditions (CMAA-70 provides allowable stress ranges for loading cycles in excess of 20,000) and are not generally subjected to stress reversal (CMAA-70 allowable stress range is reduced to below the basic allowable stress for only a limited number of joint configurations).

7. Hoist rope requirements. CMAA-70, Article 4.2.1, requires that the capacity load plus the bottom block divided by the number of parts of rope not exceed 20% of the published rope breaking strength. EOCI-61 requires that the rated capacity load divided by the number of parts of rope not exceed 20% of the published rope breaking strength. The capacity load plus the bottom block divided by the number of parts of rope yields 8.62 tons and 8.14 tons for the containment building and turbine building cranes, respectively. These values are less than 20% of the 50.1-ton published breaking strength of 1-1/8 inch 6 x 37 Improved Plow Steel - Fiber Core Wire Rope.

8. Drum design crushing and bending loads. CMAA-70, Article 4.4.1, requires that the drum be designed to withstand combined crushing and bending loads. EOCI-61 requires only that the drum be designed to withstand maximum load bending and crushing loads with no stipulation that these loads be combined. The combination of crushing and bending loads for the subject cranes could not be verified due to lack of information. However, this variation is not expected to be of consequence since the requirements of CMAA-70 represent the codification of good engineering practice that has been incorporated in the containment building and turbine building cranes built to EOCI-61 specifications although a specific requirement was not contained in EOCI-61.

9. Drum design groove depth and pitch. CMAA-70, Article 4.4.3, provides recommended drum groove depth and pitch. EOCI-61 provides no similar guidance. The recommendations in CMAA-70 constitute a codification of good engineering practice with regard to reeving stability and reduction of rope wear and do not differ substantially from practices employed in the design of containment building and turbine building cranes built to EOCI-61 specifications.

The containment building and turbine building drum groove depth and pitch meet the requirements of CMAA-70.

10. Gear design. CMAA-70, Article 4.5, requires that gearing horsepower rating be based on certain American Gear Manufacturers Association (AGMA) standards and provides a method for determining allowable horsepower. EOCI-61 provides no similar guidance. The recommendations in CMAA-70 constitute a codification of good engineering practice for gear design and do not differ substantially from the practices employed in the design of the containment building and turbine building cranes built to EOCI-61 specifications. The containment building and turbine building crane gears are in accordance with AGMA standards.

11. Bridge brake design. CMAA-70, Article 4.7.2.2, requires that bridge brakes, for cranes with cab control and the cab on the trolley, be rated at least 75% of bridge motor torque. EOCI-61 requires a brake rating of 50% of bridge motor torque for similar configurations. A cab-on-trolley control arrangement is not used for the containment building and turbine building cranes. The containment building and turbine building crane bridge and trolley brakes are rated at 100% of the motor full load torque.

12. Hoist brake design. CMAA-70, Article 4.7.4.2, requires that hoist holding brakes, when used with a method of control braking other than mechanical, have torque ratings no less than 125% of the hoist motor torque. EOCI-61 requires a hoist holding brake torque rating of no less than 100% of the hoist motor torque without regard to the type of control brake employed. The containment building and turbine building main and auxiliary hoist brakes are rated at 150% of the hoist motor full load torque with electrical control braking systems.

13. Bumpers and stops. CMAA-70, Article 4.12, provides substantial guidance for the design and installation of bridge and trolley bumpers and stops for cranes which operate near the ends of bridge and trolley travel. No similar guidance is provided in EOCI-61. The trolley and bridge stops incorporated in the design of the containment building and turbine building cranes employ limit switches which stop the bridge or trolley prior to

reaching the end of travel. These switches provide the equivalent effect of the bumpers or stops described in CMAA-70.

14. Static control systems. CMAA-70, Article 5.4.6, provides substantial guidance for the use of static control systems. EOCI-61 provides guidance for magnetic control systems only. This variation is not an issue of consequence because magnetic control systems were generally employed in cranes designed when EOCI-61 was in effect and the static control requirements identified in CMAA-70 constitute a codification of the same good engineering practice that was used in the design of static control systems in the containment building and turbine building cranes built to EOCI-61 specifications.

15. Restart protection. CMAA-70, Article 5.6.2, requires that cranes not equipped with spring-return controllers or momentary-contact push buttons be provided with a device that will disconnect all motors upon power failure and will not permit any motor to be restarted until the controller handle is brought to the OFF position. No similar guidance is provided in EOCI-61. This variation is not of consequence for the containment building and turbine building cranes since, except for the maintained contact master OFF-ON control, they are designed with spring-return controllers or momentary-contact push buttons.

