

# TECHNICAL EVALUATION REPORT

## CONTROL OF HEAVY LOADS (C-10)

NEBRASKA PUBLIC POWER DISTRICT  
COOPER NUCLEAR STATION

NRC DOCKET NO. 50-298

NRC TAC NO. 07982

NRC CONTRACT NO. NRC-03-81-130

FRC PROJECT C5508

FRC ASSIGNMENT 13

FRC TASK 346

*Prepared by*

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*Prepared for*

Nuclear Regulatory Commission  
Washington, D.C. 20555

Lead NRC Engineer: A. Singh,  
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September 8, 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. F. Vosbury, Mr. C. Bomberger, and Mr. I. H. Sargent contributed to the technical preparation of this report through a subcontract with WESTEC Services, Inc.

## 1. INTRODUCTION

### 1.1 PURPOSE OF REVIEW

This technical evaluation report documents an independent review of general load handling policy and procedures at the Nebraska Public Power District's (NPPD) Cooper Nuclear Station. This evaluation was performed with the following objectives:

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

### 1.2 GENERIC BACKGROUND

Generic Technical Activity Task A-36 was established by the Nuclear Regulatory Commission (NRC) staff to systematically examine staff licensing criteria and the adequacy of measures in effect at operating nuclear power plants to assure the safe handling of heavy loads and to recommend necessary changes in these measures. This activity was initiated by a letter issued by the NRC staff on May 17, 1978 [2] to all power reactor licensees, requesting information concerning the control of heavy loads near spent fuel.

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

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



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

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

1. define safe load travel paths through procedures and operator training so that, to the extent practical, heavy loads are not carried over or near irradiated fuel or safe shutdown equipment
2. provide sufficient operator training, handling system design, load handling instructions, and equipment inspection to 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 NPPD, the Licensee for Cooper Nuclear Station, requesting that NPPD review provisions for handling and control of heavy loads at Cooper Station, 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. NPPD responded to this request on June 30, 1981 [4] and October 9, 1981 [5]. In response to the December 7, 1981 conference call with the NRC, the reviewer, and NPPD, the Licensee provided additional information on May 14, 1982 [6], July 25, 1983 [7], and September 1, 1983 [8]; the information has been incorporated into this final technical evaluation.

## 2. EVALUATION

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

### 2.1 GENERAL GUIDELINES

The NRC has established seven general guidelines to provide the defense-in-depth appropriate for the safe handling of heavy loads. They are identified under the following topics in Section 5.1.1 of NUREG-0612:

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

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



Table 2.1. Cooper Station/MINRG-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 Blings |    | Guideline 6 Crane - Test and Inspection |    | Guideline 7 Crane Design |    | Interim Measure 1 Technical Specifications |    | Interim Measure 6 Special Attention |    |
|---------------------------------------|---------------------------|-----------------------------|----|------------------------|----|-------------------------------------|----|-------------------------------------|----|--------------------|----|---|----|--------------------------|----|--|----|-------------------------------------|----|
|                                       |                           |                             |    |                        |    |                                     |    |                                     |    |                    |    |   |    |                          |    |  |    |                                     |    |
| 1. Reactor Building Crane             | 100 Main                  | --                          | -- | --                     | -- | C                                   | -- | --                                  | -- | --                 | -- | C                                       | -- | C                        | -- | C  | -- | --                                  | -- |
| Outside Seal- 80 circular cavity plug | 80                        | C                           | C  | C                      | C  | --                                  | -- | C                                   | -- | --                 | -- | --                                      | -- | --                       | -- | --   | -- | C                                   | -- |
| Center Cavity plug                    | 92                        | C                           | C  | C                      | C  | --                                  | -- | C                                   | -- | --                 | -- | --                                      | -- | --                       | -- | --   | -- | C                                   | -- |
| Bottom Dryer plug                     | 44                        | C                           | C  | C                      | C  | --                                  | -- | C                                   | -- | --                 | -- | --                                      | -- | --                       | -- | --   | -- | C                                   | -- |
| Upper Dryer plug                      | 56                        | C                           | C  | C                      | C  | --                                  | -- | C                                   | -- | --                 | -- | --                                      | -- | --                       | -- | --   | -- | C                                   | -- |
| Bottom Fuel Pool Plug                 | 5                         | C                           | C  | C                      | C  | --                                  | -- | C                                   | -- | --                 | -- | --                                      | -- | --                       | -- | C  | -- | C                                   | -- |
| Upper Fuel Pool Plug                  | 9                         | C                           | C  | C                      | C  | --                                  | -- | C                                   | -- | --                 | -- | --                                      | -- | --                       | -- | C  | -- | C                                   | -- |
| Drywell Head                          | 43                        | C                           | C  | C                      | C  | --                                  | -- | C                                   | -- | --                 | -- | --                                      | -- | --                       | -- | --   | -- | C                                   | -- |
| RPV Head Insulation                   | 4                         | C                           | C  | C                      | C  | --                                  | -- | --                                  | -- | C                  | -- | --                                      | -- | --                       | -- | --   | -- | --                                  | -- |
| RPV Head and Lifting Device           | 80                        | C                           | C  | C                      | C  | --                                  | -- | C                                   | -- | --                 | -- | --                                      | -- | --                       | -- | --   | -- | C                                   | -- |
| Steam Dryer                           | 32.5                      | C                           | C  | C                      | C  | --                                  | -- | C                                   | -- | --                 | -- | --                                      | -- | --                       | -- | --   | -- | C                                   | -- |
| Steam Separator                       | 42                        | C                           | C  | C                      | C  | --                                  | -- | C                                   | -- | --                 | -- | --                                      | -- | --                       | -- | --   | -- | C                                   | -- |

