CONTROL OF HEAVY LOADS AT NUCLEAR POWER PLANTS
BYRON UNITS 1 AND 2
BRAIDWOOD UNITS 1 AND 2

Docket Nos. 50-454, 50-455, 50-456, and 50-457

Author
S. A. Jensen

Principal Technical Investigator
T. H. Stickley

EG&G Idaho, Inc.

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ABSTRACT

The Nuclear Regulatory Commission (NRC) has requested that all nuclear plants either operating or under construction submit a response of compliancy with NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants." EG&G Idaho, Inc. has contracted with the NRC to evaluate the responses of those plants presently under construction. This report contains EG&G's evaluation and recommendations for Byron/Braidwood.

EXECUTIVE SUMMARY

Byron/Braidwood does not totally comply with the guidelines of NUREG-0612. In general, compliance is insufficient in the following areas:

- Satisfactory action on Guidelines 2 and 3 has been promised but not completed.

- Commonwealth Edison has not satisfactorily responded to Guidelines 1, 4, 5 and 7.

The main report contains recommendations which will aid in bringing the above items into compliance with the appropriate guidelines.

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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, Article 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, Articles 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.

The approach used to develop the staff guidelines for minimizing the potential for a load drop was based on defense in depth and is summarized as follows:

- Provide sufficient operator training, handling system design, load handling instructions, and equipment inspection to assure reliable operation of the handling system

- 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

- Provide mechanical stops or electrical interlocks to prevent movement of heavy loads over irradiated fuel or in proximity to equipment associated with redundant shutdown paths.

TECHNICAL EVALUATION REPORT
FOR
BYRON/BRAIDWOOD

1. INTRODUCTION

1.1 Purpose of Review

This technical evaluation report documents the EG&G Idaho, Inc. review of general load handling policy and procedures at Byron/Braidwood This evaluation was performed with the objective of assessing conformance to the general load handling guidelines of NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants" [1], Section 5.1.1.

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

2. EVALUATION AND RECOMMENDATIONS

2.1 Overview

The following sections summarize Commonwealth Edison's review of heavy load handling at Byron/Braidwood accompanied by EG&G's evaluation, conclusions, and recommendations to the licensee for bringing the facilities more completely into compliance with the intent of NUREG-0612. Commonwealth Edison's review of the facilities does not differentiate between the units so it is assumed that all units are of identical design. The licensee has indicated the weight of a heavy load for this facility (as defined in NUREG-0612, Article 1.2) as 2000 lbs.

2.2 Heavy Load Overhead Handling Systems

This section reviews the licensee's list of overhead handling systems which are subject to the criteria of NUREG-0612 and a review of the justification for excluding overhead handling systems from the above mentioned list.

2.2.1 Scope

"Report the results of your review of plant arrangements to identify all overhead handling systems from which a load drop may result in damage to any system required for plant shutdown or decay heat removal (taking no credit for any interlocks, technical specifications, operating procedures, or detailed structural analysis) and justify the exclusion of any overhead handling system from your list by verifying that there is sufficient physical separation from any load-impact point and any safety-related component to permit a determination by inspection that no heavy load drop can result in damage to any system or component required for plant shutdown or decay heat removal."

Staff guidelines resulting from the foregoing are tabulated in Section 5 of NUREG-0612.

1.3 Plant-Specific Background

On December 22, 1980, the NRC issued a letter [3] to Commonwealth Edison, the licensee for Byron/Braidwood requesting that the licensee review provisions for handling and control of heavy loads at Byron/Braidwood, 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 April 7, 1982, Commonwealth Edison provided the initial response [4] to this request.

recommends that the Licensee clarify whether the cranes mentioned in our evaluation should be included in Table 2.1 or not. We have presently included them in the table.

A. Summary of Licensee Statements

The Licensee's review of overhead handling systems identified the cranes and hoists shown in Table 2.1 as those which handle heavy loads in the vicinity of irradiated fuel or safe shutdown equipment.