In addition to those items noted in FRC's evaluation the Licensee has compared ANSI B30.2-1976 and CMAA-70 with EOCI-61 and provided the following additional evaluations:

1. Structural Steel. CMAA-70 requires ASTM A36 structural steel; the ordinary structural steel for containment building and turbine building cranes conforms to ASTM A36, and low alloy structural steel conforms to ASTM A242.

2. Stress Requirements. Although the specification requirements differ, the stress requirements of CMAA-70 for bridge girders, end trucks, and trolley frames are met by the containment building and turbine building cranes.

3. Crane Hook Latches. ANSI B30.2-1976 adds the requirement that crane hooks have latches if practical in that application. This requirement is met by the containment building and turbine building cranes.

b. Evaluation

The Point Beach auxiliary crane satisfies the criteria of Guideline 7 on the basis of the Licensee's certification that modifications currently in progress will comply with ANSI B30.2-1976 and CMAA-70.

The Point Beach containment building and turbine building cranes substantially satisfy the criteria of Guideline 7 on the basis that the cranes were designed and procured to EOCI-61 standards. In addition, the Licensee has satisfactorily addressed the more restrictive design requirements imposed by CMAA-70. The following evaluation of each Licensee exception to a specific requirement of CMAA-70 is provided:

1. Impact allowance. The Licensee notes that the auxiliary hoist speed is 35 fpm, which is in excess of the 30-fpm hoist speed at which other overhead cranes subject to this review operate. It is agreed that modification to reduce this hoist speed is unnecessary since all critical loads are handled by the main hoist.

2. Bumpers and Stops. Trolley and bridge stops for these cranes employ limit switches which stop the bridge or trolley prior to the end of travel; such a design suitably precludes crane operation under load at the end of bridge or trolley travel.

c. Conclusion

The design and fabrication of overhead electric travelling cranes at Point Beach Nuclear Station are 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.

The status of the Licensee's implementation and the evaluation of these interim protection measures are summarized in the succeeding paragraphs of this section.

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

"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

Point Beach Technical Specification 15.3.8, "Refueling and Spent Fuel Assembly Storage," will be modified to prohibit the movement of heavy loads over spent fuel in the spent fuel pool until such time as a single-failure-proof crane has been installed. In particular, Section 15.3.8.B4 will be revised to exclude the phrase "whenever possible."

b. Evaluation and Conclusion

When modified, plant technical specifications will conform to the requirements of Interim Protection Measure 1.

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

"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 corresponding 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 for the corresponding general guidelines 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 Over the Core [Interim Protection Measure 6, NUREG-0612, Section 5.3]

"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 load handling procedures have been evaluated and upgraded to include reference to interim safe load paths. Crane operators are trained. Plant maintenance procedures meeting the requirements of ANSI B30.2, Chapter 2-2, with some exceptions, are observed.

b. Evaluation

Although not specifically addressed by the Licensee, it is apparent from responses to Guidelines 5 and 6 that visual inspections of load bearing components of slings and cranes meet the intent of interim protection measure. Conformance with the requirements of Chapter 2-2 of ANSI B30.2 ensures that appropriate repair and replacement of defective components is performed. Inherent in the responses to Guideline 4, the special lifting devices are visually inspected annually and appropriate quality controls are placed on repairs and replacement parts.

c. Conclusion

The requirements of Interim Protection Measure 6 have been satisfied by the Licensee through implementation of necessary programs or by performance of required reviews.

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 Wisconsin Electric Power Company's (WEPC) Point Beach Nucelar Power Plant Units 1 and 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 the Point Beach Units 1 and 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 MEASURES

The NRC staff has stated in NUREG-0612, Section 5.3 that certain measures should be initiated to provide reasonable assurance that handling of heavy loads will be performed in a safe manner until 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 ensures that the staff's measures for interim protection at Point Beach Nuclear Plant have been satisfied.

4. REFERENCES

1. "Control of Heavy Loads at Nuclear Power Plants"
   NRC, 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
   May 17, 1978

3. Generic letter to Point Beach Nuclear Plant
   Subject: Request for Review of Heavy Load Handling
   NRC, December 22, 1980

4. C. W. Fay (WEPC)
   Letter to H. R. Denton (NRC)
   Subject: Control of Heavy Loads at Nuclear Power Plants
   September 30, 1981

5. C. W. Fay (WEPC)
   Letter to H. R. Denton (NRC)
   Subject: Control of Heavy Loads at Nuclear Power Plants
   January 11, 1982

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