

TECHNICAL EVALUATION REPORT

CONTROL OF HEAVY LOADS (C-10)

LACROSSE BOILING WATER REACTOR

DAIRYLAND POWER COOPERATIVE

NRC DOCKET NO. 50-409

FRC PROJECT C5506

NRC TAC NO. 07999

FRC ASSIGNMENT 13

NRC CONTRACT NO. NRC-03-81-130

FRC TASK 364

Prepared by

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Prepared for

Nuclear Regulatory Commission
Washington, D.C. 20555

Lead NRC Engineer: F. Clemenson

May 31, 1983

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FOREWORD

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

Mr. C. R. Bomberger and Mr. I. H. Sargent contributed to the technical preparation of this report through a subcontract with WESTEC Services, Inc.

1. INTRODUCTION

1.1 PURPOSE OF REVIEW

This technical evaluation report documents an independent review of general load handling policy and procedures at the Dairyland Power Cooperative's (DPC) LaCrosse Boiling Water Reactor (LACBWR). This evaluation was performed with the following objectives:

- o to assess conformance to the general load handling guidelines of NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants" [1], Section 5.1.1
- o to assess conformance to the interim protection measures of NUREG-0612, Section 5.3.

1.2 GENERIC BACKGROUND

Generic Technical Activity Task A-36 was established by the U.S. Nuclear Regulatory Commission (NRC) staff to systematically examine staff licensing criteria and the adequacy of measures in effect at operating nuclear power plants to 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-part objective using an accepted approach or protection philosophy. The first portion of the objective, achieved through a set of general guidelines identified in NUREG-0612, Section 5.1.1, is to ensure that all load handling systems at

nuclear power plants are designed and operated so that their probability of failure is uniformly small and appropriate for the critical tasks in which they are employed. The second portion of the staff's objective, achieved through guidelines identified in NUREG-0612, Sections 5.1.2 through 5.1.5, is to ensure that, for load handling systems in areas where their failure might result in significant consequences, either (1) features are provided, in addition to those required for all load handling systems, to ensure that the potential for a load drop is extremely small (e.g., a single-failure-proof crane) or (2) conservative evaluations of load-handling accidents indicate that the potential consequences of any load drop are acceptably small. Acceptability of accident consequences is quantified in NUREG-0612 into four accident analysis evaluation criteria.

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 the 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 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 DPC, the Licensee for the LaCrosse plant, requesting that the Licensee review provisions for the handling and control of heavy loads at the LaCrosse plant, evaluate these provisions with respect to the guidelines of NUREG-0612, and provide certain additional information to be used for an independent determination of

conformance to these guidelines. On June 1, 1981, DPC provided the initial response [4] to this request. Additional information was provided on February 24, 1982 [5] and August 25, 1982 [6].

A draft technical evaluation report based upon these submittals was prepared and informally transmitted to the Licensee for review and comment. On November 16, 1982, a telephone conference call was conducted with representatives of the NRC, FRC, and DPC to discuss unresolved issues. As a result of this call, additional information was forwarded by DPC on November 24, 1982 [7] and is incorporated into this technical evaluation.

2. EVALUATION

This section presents a point-by-point evaluation of load handling provisions at the LaCrosse plant 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 5.2. In each case, the guideline or interim measure is presented, Licensee-provided information is summarized and evaluated, and a conclusion as to the extent of compliance, including recommended additional action where appropriate, is presented. These conclusions are summarized in Table 2.1.

2.1 GENERAL GUIDELINES

The NRC has established seven general guidelines which must be met in order to provide the defense-in-depth approach for the handling of heavy loads. These guidelines consist of the following criteria from Section 5.1.1 of NUREG-0612:

- o Guideline 1 - Safe Load Paths
- o Guideline 2 - Load Handling Procedures
- o Guideline 3 - Crane Operator Training
- o Guideline 4 - Special Lifting Devices
- o Guideline 5 - Lifting Devices (Not Specially Designed)
- o Guideline 6 - Cranes (Inspection, Testing, and Maintenance)
- o Guideline 7 - Crane Design.