The Licensee has also identified other cranes that have been excluded from satisifying the criteria of the general guidelines of NUREG-0612.

B. EG&G Evaluation

The Licensee appears to have included all applicable handling systems in their tables showing handling for which a load drop could damage equipment. However, it is unclear whether certain handling systems are to be exempted based on redundancy of the equipment or on the basis that the equipment is not required for safe shutdown. The handling systems in question include: Trolley Beams 53 and 54, PTS-4 and 5, SG-1, SG-2, SG-3, SG-4, Trolley Beams 28 and 29, and the cable tray drawbridge. The cranes to be exempted on the basis of redundancy of safety equipment which they are used to service should not be used except when such equipment is out of service. Damage to the equipment could have an impact on plant operation and therefore should be of concern to the Licensee.

C. EG&G Conclusions and Recommendations

Based on the information provided EG&G concludes that the Licensee has included all applicable hoists and cranes in their list of handling systems which must comply with the requirements of the general guidelines of NUREG-0612. EG&G

TABLE 2.1 (contineud).

System Designations
PTS-4
PTS-5 (Unit 2)
Trolley Beam 23
Trolley Beam 55
SG-11 (Byron)
Turbine Building Crane Unit 1 and Unit 2
PTS-5 and PTS-9
Trolley Beam 42 (Braidwood)

TABLE 2.1 CRANE/HOIST SYSTEMS CONSIDERED AS POTENTIAL SOURCES FOR DAMAGE OF SAFETY COMPONENTS.

System Designations
Polar Crane
SG-12 (Unit 1)
SG-13 (Unit 2)
Manipulator Crane
Cable Tray Drawbridge Winch
Reactor Coolant Pump Seal Removal Cranes for Loops 1, 2, 3, and 4
RCP Seal Removal Jib Crane Loop 1
RCP Seal Removal Jib Crane Loop 2
RCP Seal Removal Jib Crane Loop 3
RCP Seal Removal Jib Crane Loop 4
Stud Tensioner Hoists (3)
Loop 3 Jib 5
Loop 4 Jib 3
Loop 4 Jib 4
Loop 1 Jib 5
Loop 1 Jib 6
Loop 2 Jib 3
Loop 2 Jib 4
Loop 3 Jib 6
Fuel Building Crane
Spent Fuel Pit Bridge Crane
Trolley Beam 10
Trolley Beam 11
Trolley Beam 24
Trolley Beam 25
Trolley Beam 28
Trolley Beam 29
Trolley Beam 53
Trolley Beam 54
SG-1
SG-2
SG-3
SG-4
PTS-2
PTS-3 (Unit 2)

2.3.1 Safe Load Paths [Guideline 1, NUREG-0612, Article 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

The Licensee has evaluated load path locations for Byron/Braidwood. The Licensee states that load movement follows the safest and shortest route with the load as close to the floor as possible. Due to the nature of the load paths, the Licensee states that marking the load paths on the floor is generally not feasible nor would it contribute to reactor safety.

B. EG&G Evaluation

The Licensee response and drawings submitted indicates that Guideline 1 criteria have been partly satisfied at Byron/Braidwood. Load paths have been developed for all heavy loads which have been identified.

The Licensee's position on the unfeasibility of marking load paths on the floor is not acceptable. EG&G does agree that for some areas and/or loads floor marking is not the best method for designating a load path, but for certain loads it may be the best method available.

2.3 General Guidelines

This section addresses the extent to which the applicable handling systems comply with the general guidelines of NUREG-0612 Article 5.1.1. EG&G's conclusions and recommendations are provided in summaries for each guideline.

