TECHNICAL EVALUATION REPORT

CONTROL OF HEAVY LOADS (C-10)

CONSUMERS POWER COMPANY

PALISADES PLANT

NRC DOCKET NO. 50-255

NRC TAC NO. 47129

NRC CONTRACT NO. NRC-03-81-130

FRC PROJECT C5508

FRC ASSIGNMENT 13

FRC TASK 378

Prepared by

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Prepared for

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Washington, D.C. 20555

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FOREWORD

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

Mr. I. H. Sargent and Mr. C. R. Bomberger 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 Consumers Power Company's (CPC) Palisades Plant. This evaluation was performed with the following objectives:

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

1.2 GENERIC BACKGROUND

Generic Technical Activity Task A-36 was established by the 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 assure the safe handling of heavy loads and to recommend necessary changes to these measures. This activity was initiated by a letter issued by the NRC staff on May 17, 1978 [2] to all power reactor licensees, requesting information concerning the control of heavy loads near spent fuel.

The results of Task A-36 were reported in NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants." The staff's conclusion from this evaluation was that existing measures to control the handling of heavy loads at operating plants, although providing protection from certain potential problems, do not adequately cover the major causes of load handling accidents and should be upgraded.

In order to upgrade measures for the control of heavy loads, the staff developed a series of guidelines designed to achieve a two-phase objective using an accepted approach or protection philosophy. The first portion of the objective, achieved through a set of general guidelines identified in NUREG-0612, Section 5.1.1, is to ensure that all load handling systems at

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

- o define safe load travel paths through procedures and operator training so that, to the extent practical, heavy loads are not carried over or near irradiated fuel or safe shutdown equipment
- o provide sufficient operator training, handling system design, load handling instructions, and equipment inspection to assure reliable operation of the handling system.

Staff guidelines resulting from the foregoing are tabulated in Section 5 of NUREG-0612. Section 6 of NUREG-0612 recommended that a program be initiated to ensure that these guidelines are implemented at operating plants.

1.3 PLANT-SPECIFIC BACKGROUND

On December 22, 1980, the NRC issued a letter [3] to Consumers Power Company (CPC), the Licensee for the Palisades plant, requesting that the Licensee review provisions for 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. On July 6 [4] and September 23, 1981 [5], Palisades personnel provided initial and subsequent responses to this request. Based on this information, a draft technical evaluation report (TER) was prepared and informally transmitted to the Licensee for review and comments. On January 13, 1983, a telephone conference call involving the NRC, FRC, and CPC was held to discuss the draft TER concerning control of heavy loads at the Palisades plant. In response to this telephone call, CPC provided additional information on February 18, 1983 [6], August 15, 1983 [7], and September 12, 1983 [8], which has been incorporated into this final technical evaluation.

2. EVALUATION

This section presents a point-by-point evaluation of load handling provisions at the Palisades 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 5.3. In each case, the guideline or interim measure is presented, Licensee-provided information is summarized and evaluated, and a conclusion as to the extent of compliance, including recommended additional action where appropriate, is presented. These conclusions are summarized in Table 2.1.

2.1 GENERAL GUIDELINES

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

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

These seven guidelines should be satisfied for all overhead handling systems 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 FRC's evaluation of this verification are contained in the succeeding paragraphs.

Table 2.1 Palisades/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 Polar Crane (RCCR-1)	125/15	--	--	C	--	--	C	C	--	C
Incore Shipping Cask	10.3	C	C	--	R	--	--	--	--	C
New Fuel Assembly	0.7	C	C	--	--	C	--	--	--	C
Primary Coolant Pump Rotor	16.3	C	C	--	--	C	--	--	--	C
Primary Coolant Pump Impeller	0.9	C	C	--	--	C	--	--	--	C
Reactor Vessel Head	5.0	C	C	--	R	--	--	--	--	C
2. Fuel Building Gantry Crane	100/15	--	--	C	--	--	C	C	C	--
Equipment Hatch Shield Blocks	2.7	C	C	--	--	C	--	--	C	--
Tilt Pit Gate	1.2	C	C	--	--	C	--	--	C	--
Spent Fuel Rack	44	C	C	--	R	--	--	--	C	--

C = Licensee action complies with NUREG-0612 Guideline.
-- = Not applicable.
R = Licensee has proposed revisions or modifications which, when implemented, will be in compliance with NUREG-0612 Guideline.

2.1.1 Heavy Load Overhead Handling Systems

a. Summary of Licensee Statements and Conclusions

The Licensee has identified the following to be the only permanently installed overhead handling systems capable of carrying loads which could damage plant systems required for safe shutdown or decay heat removal:

- o reactor building polar crane (L1)
- o reactor building jib crane (L1A)
- o fuel building crane (L3)
- o fuel building jib crane.