C = Licensee action complies with MINRG-0612 Guideline.

-- = Not applicable.

Table 2.1 (Cont.)

| Heavy Loads                             | Weight<br>or<br>Capacity<br>(tons) | Guideline 1<br>Safe Load |            | Guideline 2<br>Procedures |            | Guideline 3<br>Crane Operator<br>Training |          | Guideline 4<br>Special Lifting<br>Devices |         | Guideline 5<br>Slings |        | Guideline 6<br>Crane - Test<br>and Inspection |                                | Guideline 7<br>Crane Design |              | Interim<br>Measure 1<br>Technical<br>Specifications |                             | Interim<br>Measure 6<br>Special<br>Attention |                      |
|---|------------------------------------|--------------------------|------------|---------------------------|------------|---|----------|---|---------|-----------------------|--------|---|--------------------------------|-----------------------------|--------------|---|-----------------------------|--|----------------------|
|   |                                    | Paths                    | Procedures | Procedures                | Procedures | Training                                  | Training | Devices                                   | Devices | Slings                | Slings | Crane - Test<br>and Inspection                | Crane - Test<br>and Inspection | Crane Design                | Crane Design | Technical<br>Specifications                         | Technical<br>Specifications | Special<br>Attention                         | Special<br>Attention |
| Vessel Service<br>Platform              | 5                                  | C                        | C          | C                         | C          | --  | --       | --  | --      | C                     | C      | --  | --                             | --                          | --           | --  | --                          | --   | --                   |
| Waste and<br>Debris<br>Shipping<br>Cask | 35                                 | C                        | C          | C                         | C          | --  | --       | C   | C       | --                    | --     | --  | --                             | --                          | --           | --  | --                          | C  | C                    |
| <hr/>                                   |                                    |                          |            |                           |            |   |          |   |         |                       |        |   |                                |                             |              |   |                             |  |                      |
| 2. Intake Struc-<br>ture Crane          | 35                                 | --                       | --         | --                        | --         | C   | C        | --  | --      | --                    | --     | C   | C                              | C                           | C            | --  | --                          | --   | --                   |
| Service Motor<br>Pump                   | 6                                  | C                        | C          | C                         | C          | --  | --       | --  | --      | C                     | C      | --  | --                             | --                          | --           | --  | --                          | --   | --                   |
| Service Motor<br>Pump Motor             | 1.75                               | C                        | C          | C                         | C          | --  | --       | --  | --      | C                     | C      | --  | --                             | --                          | --           | --  | --                          | --   | --                   |
| <hr/>                                   |                                    |                          |            |                           |            |   |          |   |         |                       |        |   |                                |                             |              |   |                             |  |                      |
| 3. Control Build-<br>ing Hoist H-7      | 5                                  | --                       | --         | --                        | --         | C   | C        | --  | --      | --                    | --     | C   | C                              | C                           | C            | --  | --                          | --   | --                   |
| R/R Service<br>Water Booster<br>Pump    | 1.5                                | C                        | C          | C                         | C          | --  | --       | --  | --      | C                     | C      | --  | --                             | --                          | --           | --  | --                          | --   | --                   |
| R/R Service<br>Water Booster<br>Pump    | 3.25                               | C                        | C          | C                         | C          | --  | --       | --  | --      | C                     | C      | --  | --                             | --                          | --           | --  | --                          | --   | --                   |