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:

A. Guideline 1--Safe Load Paths

B. Guideline 2--Load Handling Procedures

C. Guideline 3--Crane Operator Training

D. Guideline 4--Special Lifting Devices

E. Guideline 5--Lifting Devices (not specially designed)

F. Guideline 6--Cranes (Inspection, Testing, and Maintenance)

G. 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 succeeding paragraphs address the guidelines individually.

A. Summary of Licensee Statements

The Licensee states that procedures will be developed to cover load handling operations for the heavy loads identified in Table 3.1-1 of NUREG-0612. These procedures will identify the required equipment, the inspection and acceptance criteria prior to load movement, the steps and sequence in handling the load and define the safe load path and other special precautions. They also state that approved procedures will be in effect prior to fuel loading.

B. EG&G Evaluation

The Licensee has stated that load handling procedures will be developed which will comply with the requirements of Guideline 2. These guidelines should be available for possible review by the possible NRC prior to fuel loading.

C. EG&G Conclusions and Recommendations

The Byron/Braidwood Stations do not presently comply with Guideline 2. In order to comply with the guideline the Licensee should complete the development of load handling procedures for the applicable cranes and loads. These procedures should be available for possible NRC review prior to fuel loading.

2.3.3 Crane Operator Training [Guideline 3, NUREG-0612, Article 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' [5]."

Load path markings are meant to be used by load handling operators and their supervisors as a means for monitoring proper areas where movements of heavy loads will take place so that personnel not directly involved in load handling will be alerted to keep these pathways clear of non-related materials. By consolidating the various load paths, the Licensee should be able to develop a systematic sequence of pathways for the movement of heavy loads to their lay-down or staging areas which is not overly complex or confusing to operators and supervisors, thus contributing to the general safety of plant personnel by minimizing interference with load handling operations. For some crane systems such as monorails the load paths are defined by the routing of the monorail and the marking necessary would be minimal.

C. EG&G Conclusions and Recommendations

EG&G concludes from the Licensee's response that the Bryon/Braidwood Stations partially comply with Guideline 1.

In order to adhere to the criteria of this guideline, EG&G recommends that the Licensee clearly mark safe load paths on the floor or by some other means in areas where heavy loads are handled.

2.3.2 Load Handling Procedures [Guideline 2, NUREG-0612, Article 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

The Licensee statements are as follows:

The lifting devices have been or will be designed in accordance with industrial standards using good engineering practices.

Special lifting devices for the reactor vessel head and upper internals have been provided by Westinghouse. Both lifting rigs have been designed for 200% of the dead load using AISC allowables and load tested to 125% of their rated load.

B. EG&G Evaluation

The Licensee has identified only two (2) special lifting devices. The information given on the design of these devices is inadequate for a comparison of the criteria used for design versus the requirements of Guideline 4. Insufficient information has been provided by the Licensee for EG&G to verify that periodic testing is performed to maintain continuing compliance in accordance with Section 5.2 of ANSI N14.6-1978.

C. EG&G Conclusions and Recommendations

Byron/Braidwood Stations do not comply with Guideline 4. In order to satisfactorily comply with the criteria, the Licensee should perform the following:

(1) review, evaluate and report on the design and fabrication of all special lifting devices with respect to the requirements of ANSI N14.6-1978 and Guideline 4.

A. Summary of Licensee Statements

The Licensee states that Byron/Braidwood will comply with ANSI B30.2-1976 with respect to operator training, qualification, and conduct.

B. EG&G Evaluation

No information on operator training, qualifications or conduct was given by the Licensee other than their statement that they will comply with ANSI B30.2-1976. This compliance should be complete before fuel loading occurs.

C. EG&G Conclusion and Recommendations

Based on the Licensee's statement Byron/Braidwood will comply with Guideline 3. Procedures and program records should be readily available for possible review and inspection by the NRC staff.

2.3.4 Special Lifting Devices [Guideline 4, NUREG-0612, Article 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' [6]. 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) or the load and of the intervening components of the special handling device."

(2) submit verification that procedures exist for all special lifting devices which satisfy the requirements of Section 5 (Acceptance Testing, Maintenance, and Assurance of Continued Compliance) of ANSI A14.6-1978. Compliance with this guideline should be complete for each lifting device before they are used in a critical situation.