Of the cranes identified, the Licensee states that the 1-ton reactor and fuel building jib cranes have been excluded from compliance with NUREG-0612 guidelines because they are limited to loads less than 1300 lb and because load paths are restricted to prevent movement over irradiated fuel or equipment required for safe shutdown or decay heat removal.

In addition, the turbine building service crane has been excluded by the Licensee since no equipment required for safe shutdown or decay heat removal lies within the load path of the crane.

b. Evaluation and Conclusion

The Licensee's conclusions concerning load handling systems subject to the general guidelines of Section 5.1.1 are consistent with the objectives of NUREG-0612.

2.1.2 Safe Load Paths [Guideline 1, NUREG-0612, Section 5.1.1(1)]

> "Safe load paths should be defined for the movement of heavy loads to minimize the potential for heavy loads, if dropped, to impact irradiated fuel in the reactor vessel and in the spent fuel pool, or to impact safe shutdown equipment. The path should follow, to the extent practical, structural floor members, beams, etc., such that if the load is dropped, the structure is more likely to withstand the impact. These load paths should be defined in procedures, shown on equipment layout drawings, and clearly marked on the floor in the area where the load is to be handled. Deviations from defined load paths should require written alternative procedures approved by the plant safety review committee."

a. Summary of Licensee Statements and Conclusions

The Licensee states that, as a result of a cask drop analysis (dated July 1974), safe load paths have been defined to control movement of heavy loads in the vicinity of the spent fuel pool. A new procedure is currently being developed to cover deviations from the safe load paths required by existing procedure FHS-M-23. The new procedure will require that deviations from safe load paths be approved by both the reactor engineer and the shift supervisor. FHS-M-23 will refer to the new procedure. Further, safe load paths are shown on an equipment layout drawing and defined in procedure FHS-M-23. Efforts are currently under way to revise procedure FHS-M-23 to include requirements that the crane operator take movement signals from another individual who has knowledge of safe load paths and procedures.

The Licensee states that safe load paths for the containment building will be shown on containment layout drawings. These drawings will be made part of procedure FHS-M-24 along with instructions for the manner in which the safe load paths are to be followed.

b. Evaluation

Safe load paths developed by the Licensee in the fuel pool building, and based upon the cask drop analysis of July 1974, satisfy the criteria of this guideline. Additional proposed actions, such as development and use of load paths for specific heavy loads in the containment building and designation and inclusion of these load paths in layout drawings and procedures, are consistent with the intent of this guideline. In addition, the use of a knowledgeable signalman to direct load movements is an acceptable alternative to load path marking. However, the Licensee should ensure that the duties and responsibilities of the proposed signalman are specifically delineated in appropriate procedures to ensure that load movement is controlled within the established safe load paths.

The proposed handling of load path deviations requiring approval by the reactor engineer and shift supervisor meets the intent of this guideline

provided that delegation of such an authority is well documented and emanates from the plant's Safety Review Committee.

c. Conclusion

Implementation of safe load paths at the Palisades plant is performed in a manner consistent with this guideline contingent upon the Licensee's verification that proposed actions are acceptably implemented.

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

Movement of any load greater than 1300 lb (weight of a fuel assembly) within the reactor and fuel handling buildings at the Palisades plant is controlled by at least one written procedure that includes, as a minimum:

1. identification of required equipment
2. inspection and acceptance criteria required before movement
3. steps and proper sequence to be followed
4. defined safe load paths
5. other special precautions and instructions.

Specifically, for the reactor building polar crane, two procedures have been implemented by the Licensee to govern load handling. These procedures are FHS-M-24, "Movement of Heavy Loads in the Containment Building Area (649 ELEV)," and FHS-M-25, "Specific Requirements for Moving Heavy Loads Inside the Containment Near the Reactor Vessel." The Licensee states that the second procedure, FHS-M-25, identifies site-specific requirements for movement of the reactor missile shields and other heavy loads over or near the reactor vessel which are typically handled during refueling. Individual procedures are also

prepared, if not already in existence, for movement of any other loads within 19 ft of the center line of the reactor vessel.