### 2.1.1 Overhead Heavy Load Handling Systems

#### a. Summary of Licensee Statements and Conclusions

The Licensee's review of overhead load handling systems identified the following cranes as subject to the general guidelines of NUREG-0612:

- o reactor building crane
- o intake structure crane
- o control building hoist (H-7).

Other load handling devices identified by the Licensee have been excluded from compliance with NUREG-0612 for the following reasons:

1. No safe shutdown/decay heat removal equipment or irradiated fuel is located in proximity to the load handling device:
  - o reactor building jib crane/trolley
  - o MK-I containment project 4.5-ton hoists (2) and 7.5-ton hoist
  - o reactor building hoist/monorails (H-10 and H-12).
2. The load handling device has a sole purpose maintenance function such that a load drop will damage only equipment which is already out of service for maintenance:
  - o reactor building hoists/monorails (H-9A, H-9B, H-13, H-14, and C2)
  - o diesel generator monorail (C-4).

#### b. Evaluation

The Licensee's exclusion of certain load handling systems from compliance with Section 5.1.1 is consistent with the intent of the NUREG-0612 objective to improve load handling reliability.

### 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 has provided general arrangement drawings identifying safe load paths for the reactor vessel head, reactor vessel plugs, dryer/separator pool plugs, drywell head, and bellows shield. The safe load paths for the steam dryer and steam separator are defined by the layout of dryer and separator storage pool since the dryer and separator follow and are not lifted out of the storage pool. The load paths for the concrete plugs follow, to a great extent, structural floor members. Movement of the drywell head and reactor pressure vessel head follows structural floor members before angling to the respective laydown areas. The loads are moved in a manner to minimize the potential to impact irradiated fuel and are not moved over safe shutdown equipment. The load paths will be added to their respective procedures and written alternatives will be approved by the Cooper Station Operations Review Committee. Marking load paths on the floor will not be done as it is not good practice in terms of Cooper Station radiation and contamination control procedures. However, a crane signalman, whose duties are delineated in procedures, is used to direct the crane operator along the designated load paths.

Further, procedures are being revised to minimize the exposure of safe shutdown equipment to damage from loads dropped from control building hoist H-7.

b. Evaluation

Safe load paths on the refueling floor are consistent with the intent of Section 5.1.1(1) of NUREG-0612.

Since the load path for control building monorail H-7 is fixed by the path of the rail, the Licensee's commitment to procedurally limit the exposure of safe shutdown equipment to potential damage from a load drop is consistent with the guidance in NUREG-0612.

c. Conclusion

Development of safe load paths at Cooper Nuclear Station is performed in a manner consistent 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 procedures specify the equipment required, inspection and acceptance criteria required prior to load movement, the sequence of events, precautions and limitations, and safe load paths for the major loads in accordance with Section 5.1.1(2) of NUREG-0612.

Station Procedure 7.6.1, "Operation of Reactor Building Crane and Miscellaneous Reactor Building Hoists," controls the operation of the reactor building crane and other miscellaneous hoists in the reactor building. This procedure requires that a special procedure be written any time heavy loads not covered by a specific procedure are to be moved over or near the open vessel, fuel pool, or safety equipment. Station Procedures 7.4.1 through 7.4.6 and 7.4.19 have precautions to ensure that load handling operations remain within the safe load paths. Station Procedure 3.7 and Special Procedure 77-3 show the horizontal controlled path of the spent fuel cask. The service water pump is covered by Procedure 7.2.15, which states that no pump or motor parts shall be lifted where a load drop could result in damage to the other pumps and motors or associated safety-related equipment. The residual heat removal service water booster pumps are covered by Procedure 7.2.14, which states that no pump and motor parts shall be lifted where a load drop could result in damage to the other pumps and motors or associated safety-related equipment.