2.3.5 Lifting Devices (Not Specially Designed) [Guideline 5, NUREG-0612, Article 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' [7]. 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

The Licensee states that all lifting devices were designed according to industrial standards using good engineering practices.

B. EG&G Evaluation

Insufficient information was given for EG&G to properly evaluate the slings used at the Byron/Braidwood Stations.

C. EG&G Conclusions and Recommendations

The Byron/Braidwood Stations do not comply with Guideline 5. In order to comply the Licensee should submit verification for the following:

(1) slings are installed and used in accordance with ANSI B30.9-1071

(2) sling selection is based upon the sum of the static and maximum dynamic loads

(3) slings are marked with the "static load" which produces the maximum static and maximum dynamic loads

(4) slings restricted in use to only certain cranes are clearly marked to so indicate.

2.3.6 Cranes (Inspection, Testing, and Maintenance) [Guideline 6, NUREG-0612, Article 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

Cranes will be inspected, tested and maintained in accordance with Chapter 2-2 of ANSI B30.2-1976, 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 cranes having limited usage, the inspections and tests will be performed prior to their use. Approved procedures will be in effect prior to fuel load.

B EG&G Evaluation

The Licensees state that crane inspection, testing, and maintenance programs will comply with ANSI B30.2-1976 with exceptions as allowed by Guideline 6.

C. EG&G Conclusions and Recommendations

Byron/Braidwood Station complies with Guideline 6 on the basis of the Licensee's statement.

2.3.7 Crane Design [Guideline 7, NUREG-0612, Article 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' [8]. 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

The polar cranes and fuel handling building cranes were designed in accordance with the 1975 Revision of CMAA-70 and the AISC specifications for those portions not covered by CMAA-70. Welding was performed in accordance with AWS D.1.1. Both cranes are designed for Class "A" service per CMAA-70 and have a minimum safety factor of 5 on all lifting tackle and gearing.

The polar crane is provided with limit switches for bridge overtravel, plus two upper and one lower limit switch for each hoist. Mechanical end stops are also provided on the bridge.

The Fuel Handling Building Crane is provided with end stops on the runways and bridge, plus upper and lower limit switches on both hoists.

The maniuplator crane was designed for Class C service per EOCI-61 and in accordance with the 1970 revision of CMAA-70. The manipulator crane is provided with interlocks to prevent fuel assemblies from colliding with the cavity walls and other objects.

The spent fuel pit bridge crane was designed for Class A service, and in accordance with the 1970 Revision of CMAA-70 and AWS D14.1. The spent fuel pit bridge crane is provided with end stops on the trolley beam and runway, plus upper and lower limit switches on each of the two 2 ton capacity hoists. The hoists are interlocked so that they cannot both be operated at the same time.

B. EG&G Evaluation

The cranes mentioned by the Licensee in their response comply with or meet the intent of Guideline 7 based on the Licensee's statements.

The Turbine Building Cranes were not mentioned in the Licensees response to this section. Monorails and other cranes which do not easily fall into the classifications for which CMAA 70 and ANSI B30.2 apply were not included in the Licensee's response. EG&G was therefore unable to evaluate their conformance to Guideline 7.

C. EG&G Conclusions and Recommendations

Byron/Braidwood Stations comply with Guideline 7 to a substantial degree on the basis of the Licensee's statements. However, no information was available on design

standards for the majority of the cranes listed as being subject to the guidelines. EG&G recommends that the Licensee perform the following:

(1) Submit verification that monorails, jib cranes, etc., were designed and fabricated to applicable industrial standards comparable to CMAA 70 and ANSI B30.2.

(2) Submit verification that the Turbine Building Cranes were designed and fabricated in accordance with CMAA 70 and ANSI B30.2 or justify their design and fabrication to some other standard.

3. CONCLUDING SUMMARY

3.1 Applicable Load Handling Systems

The list of cranes and hoists supplied by the licensee as being subject to the provisions of NUREG-0612 is adequate (see Section 2.2.1). However, clarifications should be made as to whether certain cranes are to be excluded.

