CONTROL OF HEAVY LOADS AT NUCLEAR POWER PLANTS
RIVER BEND STATION - UNIT 1
(Phase I)
Docket No. [50-458]

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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 River Bend Station (RBS) Unit 1.

EXECUTIVE SUMMARY

RBS Unit 1 is not totally consistent with the guidelines of NUREG-0612. In general, compliance is insufficient in the following areas:

- Suitable Safe Load Paths designation for 35 loads.
- The commitment for load handling procedures
- Confirming, whether there are three or only two special lifting devices and the consistency of the RBS position on critical load handling by the special lifting devices
- Resolution of the identified exception on initial testing to confirm a fully consistent status of crane design.

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

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TABLES

Control of Heavy Loads at Nuclear Power Plants

River Bend Station Unit 1

(Phase I)

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 RBS Unit 1. 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 applicants, 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, 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 (a) 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 (b) 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.

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 Gulf States Utilities Co. (GSU), the applicant for RBS Unit 1 requesting that the applicant review provisions for handling and control of heavy loads at RBS Unit 1, evaluate these provisions with respect to the guidelines of NUREG-0612, and provide certain additional information to be used for an independent determination of conformance to these guidelines. On June 24, 1981 and March 1, 1984 GSU provided responses [4] and [5] to this request.

2. EVALUATION AND RECOMMENDATIONS

2.1 Overview

The following sections summarize GSU's review of heavy load handling at RBS Unit 1 accompanied by EG&G's evaluation, conclusions, and recommendations to the applicant for bringing the facilities more completely into compliance with the intent of NUREG-0612. GSU's review addresses only Unit 1. The applicant has indicated the weight of a heavy load for this facility (as defined in NUREG-0612, Article 1.2) as 1200 pounds.

2.2 Heavy Load Overhead Handling Systems

This section reviews the applicant'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."

A. Summary of Applicant's Statements

The applicant'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 applicant has also identified seventeen other cranes that have been excluded from satisfying the criteria of the general guidelines of NUREG-0612. (Table 2.2)

B. EG&G Evaluation

Each hoist system numbered in Table 2.1 has one or more paragraphs in the submittal to elaborate on it. From these discussions Hoists Nos. 1 through 4 are shown to contain specific risks. Item No's 5 through 13 have potential risks identified but contain statements indicating further evaluation is needed.

Each of the hoist systems listed in Table 2.2 are discussed to verify their exclusion.

C. EG&G Conclusions and Recommendations

Based on the information provided, hoists No's 1 through 4 are subject to NUREG-0612 and are correctly listed in Table 2.1. The evaluation for hoists Items 5 through 13 should be completed. Then provide information to specify which ones must comply with NUREG-0612 and will remain in Table 2.1, and which are excluded and should be transferred to Table 2.2.

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.

TABLE 2.1. OVERHEAD HANDLING SYSTEMS SUBJECT TO NUREG 0612 CRITERIA--RIVER BEND STATION UNIT 1

No.	Handling System	Capacity (Tons)	Location
1.	Reactor Building Polar Crane/Aux Hoist	100/5	Reactor Building
2.	Drywell MSIV and Relief Valve Monorail	3	Reactor Building
3.	Fuel Building Bridge Crane	15	Fuel Building
4.	Spent Fuel Cask Trolley/Aux Hoist	125/15	Fuel Building
5.	MSIV Monorails	8/5	Auxiliary Building
6.	MSIV and Feedwater Isolation Valve Monorails	3	Auxiliary Building
7.	Feedwater Valve Hoists	3	Auxiliary Building
8.	RHR A Pump Monorail	8	Auxiliary Building
9.	RHR B & C Pump Monorail	8	Auxiliary Building
10.	Auxiliary Building Tunnel Plug	6	Auxiliary Building
11.	Hoist Area Monorails	5	Control Building
12.	Floor Plug Monorail	5	Control Building
13.	Control Building Equipment Handling Area Monorail	5	Control Building