These seven guidelines should be satisfied by all overhead handling systems and programs in order to handle heavy loads in the vicinity of the reactor vessel, near spent fuel in the spent fuel pool, or in other areas where a load drop may damage safe shutdown systems. The Licensee's verification of the extent to which these guidelines have been satisfied and an evaluation of this verification are contained in the succeeding paragraphs.

Table 2.1 LaCrosse Boiling Water Reactor/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	50/5	--	--	C	--	--	C	C	--	--
a. Reactor Vessel Head	12.5	C	C	--	C	--	--	--	--	C
b. Insulation Cover	1	C	C	--	--	C	--	--	--	--
c. Head Piping	0.5	C	C	--	C	--	--	--	--	--
d. Shield Plug (3 Total)	30/31/32	C	C	--	C	--	--	--	--	--
e. Transfer Canal Shield Plug	8.6	C	C	--	C	--	--	--	P	--
f. Transfer Canal Gate	0.25	C	C	--	C	--	--	--	--	--
g. Core Spray Bundle	1	C	C	--	C	--	--	--	--	C
h. Fuel Shipping Cask	15	C	C	--	C	--	--	--	P	--
i. Misc. Casks	2-7	C	C	--	C	--	--	--	P	--
j. Crane Load Block	2	--	--	--	--	--	--	--	--	--
1. Forced Circ. Pump (FCP)	14	C	C	--	--	C	--	--	--	--

C = Licensee action complies with NUREG-0612 guidelines.
P = Licensee action partially complies with NUREG-0612 guidelines.
-- = Not applicable.

2.1.1 NUREG-0612, Heavy Loads Overhead Handling Systems

a. Summary of Licensee Statements and Conclusions

The Licensee stated that a review of load handling systems at the LaCrosse plant indicates that the 50-ton reactor building polar crane is the only load handling system subject to NUREG-0612.

The Licensee also stated that the fuel transfer bridge contains a hoisting mechanism for handling fuel elements, both new and irradiated, and control rods. However, the capacity of the hoisting mechanism is physically limited to the weight of a fuel element or less. Further, an overhead bridge crane is located in the turbine building and a gantry crane is located outside; neither is capable of a load drop in the proximity of any system or component required for plant shutdown or decay heat removal.

b. Evaluation and Conclusion

On the basis of an independent review of the data provided, the Licensee's conclusions regarding the applicability of NUREG-0612 are consistent with the general guidelines of NUREG-0612, Section 5.1.1.

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

Several drawings (Figures 6.1 through 6.6 of Reference 5) identify the safe load path of the fuel shipping cask, the location of the spent fuel pool, the reactor vessel head and shield plug setdown area, the canal plug and its

storage area when refueling, and the decay heat pump and heat exchanger. The decay heat piping enters and exits the forced circulating-pump (FCP) cubicle, where it connects to the LA FCP loop piping.

The Licensee has identified safe load paths for heavy loads handled by the reactor building crane. These load paths are designated and defined in the LACBWR operating procedures manual. The responsibility for following these load paths is delegated to the load supervisor. Temporary and permanent changes to procedures are controlled by administrative controls which require review and approval by the plant operations review committee.

In addition, the Licensee stated that the specific load path for the cask is designated in a cask handling procedure. A change in procedure requires a review and approval by the plant operations review committee.

b. Evaluation

The Licensee's approach to the designation and definition of safe load paths at the LaCrosse plant is consistent with that required by this guideline. The Licensee's use of a designated load supervisor delegated with the responsibility of ensuring that load paths are followed is an adequate alternative to load path marking.

c. Conclusion and Recommendation

The LaCrosse plant complies with Guideline 1 of NUREG-0612.

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 has stated that load handling operations are conducted in accordance with reviewed and approved procedures on which operators have been trained or briefed. All load handling operations involving movement of the reactor vessel head, the shield plugs, the insulation cover, the head piping, and the canal plug are contained in procedures in the LaCrosse Operating Manual, Vol. VI.

Special procedures were developed for use with the FCP, irradiated fuel shipping cask, and other casks that have been handled in the reactor containment building.