#### b. Evaluation

Load handling procedures used at Cooper Nuclear Station meet the intent of Section 5.1.1(2) of NUREG-0612 based on the Licensee's description of the existing procedures.



c. Conclusion

Procedures at Cooper Nuclear Station have been developed in a manner consistent with Guideline 2.

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

"Crane operators should be trained, qualified and conduct themselves in accordance with Chapter 2-3 of ANSI B30.2-1976, 'Overhead and Gantry Cranes' [9]."

a. Summary of Licensee Statements and Conclusions

The Licensee has stated that a new procedure has been written to ensure that ANSI B30.2-1976 has been met with respect to operator training, qualification, and conduct. Any conduct not in accordance with Chapter 2-3 of ANSI B30.2-1976 will disqualify an employee as a crane operator.

b. Evaluation

Crane operator training at Cooper Nuclear Station meets the intent of Section 5.1.1(3) of NUREG-0612 based on verification by the Licensee of compliance with the training requirements in Chapter 2-3 of ANSI B30.2-1976.

c. Conclusion

Crane operator training at Cooper Nuclear Station is consistent with requirements of Guideline 3.

2.1.5 Special Lifting Devices [Guideline 4, NUREG-0612, Section 5.1.1(4)]

"Special lifting devices should satisfy the guidelines of ANSI N14.6-1978, 'Standard for Special Lifting Devices for Shipping Containers Weighing 10,000 Pounds (4500 kg) or More for Nuclear Materials' [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 has identified the following special lifting devices used in the vicinity of irradiated fuel or safe shutdown equipment at Cooper Nuclear Station:

- o reactor pressure vessel head strongback
- o dryer and separator sling
- o strongback for concrete shield plugs
- o redundant crane adapter and pins
- o spent fuel cask redundant lifting yoke.

Design analyses have been performed for each of these lifting devices. Design safety factors for the concrete shield plug strongback, the crane adapter, and the steam dryer and separator sling are in conformance with the criteria of ANSI N14.6-1978. Design safety factors for the upper and lower concrete dryer/separator plugs strongback are less than those required and therefore will be modified in accordance with ANSI N14.6-1978. Finite element analysis of the reactor pressure vessel head strongback has identified two areas where the factors of safety are less than 5.0 for ultimate strength. However, these areas are close to the required value (actual values 4.6 and 4.8), and no further modifications are considered necessary.

Regarding continuing compliance, the Licensee states that all special lifting devices were load tested to 125% of rated load or greater. In addition, a program of nondestructive examination (NDE) of the load bearing welds will be developed and conducted at 5-year intervals. The inspections will use liquid penetrant or magnetic particle examinations.

The Licensee provided calculations and analyses performed by GE for the spent fuel cask redundant lifting yoke.

b. Evaluation

The spent fuel cask redundant lifting yoke meets the intent of Section 5.1.1(4) of NUREG-0612 with respect to design and fabrication.

Information provided by the Licensee indicates that the remaining lifting devices have been designed (or will be modified) with safety factors that will provide a degree of load handling reliability consistent with the requirements of this guideline. In addition, performance of initial 125% load tests, combined with the Licensee's program of periodic NDE, will provide reasonable assurance of the continued integrity of these devices.

### c. Conclusion

The design and continuing compliance programs for special lifting devices in use at Cooper Nuclear Station are consistent with the requirements of Guideline 4.

### 2.1.6 Lifting Devices Not Specially Designed [Guideline 5, NUREG-0612, Section 5.1.1(3)]

"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 stated that slings at Cooper Nuclear Station are selected and used in accordance with ANSI B30.9-1971. The procedure for selection, storage, and inspection of slings includes a factor of 1.5 times the dead weight of the load to accommodate dynamic loading conditions.

### b. Evaluation

Sling selection and use at Cooper Nuclear Station meet the intent of NUREG-0612 based on verification by the Licensee of compliance to ANSI B30.9-1971. Further, the Licensee has considered dynamic loading effects in sling selection.

c. Conclusion

Sling selection and use at Cooper Nuclear Station are performed in a manner consistent with Guideline 5.