3.2 Guideline Recommendations

Compliance with the seven NRC guidelines for heavy load handling (Section 2.3) are partially satisfied at Byron/Braidwood. This conclusion is represented in tabular form as Table 3.1. Specific recommendations to aid in compliance with the intent of these guidelines are provided as follows:

Guideline	Recommendation
1. (Section 2.3.1)	a. Clearly mark safe load paths on the floor or by some other means.
2. (Section 2.3.2)	a. Complete development of load handling procedures.
3. (Section 2.3.3)	a. Operator training records, and programs should be available for NRC review or inspection.
4. (Section 2.3.4)	a. Fully review evaluate and report on the design and fabrication of special lifting devices with respect to ANSI N14.6
	b. Submit verification that continued testing of special lifting devices will comply with ANSI N14.6.

Guideline	Recommendation
5. (Section 2.3.5)	a. Submit verification that slings are installed and used in accordance with ANSI B30.9.
	b. Submit verification that sling selection is based upon the sum of the static and maximum dynamic loads.
	c. Mark slings with the "static load" that produces the maximum static and dynamic loads.
	d. Clearly mark slings restricted in use to only certain cranes.
6. (Section 2.3.6)	a. Byron/Braidwood complies with this guideline
7. (Section 2.3.7)	a. Submit verification that the Turbine Building Cranes, monorails, jib cranes, etc., where designed and fabricated to applicable industrial standards comparable to CMAA-70 and ANSI B30.2.

4. REFERENCES

1. NUREG-0612
   Control of Heavy Loads at Nuclear Power Plants
   NRC

2. V. Stello, Jr. (NRC)
   Letter to all licensees. Subject: Request for Additional Information on Control of Heavy Loads Near Spent Fuel
   NRC, 17 May 1978

3. USNRC
   Letter to [Company]. Subject: NRC Request for Additional Information on Control of Heavy Loads Near Spent Fuel
   NRC, 22 December 1980

4. Commonwealth Edison
   Letter to Director of Nuclear Regulatory Regulation. Subject: Byron Station Units 1 and 2, Braidwood Station Units 1 and 2.
   7 April 1982

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

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

7. ANSI B30.9-1971
   "Slings"

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

BYRON/BRAIDWOOD NUREG COMPLIANCE MATRIX

Table 3.1

Equipment Designation	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
Polar Crane		230/40 ton							
	Reactor Vessel Head	411,750 lb.	NC	R	R	I	I	C	C
	Reactor Upper Internals	145,000 lb.							
	Reactor Lower Internals	269,600 lb.							
	Reactor Coolant Pump Motors	77,500 lb.							
	Reactor Core Barrel Assembly	217,300 lb.							
	Main Hook Lower Load Block	6783 lb.							
	Auxiliary Hook Lower Load Block	1770 lb.							
SC-12 (Unit 1)	Reactor Vessel Head Stud Collars - 20	1 ton	NC	R	R	I	I	C	I
SG-13 (Unit 2)	Reactor Vessel Head Studs - 806	1 ton							
	Reactor Vessel Head Stud Hole Plugs - 30 (est.)								
Manipulator Crane	Fuel Assembly - 1700 lb.	1 ton	NC	R	R	I	I	C	C
Cable Tray Drawbridge Winch	Cable Tray Drawbridge 9000 lb	10 ton	NC	R	R	I	I	C	I
Reactor Coolant Pump Seal Removal Cranes for Loops 1,2,3,4	Reactor Coolant Pump Seal Housings - 1500 lb	1 ton	NC	R	R	I	I	C	I
	Reactor Coolant Pump Couplings - 1500 lb								
RCP Seal Removal Jib Crane Loop 1	Reactor Coolant Pump Seal Housing - 1500 lb	1 ton	NC	R	R	I	I	C	I
	Reactor Coolant Pump Coupling - 1500 lb								

C = Licensee action complies with NUREG-0612 Guideline.
NC = Licensee action does not comply with NUREG-0612 Guideline.
R = Licensee has proposed revisions/modifications designed to comply with NUREG-0612 Guideline.
I - Insufficient information provided by the Licensee.