TABLE 2.2. MONORAILS, HOISTS AND CRANES EXCLUDED FROM FURTHER CONSIDERATION RIVER BEND STATION UNIT 1

No.	Handling System	Capacity (Tons)	Location
1.	HPCS Pump Monorail	12/6	Auxiliary Building 108'
2.	Control Rod Drive Maintenance	0.5	Auxiliary Building 108'
3.	RCIC Pump Monorail	3	Auxiliary Building 85'
4.	LPCS Pump Monorail	8	Auxiliary Building 108'
5.	Hoist Area Monorail	8	Auxiliary Building 164'
6.	Elevator Machine Room Hoist	3.5	Auxiliary Building 199'
7.	Jib Crane and Channel Handling Boom	0.5/0.1	Reactor Building 186'
8.	Recirc Pump Motor/In-Care Detector Cask Monorail	30/6	Reactor Building 114'
9.	Steam Tunnel Floor Plug Monorails (Reactor Building and Annulus)	3	Reactor Building 145'
10.	Fuel Transfer Tube Floor Plug Monorail	3	Reactor Building 156'
11.	Drywell Access Monorail	8	Reactor Building 110'
12.	Containment Access Monorail	12	Reactor Building 116'
13.	Crated Guide Tube Monorail	2.5	Reactor Building 114'
14.	Fuel Transfer Tube Floor Plug	8	Fuel Building 143'
15.	Jib Crane and Channel Handling Boom (future)	0.5/0.1	Fuel Building 113'
16.	Diesel Generator Unit Monorails	2	Diesel Gen. Bldg. 125'
17.	Standby Service Water Cooling Tower I Monorails	3	SSW Cooling Tower I 161'

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 succeeding paragraphs address the guidelines individually.

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 Applicant's Statements

With regard to the thirteen handling systems identified in Table 2.1 above, there are many different load handling situations encountered. Defining safe load paths in the manner described in NUREG 0612, Section 5.1.1(1), is neither required nor prudent for every situation. To do so would unnecessarily restrict plant operations and maintenance activities. To address this problem, the possible load handling situations that could be encountered have been identified. Each load handling situation has been assigned a "safety class" designation, roughly in order of safety significance. Safe load path and load handling procedural requirements have been defined for each safety class. There are 4 safety classes with class No. 3 subdivided into 3A and 3B.

Supplementing the safety class designations the loads of principal concern, that are assigned to safety class 1, 2, or 3B, are summarized. The summaries on these designators generally call for procedural restrictions and precautions for the operator to limit carrying height of the loads and travel time over areas of risk.

Five heavy loads handled by the Polar Crane have very direct travel paths to their storage locations; accordingly detailed travel paths are not required. These loads and their class are:

o	RPV Head	Class 1 and 3B
o	Steam Dryer	Class 1, 2, and 3B
o	Shroud Head/Steam Separator	Class 1 and 3B
o	Dry well Head	Class 1 and 3B
o	Portable Refueling Shield	Class 2 and 3B

In addition to the procedure including steps that minimize load height of travel, match marks have been permanently affixed to the crane rails, trolley, and end trucks to assure proper alignment of the crane during these lifts. Use of the match marks will assure that the most direct and unobstructed path is taken to and from the storage location.

To assure that load handling operations remain in safe load paths enforcement procedures call for each heavy lift to be supervised by a designated individual who will be responsible for enforcing the procedural requirement. Any deviation from these requirements will require the prior approval of the Operations Supervisor.

B. EG&G Evaluation

The submittal using tabulated data reveals that the thirteen hoisting systems handle 40 loads and involve 59 "Safety Class" designations. These are distributed to show that:

Safety Class	1	is identified with 5 loads
	2	is identified with 20 loads
	3A	is identified with 1 load
	3B	is identified with 33 loads
	4	none

The five loads discussed above, handled by the Polar Crane involves 4 safety Class 1, 2 Safety Class 2 and 5 Safety Class 3B designators. These are identified specifically because the match marks used on the crane rails, trolley and truck constitute an acceptable approach for safe load path marking. Therefore, they are consistent with Guideline 1 according to the NRC's "Synopsis of Issues Associated with NUREG 0612." The other loads of the Polar Crane and the twelve other hoist systems account for the remaining 35 loads rated into 48 Safety Class designators. They are identified as

problems without adequate information provided to show solutions consistent with Guideline 1.

Information is needed to confirm that for other heavy loads handled by the Polar crane and the other nonexempt cranes or hoists (35 identified loads), safe load paths are followed. These handling paths should follow the preferred structural floor members, beams, etc.; the safe load paths should be shown on equipment layout drawings; the safe load paths must be clearly marked in an acceptable manner, and have a deviation control system that involves written approval. The commitment for defining safe load paths in procedures will not be consistent until they reflect the complete required information on the safe load paths.

C. EG&G Conclusions and Recommendations

(1) Safe load path control systems for 5 loads handled by the Polar Crane are consistent with the intent of Guideline 1.