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

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

a. Summary of Licensee Statements and Conclusions

The Licensee has stated that ANSI B30.2-1976 has been invoked under Cooper Nuclear Station Maintenance Procedure 7.2.32, "Crane Hoist, Sling and Cable Inspection." The individual procedures for the intake structure and the reactor building cranes call for further inspection before the cranes are used.

b. Evaluation

Crane inspection, maintenance, and testing at the Cooper Nuclear Station are consistent with Section 5.1.1(6) of NUREG-0612 based on the Licensee's commitment to the guidance in ANSI B30.2-1976.

c. Conclusion

Crane maintenance and inspection programs at Cooper Nuclear Station are consistent with the requirements of 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 has stated that the cranes at Cooper Station comply with the guidelines of CMAA-70 and Chapter 2-1 of ANSI B30.2-1976.

b. Evaluation and Conclusion

Design of cranes at Cooper Nuclear Station is consistent with Guideline 7 requirements.

## 2.2 INTERIM PROTECTION MEASURES

The NRC has established six interim protection measures to be implemented at operating nuclear power plants to provide reasonable assurance that no heavy loads will be handled over the spent fuel pool and that measures exist to reduce the potential for accidental load drops to impact on fuel in the core or spent fuel pool. Four of the six interim measures of the report consist of general Guideline 1, Safe Load Paths; Guideline 2, Load Handling Procedures; Guideline 3, Crane Operator Training; and Guideline 6, Cranes (Inspection, Testing, and Maintenance). The two remaining interim measures cover the following criteria:

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

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

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

"Licenses for all operating reactors not having a single-failure-proof overhead crane in the fuel storage pool area should be revised to include



a specification comparable to Standard Technical Specification 3.9.7, 'Crane Travel - Spent Fuel Storage Pool Building,' for PWR's and Standard Technical Specification 3.9.6.2, 'Crane Travel,' for BWR's, to prohibit handling of heavy loads over fuel in the storage pool until implementation of measures which satisfy the guidelines of Section 5.1 [of NUREG-0612]."

a. Summary of Licensee Statements and Conclusions

The Licensee has stated that the overhead crane in the fuel pool area is considered single failure proof. As stated in Section 9.2 of the Safety Evaluation Report of Cooper Nuclear Station dated February 14, 1973, "The failure of any single component would not result in the dropping of the (spent fuel) cask." Therefore, the additional technical specification is not required.

b. Evaluation and Conclusion

Based on the fact that the NRC has reviewed the modified Cooper Station reactor building crane and concluded that it meets the intent of Branch Technical Position (BTP) Auxiliary Power Conversion Systems Branch (APCSB) 9-1, Cooper Nuclear Station 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. Evaluation

The specific requirements for load handling administrative controls are contained in NUREG-0612, Section 5.1.1, Guidelines 1, 2, 3, and 6. The Licensee's compliance with these guidelines has been evaluated in Sections 2.1.2, 2.1.3, 2.1.4, and 2.1.7, respectively, of this report.

## b. Conclusions and Recommendations

Conclusions and recommendations concerning the Licensee's compliance with these administrative controls are contained in Sections 2.1.2, 2.1.3, 2.1.4, and 2.1.7 of this report.

### 2.2.3 Special Reviews for Heavy Loads 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 has stated that revisions to pertinent procedures which call for visual inspection of special lifting devices and crane hoists, slings, and cables have been drafted. These revisions also provide for the appropriate repair or replacement of defective components.

## b. Evaluation

In light of the responses to Guidelines 2 and 3, it is apparent that procedures for handling loads over the core and operator training have been reviewed and upgraded as appropriate. In addition, design of special lifting devices and cranes at Cooper Station and programs for selection and use of slings have been reviewed and found to comply with NUREG-0612.

## c. Conclusion

Cooper Nuclear Station 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 Cooper Nuclear Station. 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 Cooper Nuclear Station 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 certain measures (NUREG-0612, Section 5.3) that should be initiated to provide reasonable assurance that handling of heavy loads will be performed in a safe manner until 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. Actions needed to satisfy NUREG guidelines for safe load paths have been previously addressed in Section 3.1 of this evaluation. Evaluation of the information provided by the Licensee indicates that the Licensee substantially complies with the staff's measures for interim protection.



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