Table 3.1 (Cont'd)

Equipment Designation	Heavy Loads	Weight or Capacity (tons)	Guideline 1 Safe Lead 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
RCP Seal Removal Jib Crane Loop 2	Reactor Coolant Pump Seal Housing - 1500 lb Reactor Coolant Pump Coupling - 1500 lb	1 ton	NC	R	R	I	I	C	I
RCP Seal Removal Jib Crane Loop 3	Reactor Coolant Pump Seal Housing - 1500 lb Reactor Coolant Pump Coupling - 1500 lb	1 ton	NC	R	R	I	I	C	I
RCP Seal Removal Jib Crane Loop 4	Reactor Coolant Pump Seal Housing - 1500 lb Reactor Coolant Pump Coupling - 1500 lb	1 ton	NC	R	R	I	I	C	I
Stud Tensioner Hoists (3)	Reactor Vessel Head Stud Tensioner - N/A Reactor Vessel Head Studs - 806 lb	2 ton	NC	R	R	I	I	C	I
Loop 3 Jib 5	RC Loop Stop Valve Operator - 2760 lb	2 ton	NC	R	R	I	I	C	I
Loop 4 Jib 3	RC Loop Stop Valve Operator - 2760 lb	2 ton	NC	R	R	I	I	C	I
Loop 4 Jib 4	RC Loop Stop Valve Operator - 2760 lb	2 ton	NC	R	R	I	I	C	I
Loop 1 Jib 5	RC Loop Stop Valve Operator - 2760	2 ton	NC	R	R	I	I	C	I
Loop 1 Jib 6	RC Loop Stop Valve Operator - 2760 lb	2 ton	NC	R	R	I	I	C	I
Loop 2 Jib 3	RC Loop Stop Valve Operator - 2760 lb	2 ton	NC	R	R	I	I	C	I
Loop 2 Jib 4	RC Loop Stop Valve Operator - 2760 lb	2 ton	NC	R	R	I	I	C	I

C = Licensee action complies with NUREG-0612 Guideline.
NC = Licensee action does not comply with NUREG-0612 Guideline.
R = Licensee has proposed revisions/modifications designed to comply with NUREG-0612 Guideline.
I - Insufficient information provided by the Licensee.

Table 3.1 (Cont'd)

Equipment Designation	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
Loop 3 jib 6	RC Loop Stop Valve Operator - 2760 lb	2 ton	NC	R	R	I	I	C	I
Fuel Building Crane	Spent Fuel Cask - 218,000 lb (TN-12) Fuel Assembly - 1467 lb (Main Hoist Lower Load Block - 5600 lb) Auxiliary Hoist Lower Load Block - (1500 lb est.) Failed Fuel Cannister - 940 lbs Control Rod Cluster - 158 lbs	125 ton	NC	R	R	I	I	C	C
Spent Fuel Pit Bridge Crane	New Fuel Assembly - 1467 lb Spent Fuel Assembly - 1467 lb Fuel Handling Tools - 375 lb max. Failed Fuel Cannister - 940 lbs Control Rod Cluster - 158 lbs.	2 ton	NC	R	R	I	I	C	C
Trolley Beam 10	Motor Control Center Components - 1500 lb Electrical Penetration Assembly Components - 2000 lb Pressurizer Heater Transformer Components - 2000 lb (Est.)	3 ton	NC	R	R	I	I	C	I
Trolley Beam 11	Motor Control Center Components - 1500 lb Electrical Penetration Assembly Components - 2000 lb Pressurizer Heater Transformer Components - 200 lb (Est.)	3 ton	NC	R	R	I	I	C	I

C = Licensee action complies with NUREG-0612 Guideline.
NC = Licensee action does not comply with NUREG-0612 Guideline.
R = Licensee has proposed revisions/modifications designed to comply with NUREG-0612 Guideline.
I - Insufficient information provided by the Licensee.