The procedures for the handling of heavy loads by the reactor building crane include the following: identification of required equipment, inspections and acceptance of equipment as prerequisites, the sequence of the lift, the load path to be followed, and precautions and other instructions, all of which are approved in accordance with administrative procedures.

b. Evaluation and Conclusion

The Licensee's description and implementation of procedural controls on load handling at the LaCrosse plant comply with Guideline 2 of NUREG-0612.

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

"Crane operators should be trained, qualified, and conduct themselves in accordance with Chapter 2-3 of ANSI B30.2-1976, 'Overhead and Gantry Cranes' [8]."

a. Summary of Licensee Statements and Conclusions

The Licensee has stated that LaCrosse crane operators are qualified to LaCrosse Administrative Control Procedure 23.1, "LACBWR Crane Operator Qualification and Certification," which encompasses the requirements of ANSI B30.2-1976 with respect to operator training, qualification, and conduct.

b. Evaluation

Crane operator training at the LaCrosse plant is considered to meet the intent of the guideline based on the Licensee's verification that the program meets the provisions of ANSI B30.2-1976.

c. Conclusion

The LaCrosse plant complies with Guideline 3 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 stress design factor on only the weight (static load) of the load and of the intervening components of the special handling device [NUREG-0612, Guideline 5.1.1(4)]."

a. Summary of Licensee Statements and Conclusions

The Licensee has stated that, prior to use at the plant site, lifting devices for casks are verified to be capable of the desired lift by the requirement of certain tests, inspections, material certifications, and design data, as appropriate, from the manufacturer. In addition, a load test of the lifting device is performed onsite. These actions ensure conformance to the guidelines of ANSI N14.6-1978.

Lifting devices used for other heavy loads handled by the reactor building crane, except for the insulation cover and the FCP, are of unique designs, and each is used only on its associated load. These lifting devices are inspected prior to and immediately after each load is lifted. Lifting devices for the insulation cover and FCP are commercial wire rope slings and

conform to ANSI B30.9-1971. These lifting slings are inspected and tested in accordance with approved procedures and programs.

Subsequently, the Licensee stated that, based on review and comparison, LACBWR does not have any special lifting devices as defined in ANSI N14.6-1978. However, if any are to be used with the reactor building crane (polar crane), they will be in compliance with ANSI N14.6.

The designated lifting devices for the reactor vessel head, shield plugs, and transfer canal shield plug, are unique configurations of commercial lifting devices. The designated lifting rig for both the vessel head and shield plugs is a commercial 3-part wire rope sling with appropriate clevises and turnbuckles for leveling purposes. The weakest part of the lifting rig is the alloy steel oblong link at the top of the 3-part sling. It is rated at 37 tons with a safety factor of 5, which is in excess of that required by CMAA-70 for crane dynamic loading, inclusive of a 20% dead weight factor.

The designated lifting device for the transfer canal shield plug is made of commercial oblong links and chain shackles. The weakest part is the link with a load rating of 9.6 tons with a safety factor of 5, which is in excess of that required by CMAA-70 for crane dynamic loading, inclusive of a 20% dead weight factor.

LACBWR maintains a regular inspection program of which these lifting devices are a part. LACBWR does not currently have yokes and special lifting devices as defined in ANSI N14.6-1978; however, some have been used. Those lifting rigs were verified to have been designed, fabricated, tested, and inspected by the owner. This was required in accordance with the LACBWR quality assurance program.

b. Evaluation

The Licensee's contention that LACBWR has no special lifting devices is acceptable because none of the designated lifting devices, which consist of wire rope slings or chains, are considered to be special lifting devices as defined in ANSI N14.6-1978. Additional actions, such as inspection prior to and immediately after load lift and testing in accordance with approved

procedures, enhance load handling reliability of these devices and are consistent with the requirements of this guideline.

The Licensee has indicated that prior to use at the plant site, the capability of lifting devices for casks are verified by the manufacturer through the requirements of certain tests, inspections, material certifications, and design data. In addition, a load test of the lifting device is performed onsite. These tests and manufacturer verifications meet the intent of this guideline. However, the Licensee should ensure that verification from the manufacturer and onsite load tests comply with the requirements of ANSI N14.6-1978.

c. Conclusion

The LaCrosse plant complies with Guideline 4 of NUREG-0612 based on the Licensee verification that cask lifting devices and onsite load tests comply with ANSI N14.6-1978 guidelines.