In the fuel handling building, a procedure has been developed in conjunction with the cask drop analysis entitled "Movement of Heavy Loads in the Spent Fuel Area" (FHS-M-23), which satisfies the intent of NUREG-0612, Section 5.1.1(2).

b. Evaluation and Conclusion

The criteria of this guideline are satisfied at the Palisades plant on the basis of the Licensee's verification that procedures contain the information identified in 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' [9]."

a. Summary of Licensee Statements and Conclusions

The Licensee states that programs and procedures at the Palisades plant for crane operator training, qualification, and conduct have been reviewed and are in compliance with and meet the intent of Chapter 2-3 of ANSI B30.2-1976.

b. Evaluation and Conclusion

The Palisades program for crane operator training satisfies the criteria of this guideline on the basis of the statement that these programs have been reviewed and are in compliance with ANSI B30.2-1976.

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' [10]. 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 has identified the core support barrel (CSB), upper guide structure (UGS), reactor vessel (RV) head, and missile shield lifting devices to be subject to the requirements of this guideline. Design calculations for these lifting devices have been reviewed, and it has been determined that all lifting devices were designed with stress design factors greater than 3 on yield strength and greater than 5 on ultimate strength. As further proof of design adequacy, the Licensee notes that the RV head, UGS, and CSB lift devices have been used numerous times in the past 10 years with no indication of excessive strain or other adverse effects. In addition, these devices were built and designed by a NSSS vendor and were subject to the vendor's quality control and quality assurance programs.

The Licensee notes that the missile shield lift device was recently purchased and was proof tested to 150% of rated load. However, no load tests were performed on remaining lifting devices. Evaluation of these lifting devices conducted by the Licensee indicates that such load tests are not considered necessary for the following reasons:

1. Design stresses for these devices are substantial.
2. The devices are simple and held together, for the most part, by mechanical joints.
3. Welds that do exist on critical parts were performed under procedures developed by Combustion Engineering (CE).
4. All material and workmanship were subject to CE's quality assurance program.
5. All devices received a load test to a least 100% of rated load.

The Licensee states that lifting devices are used with the reactor building polar crane, which has a maximum hoist speed of 6 feet per minute (fpm). Therefore, the dynamic loading experienced by these lifting devices is considered negligible.

A program for ensuring continuing compliance consistent with the requirements of ANSI N14.6-1978, Section 5.3 has been implemented. Critical welds of these lifting devices will be subject to nondestructive examination (NDE) at intervals no greater than 5 years. This is considered adequate since the devices are used during refueling outages.

b. Evaluation

Although it cannot be determined that the specific requirements of ANSI N14.6-1978 for component design and fabrication have been satisfied for the Palisades lifting devices, it is evident that these devices will provide a high degree of load handling reliability. Informaton provided by the Licensee indicates that stress design factors for these devices satisfy ANSI requirements and that quality controls were placed on these devices during their fabrication by the vendor. Further, although all devices with the exception of the missile sheild lift device were not proof tested, sufficient information has been provided to substantiate the workmanship of these devices. Specifically, the use of conservative design margins, uncomplicated designs, maximum use of mechanical joints, fabrication control of welds, and a load test to 100% of rated load provide proof of workmanship consistent with that required by ANSI N14.6-1978.

In addition, the Licensee's program of annual visual examinations supplemented by NDE of critical welds at intervals less than 5 years provides reasonable assurance of continued reliability consistent with ANSI requirements, based upon the limited usage of the devices.

c. Conclusion

Design, testing, and continued use of special lifting devices at the Palisades plant is performed in a manner consistent with that contained in Guideline 4 of NUREG-0612.

2.1.6 Lifting Devices (Not Specially Designed) [Guideline 5, NUREG-0612, Section 5.1.1(5)]

"Lifting devices that are not specially designed should be installed and used in accordance with the guidelines of ANSI B30.9-1971, 'Slings' [11]. However, in selecting the proper sling, the load used should be the sum of the static and maximum 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 reviewed ANSI B30.9-1971 requirements and determined that the use of slings for handling heavy loads at the Palisades plant meets the intent of ANSI B30.9-1971. Those slings which are used exclusively on the main hoist of either the reactor building crane or fuel pool crane will be marked as to their limited use and will be rated for static load only. The maximum hoist speed of 4 fpm on the fuel pool crane and 6 fpm on the reactor building crane does not permit a dynamic load of any consequence.