Table 3.1 (Cont'd)

Equipment Designation	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
Trolley Beam 24	RHR Heat Exchangers Tube Bundle - 14,500 lbs Concrete Plugs - 15,000 lbs	12 ton	NC	R	R	I	I	C	I
Trolley Beam 25	RHR Heat Exchangers Tube Bundle - 14,500 lbs Concrete Plugs - 15,000 lbs	12 ton	NC	R	R	I	I	C	I
Trolley Beam 28	---	3 ton	NC	R	R	I	I	C	I
Trolley Beam 29	Valve Operator for 1CV112A - weight N/A	3 ton	NC	R	R	I	I	C	I
Trolley Beam 53	Charging Pump - 7500 lb Charging Pump Motor - 4345 lb	8 ton	NC	R	R	I	I	C	I
Trolley Beam 54	Charging Pump - 7500 lb Charging Pump and Motor - 4325 lb	8 ton	NC	R	R	I	I	C	I
SG-1	Diesel Generator Cylinder Head Covers - 830 lb	2 ton	NC	R	R	I	I	C	I
SG-2	Diesel Generator Cylinder Head Covers - 830 lb	2 ton	NC	R	R	I	I	C	I
SG-3	Diesel Generator Cylinder Head Covers - 830 lb	2 ton	NC	R	R	I	I	C	I
SG-4	Diesel Generator Cylinder Head Covers - 830 lb	2 ton	NC	R	R	I	I	C	I

C = Licensee action complies with NUREG-0612 Guideline.
NC = Licensee action does not comply with NUREG-0612 Guideline.
R = Licensee has proposed revisions/modifications designed to comply with NUREG-0612 Guideline.
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Table 3.1 (Cont'd)

Equipment Designation	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
PIS-2	Concrete Plugs - 11,700 lb	6 ton	NC	R	R	I	I	C	I
PIS-3 (Unit 2)	Containment Spray Pump/Motor - 7307 lb Charging Pump - 7500 lb Safety Injection Pump - 5260 lb Charging Pump Motor - 4345 lb Safety Injection Pump Motor - 4345 lb								
PIS-4	Safety Injection Pump - 5260 lb	6 ton	NC	R	R	I	I	C	I
PIS-5 (Unit 2)	Safety Injection Pump Motor - 3100 lb								
Trolley Beam 23	Charging Pump - 7500 lb Containment Spray Pump/Motor - 7307 lb RHR Pump/Motor - 6200 lb Safety Injection Pump - 5260 lb Safety Injection Motor - 4345 lb ESW Pump - 9500 lb ESW Motor - 12,000 lb	10 ton	NC	R	R	I	I	C	I
Trolley Beam 55	Charcoal Filters - 500 lb Fan Motors - 2000 lb Other HVAC Equipment - 12,000 lb	8 ton	NC	R	R	I	I	C	I
SG-11	Essential Service Water Makeup Pump - 7000 lb Circulating Water Makeup Pump Motor	12 ton	NC	R	R	I	I	C	I

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Equipment Designation	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
	ESW Makeup Pump Driver - 2250 lb ESW Makeup Pump Gearbox - 2250 lb								
Turbine Building Cranes Unit 1 (*Unit 2)	Turbine Components: LP Spindles-294,000 lb HP Spindles-131,000 lb HP Cylinder Cover - 166,000 lb LP Cylinder Cover - 172,300 lb Other Lighter Loads	125/25 ton 148/25 ton*	NC	R	R	I	I	C	I
PTS-8 & PTS-9	Circulating Water Pump Motor - 75,000 lb	30 ton	NC	R	R	I	I	C	I
Trolley Beam 42	WS Pump - 41,300 lb WS Motor - 22,500 lb	12 ton							

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