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' [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

The Licensee has stated that lifting devices for the insulation cover and FCP are commercial wire rope slings and conform completely to ANSI B30.9-1971 requirements. The inspection and testing program for slings includes these lifting slings.

The Licensee states that all general lifting devices in use at LACBWR are commercially fabricated; none are made by plant personnel. The manufacturer

of these slings provides a rated capacity of each sling. The rated load capacity is based on a design safety factor of 5. Some slings are ordered to include a proof test by the manufacturer, and all slings have tags stating the rated load capacity.

In rigging slings, due allowance is made for variations and unusual conditions of the sling application. In handling the load, all slack in the sling is taken up carefully before beginning the lift. The start of the lift is done at the slowest crane speed with no jerks. Acceleration and deceleration rates are as low as is possible to limit dynamic loading. The 50-ton main hoist speed of the reactor building crane is 12 feet per minute (fpm), maximum, and the 5-ton auxiliary hoist speed does not exceed 25 fpm.

LACBWR has no restrictions on sling-crane combinations. Rigging instructions on sling-load combinations ensure an adequate safety margin on the sling. Sling selection for a lift that does not have a designated lifting rig is made by the load supervisor, whose responsibility includes selection for an adequate safety margin for the lift.

LACBWR does not repair any slings, and replacement is based on the conservative inspection criteria of ANSI B30.9.

b. Evaluation

Lifting devices for the insulation cover and the FCP conform to ANSI B30.9-1971. All other commercially fabricated general lifting devices are selected on the basis of a design safety factor of 5, as specified in ANSI B30.9. Slings are marked with rated load capacity, which may not include dynamic loading. Since the hoisting speeds at the LaCrosse plant are relatively slow, any contribution from the dynamic effect would be insignificant and may be disregarded. A formal inspection and testing program for slings is in effect, and replacement is based on the conservative inspection criteria of ANSI B30.9.

Therefore, lifting devices at LACBWR satisfy the requirements of this guideline.

c. Conclusion

The LaCrosse plant complies with Guideline 5.

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

"The crane should be inspected, tested and maintained in accordance with Chapter 2-2 of ANSI B30.2-1976, 'Overhead and Gantry Cranes,' [8] with the exception that tests and inspections should be performed prior to use when it is not practical to meet the frequencies of ANSI B30.2 for periodic inspection and test, or where frequency of crane use is less than the specified inspection and test frequency (e.g., the polar crane inside a PWR containment may only be used every 12 to 18 months during refueling operations and is generally not accessible during power operation. ANSI B30.2, however, calls for certain inspections to be performed daily or monthly. For such cranes having limited usage, the inspections, tests, and maintenance should be performed prior to their use)."

a. Summary of Licensee Statements and Conclusions

The Licensee has stated that all elements of Chapter 2-2 of ANSI B30.2-1976 with respect to inspection, testing, and maintenance are incorporated in Preventive Maintenance Procedure M-37-01, currently in use at the LaCrosse plant.

b. Evaluation

The LaCrosse plant complies with Section 5.1.1(6) of NUREG-0612 on the basis of its use of plant procedures which comply with ANSI B30.2-1976, Chapter 2-2.

c. Conclusion

The LaCrosse plant complies with Guideline 6 of NUREG-0612.

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

"The crane should be designed to meet the applicable criteria and guidelines of Chapter 2-1 of ANSI B30.2-1976, 'Overhead and Gantry Cranes,' and of CMAA-70 [11], 'Specifications for Electric Overhead

Traveling Cranes.' An alternative to a specification in ANSI B30.2 or CMAA-70 may be accepted in lieu of specific compliance if the intent of the specification is satisfied."

a. Summary of Licensee Statements and Conclusions

The Licensee has stated that the reactor containment building crane was designed and constructed to Allis-Chalmers procurement specification 41-552 (Sargent and Lundy Specification W-1759). The specifications therein have been compared to those in Chapter 2-1 of ANSI B30.2-1976 and found to be equivalent.