Slings which are used with auxiliary hooks (both cranes are capable of up to 35 fpm) will be analyzed for both static and dynamic loading. If the dynamic load is greater than 10% of the presently rated static load, the combined dynamic and static load will be used to rate the sling.

b. Evaluation

Use of slings at the Palisades plant satisfies the criteria of Guideline 5 on the basis of the Licensee's verification that use of these slings meets the intent of ANSI B30.9-1971. In addition, CPC has satisfied criteria for use and selection of slings and procedures for restricting slings for limited use on certain cranes. Since the main hoist speeds of the reactor building crane or fuel pool crane are relatively low, the dynamic loads imposed on dedicated slings are reasonably small and may be disregarded in determining the slings' maximum rated load. Considering the nominal allowance for dynamic loading provided in CMAA-70 for crane design (dynamic load = 0.5% x static load per foot per minute of hoist speed), it can be concluded that the maximum dynamic

loading in the auxiliary hook slings will be 17.5%. The Licensee's decision to provide an additional allowance for dynamic loading only in cases where such loading is greater than 10% of static load is reasonable.

c. Conclusion

Selection and use of slings at the Palisades plant is in accordance with Guideline 5.

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

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

a. Summary of Licensee Statements and Conclusions

The Licensee states that the cranes identified are tested, inspected, and maintained in accordance with written procedures that meet the intent of guidelines provided in ANSI B30.2-1976. With the exception of a daily limit switch test, which is performed monthly by plant electricians, Section 2-2 of ANSI B30.2 is complied with. Because each operator has a different interpretation of how to test limit switches, limit switch testing is included in monthly maintenance inspections.

b. Evaluation

The criteria of this guideline are satisfied at the Palisades plant on the basis that the program in use meets the intent of ANSI B30.2-1976 with the exception of limit switch testing being monthly rather than daily. This

exception is acceptable in view of exceptions allowed by Section 5.1.1(6) of NUREG-0612.

c. Conclusion

Inspection, testing, and maintenance of cranes at the Palisades plant is 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' [12]. An alternative to a specification in ANSI B30.2 or CMAA-70 may be accepted in lieu of specific compliance if the intent of the specification is satisfied."

a. Summary of Licensee Statements and Conclusions

The Licensee states that the reactor building polar crane and the auxiliary building crane were originally designed and manufactured in accordance with Electric Overhead Crane Institute Specification 61 (EOCI-61) [13]. The crane manufacturer, Dresser Industries, has compared the design of these cranes with the requirements of CMAA-70 and ANSI B30.2-1976 and has concluded that the auxiliary building crane meets the mandatory electrical, structural, and mechanical design requirements. The reactor building crane also meets these standards with one exception: when a 135-ton load is carried within 6 feet of the rail, a stress of 15.25 ksi is formed in the bridge end ties which exceeds the allowable stress (14.4 ksi) by 0.85 ksi; the Licensee considers this overstress to be insignificant.

b. Evaluation and Conclusion

Design of cranes at the Palisades plant is considered to be consistent with this guideline on the basis of the Licensee's comparison of existing crane design with the more restrictive requirements of CMAA-70. Further, it is agreed that an overload of 0.85 ksi (106%) is not significant, but load movements in this area should be limited by procedure, if possible.

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 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 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 Statement and Conclusion

The Palisades plant procedure FHS-M-23 prohibits movement of heavy loads over the fuel pool.

b. Evaluation and Conclusion

The Palisades plant complies with Interim Protection Measure 1.

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

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

a. Summary of Licensee Statements and Conclusions

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

b. Evaluations, Conclusions, and Recommendations

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

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

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

a. Summary of Licensee Statements and Conclusions

The Licensee states that a special review for handling heavy loads over the core has been completed in compliance with Section 5.3, Interim Protection Measure 6 of NUREG-0612.

b. Evaluation and Conclusion

The Palisades plant complies with Interim Protection Measure 6 based on the Licensee verification.

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 Palisades plant. Overall conclusions and recommended Licensee actions, where appropriate, are provided with respect to both general provisions for load handling (NUREG-0612, Section 5.1.1) 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 Palisades plant 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 established (NUREG-0612, Section 5.3) certain measures that should be initiated to provide reasonable assurance that handling of heavy loads will be performed in a safe manner until final implementation of the general guidelines of NUREG-0612, Section 5.1 is complete. Specified measures include the implementation of a technical specification to prohibit the handling of heavy loads over fuel in the storage pool; compliance with

Guidelines 1, 2, 3, and 6 of NUREG-0612, Section 5.1.1; a review of load handling procedures and operator training; and a visual inspection program, including component repair or replacement as necessary of cranes, slings, and special lifting devices to eliminate deficiencies that could lead to component failure. Evaluation of information provided by the Licensee indicates that the Palisades plant complies with the staff's measures for interim protection.

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September 12, 1983

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

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

11. ANSI B30.11-1971
"Slings"

12. CMAA-70
"Specifications for Electric Overhead Traveling Cranes"

13. EOCI-61
"Specifications for Electric Overhead Traveling Cranes"