The reactor building polar crane was built to the requirements contained in EOCI Specification 61. Dynamic load factors from this specification were incorporated into the crane design. The 50-ton main hoist speed is 12 fpm, maximum. The maximum 5-ton auxiliary hoist speed is 25 fpm. The maximum bridge speed is 50 fpm. The trolley speed is 20 fpm, maximum. All of these speeds are well within the impact allowances of EOCI-61. The loads lifted by this crane at LACBWR are significantly less than crane capacity. This factor also reduces the potential for dynamic loads to approach the rated crane capacity during lifts.

The August 25, 1982 submittal [6] provided significant details of the crane design and indicated equivalency to Chapter 2-1 of ANSI B30.2-1976 and a degree of reliability consistent with CMAA-70. Information provided in this submittal included the following:

1. Impact allowance - this criterion is not an issue for the LACBWR due to the slow hoisting speeds (main hoist maximum speed is 12 fpm; auxiliary hoist maximum speed is 25 fpm).
2. Torsional forces - the crane is of box girder construction with all loads located equally between the girders.
3. Bending stress - no wind loading calculations are needed since the crane is located indoors.
4. Longitudinal stiffeners - none are used.
5. Allowable compressive stress - the b/c ratio is 25.3 and therefore within the specifications of CMAA-70.

6. Fatigue considerations - this criterion is not an issue since the crane, in 17 years of operation, has not lifted a load greater than 80% of the design load.
7. Hoist rope requirements - rated capacity plus the load block does not exceed 20% of the rope breaking strength.
8. Drum design - the drum was designed to withstand the combined crushing and bending loads. The drum groove depth and pitch are in accordance with CMAA-70 specifications. The gear design has been done to the maximum allowable horsepower of the motors.
9. Bridge brake design - this specification is not applicable since the LACBWR crane has no cab.
10. Hoist brake design - hoist brakes meet the requirements of CMAA-70.
11. Bumpers and stops - there are no stops required on the circular bridge rails. No stops or bumpers are provided for the trolley because of its slow rate of travel.
12. Static control systems - this criterion is not applicable since magnetic controllers are used.
13. Restart protection - spring return push buttons are used for control systems.

b. Evaluation

Based on the design data provided by the Licensee, the reactor building polar crane substantially meets the applicable criteria of Chapter 2-1 of ANSI B30.2-1976. The evaluation provided also indicates that the overall design of the reactor building polar crane provides a degree of load handling reliability consistent with CMAA-70.

c. Conclusion

The reactor building polar crane at the LaCrosse plant complies 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 Guideline 1, Safe Load Paths; Guideline 2, Load Handling Procedures; Guideline 3, Crane Operator Training; and Guideline 6, Cranes (Inspection, Testing, and Maintenance). The two remaining interim measures cover the following criteria:

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

Licensee implementation and evaluation of these interim protection measures are contained in the succeeding paragraphs of this section.

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

"Licenses for all operating reactors not having a single-failure-proof overhead crane in the fuel storage pool area should be revised to include a specification comparable to Standard Technical Specification 3.9.7, 'Crane Travel - Spent Fuel Storage Building,' for PWR's and Standard Technical Specification 3.9.6.2, 'Crane Travel,' for BWR's, to prohibit handling of heavy loads over fuel in the storage pool until implementation of measures which satisfy the guidelines of Section 5.1 [of NUREG-0612]."

a. Summary of Licensee Statements and Conclusions

Licensee-provided information has identified LACBWR Technical Specification 4.2.8.5 to impose the following requirements for items that can be handled in or near the FESW:

"4.2.8.5 With the exception of a spent fuel shipping cask, the core spray bundle, the transfer canal shield plug and the other components and fixtures that are normally located and used within the spent fuel storage well, no objects heavier than a fuel assembly shall be handled over the spent fuel storage well.

The Licensee also states that other technical specifications (4.2.19 and 2.12.5) impose requirements for containment isolation and FESW water levels when handling a heavy load.

Handling the spent fuel cask over spent fuel in the pool is required because of the fuel element storage configuration. In addition, the Licensee

stated that present technical specifications fully control the handling of heavy loads over fuel in the FESW; no new technical specifications or changes are contemplated or proposed.

b. Evaluation

The existence of LACBWR Technical Specification 4.2.8.5, which prohibits the movement of heavy loads over spent fuel (with limited exceptions) substantially satisfies the requirements of this interim measure. However, exemption of several items in the spent fuel pool does not satisfy the requirements of this interim measure. No information has been provided to demonstrate that specialized procedures and precautions exist to prevent or limit the movement of these heavy loads over spent fuel in the FESW. In addition, no reasons are given for excepting the core spray bundle and the transfer canal shield plug. The remaining items, identified only as "other components and fixtures that are normally located and used within the FESW," lack definition and could be subject to the interpretation of the crane operator.

c. Conclusion and Recommendations

The LaCrosse plant does not comply with this interim protection measure; to comply fully, the Licensee should prohibit movement of any heavy load over spent fuel assemblies in the FESW.

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

"Procedural or administrative measures [including safe load paths, load handling procedures, crane operator training, and crane inspection]... can be accomplished in a short time period and need not be delayed for completion of evaluations and modifications to satisfy the guidelines of Section 5.1 [of NUREG-0612]."

a. Summary of Licensee Statements and Conclusions

Summaries of Licensee statements and conclusions are contained in discussions of the respective general guidelines in Sections 2.1.2, 2.1.3, 2.1.4, and 2.1.7.

b. Evaluations, Conclusions, and Recommendations

Evaluations, conclusions, and recommendations are contained in discussions of the respective general guidelines in Sections 2.1.2, 2.1.3, 2.1.4, and 2.1.7.

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

"...special attention should be given to procedures, equipment, and personnel for the handling of heavy loads over the core, such as vessel internals or vessel inspection tools. This special review should include the following for these loads: (1) review of procedures for installation of rigging or lifting devices and movement of the load to assure that sufficient detail is provided and that instructions are clear and concise; (2) visual inspections of load bearing components of cranes, slings, and special lifting devices to identify flaws or deficiencies that could lead to failure of the component; (3) appropriate repair and replacement of defective components; and (4) verify that the crane operators have been properly trained and are familiar with specific procedures used in handling these loads, e.g., hand signals, conduct of operation, and content of procedures."

a. Summary of Licensee Statements and Conclusions

The Licensee has stated that, prior to each refueling (i.e., the handling of heavy loads over the core), the procedures are reviewed and revised as necessary, reviewed by the operations review committee, and approved by the plant superintendent. Inspection, testing, and maintenance is done in accordance with preventive maintenance procedure M-37-01, currently in use at LaCrosse plant.

In addition, the special handling and lifting equipment is assembled, inspected, and functionally tested, if applicable. Any replacement or repairs are made at this time prior to use in the refueling.

Further, crane operator qualification is verified and training on the approved procedures is conducted prior to the operator's handling the core and vessel components.

d. Evaluation and Conclusion

The LaCrosse plant complies with Interim Protection Measure 6.

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 the LaCrosse plant. Overall conclusions and recommended Licensee actions, where appropriate, are provided with respect to both general provisions for load handling (NUREG-0612, Section 5.1.5) 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 LaCrosse plant are consistent with the staff's objectives as expressed in these guidelines.

3.2 INTERIM PROTECTION MEASURES

The NRC staff has established (NUREG-0612, Section 5.3) that certain measures should be initiated to provide reasonable assurance that the handling of heavy loads will be performed in a safe manner until final implementation of the general guidelines of NUREG-0612, Section 5.1 is complete. Specified measures include: the implementation of a technical specification to prohibit

the handling of heavy loads over fuel in the storage pool; compliance with Guidelines 1, 2, 3, and 6 of NUREG-0612, Section 5.1.1; a review of load-handling procedures and operator training; and a visual inspection program, including component repair or replacement, as necessary, of cranes, slings, and special lifting devices to eliminate deficiencies that could lead to component failure. The evaluation of information provided by the Licensee indicates that LaCrosse plant complies with the staff's measures for interim protection, with one exception:

- o LACBWR should modify the technical specification to prohibit movement of any heavy load over spent fuel assemblies in the FESW.

4. REFERENCES

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