(2) Additional evaluation and information, as discussed in 2.3.1B above, is needed for RBS to show consistency with NUREG 0612 Guideline 1, for 35 loads.

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 Applicant's Statements

For each of the heavy loads listed, where compliance with NUREG 0612 is required, the safe load path/procedural requirements corresponding to the RBS assigned safety class will be added to the appropriate plant procedures. When more than one safety class assignment was made for a particular load, the safe load path/procedural requirements of all safety class assignments will be included in the procedures.

Measures will be included in a number of plant procedures utilized in performing heavy lifts. Each such heavy lift will be supervised by a designated individual who will be responsible for enforcing the procedural requirements. Any deviation from these requirements will require the prior approval of the Operations Supervisor.

B. EG&G Evaluation

The information submitted provides a commitment to develop procedures. However, the five specific requirements that these procedures should include (see 2.3.2 above) have not been addressed. In the preparation RBS should include all of the requirements or justify exceptions. Suitable resolution of the Safe Load Path guidelines must be established before procedures consistent with Guidelines can be written.

C. EG&G Conclusions and Recommendations

RBS should supplement the commitment to develop procedures with information or statements to confirm that the procedures incorporate all of the requirements specified in NUREG 0612 Section 5.1.1(2).

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' [6]."

A. Summary of Applicant's Statements

A procedure for the qualification and training of overhead crane operators will be developed which meets the provisions of ANSI B30.2-1976, Chapter 2-3. This procedure will include training, examination, experience, and physical requirements for crane operators as well as precautions and instructions to assure proper conduct of crane operation. In addition, required crane operator training will include, among other things, instruction in crane operator conduct, such as proper hand signals, testing of controls, limit devices, attaching the load, and moving the load. No exceptions to the guidance in ANSI B30.2-1976, Chapter 2-3 are taken.

With regard to the monorail/hoist systems identified, the provisions of ANSI B30.2-1976 are not directly applicable. Appropriate requirements, however, will be included in plant procedures regarding the control and use of hoists. These procedures require that hoist operators be trained in hoist operation and certified as hoist operators by the Mechanical Maintenance Supervisor.

B. EG&G Evaluation

Development and application of the procedure RBS states they will follow, without exception, is adequate commitment to show consistency with Guideline 3.

C. EG&G Conclusions and Recommendations

The commitment for operator training, qualification, and conduct is consistent with Guideline 3.

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' [7]. 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."

A. Summary of Applicant's Statements

With regard to special lifting devices, there are three identified that are used to handle heavy loads in the containment. These are: 1) Head Strongback Carousel, 2) Dryer/Separator Strongback. A description of each of these devices and plant function or operations in which these devices are used is presented.

The two special lifting devices were evaluated against ANSI N14.6-1978, with special emphasis on Sections 3.2 and 5 of that standard. The devices were designed and fabricated prior to the application of this standard to special lifting devices, therefore there are a number of sections that are not appropriate to apply in retrospect. These relate to Designer's and Fabricator's responsibilities in Sections 3.1, 3.3, 4.1, 4.2 and 4.3. Information on drawings and letters indicate that

sound engineering practices were placed on the fabricator and inspectors by the designer. The devices were designed and supplied in accordance with Project Quality Assurance program as appropriate for Category 1 structures.

The devices will be used only in controlled environments; procedures will permit their use for the loads intended only, or special test loads. Certain specific design considerations not pertinent to load handling reliability were not addressed.

RBS takes specific exception to considering the heavy loads handled by the two strongbacks as critical loads, at this time. Any load drop scenarios are believed premature and are not required until the final report to NRC, so ANSI N14.6 Section 6 is not applied.

Stress design and fracture toughness considerations have been evaluated and are consistent with ANSI N14.6 Section 3.2 requirements. Inspection, test, and maintenance meets the ANSI N14.6 Section 5 requirements with four exceptions.

- The inspection interval, due to long periods between usage will be prior to use by qualified personnel and thorough NDE examination each 5 years.

- Load testing was initially at 125% so follow-up, after any incident subjecting load bearing components to excess stresses, will use dimensional examination and NDE. If defects or deformation are detected, a 125% load test consistent with initial proof test will be made and followed with NDE.

- Proof load testing was at 125% and the devices service is dedicated to one or two specific loads, so subsequent proof load testing will be at 125% followed by NDE.

- The NDE and dimensional examinations are at intervals longer than recommended by Section 5.3.1(2) of ANSI N14.6, but will be performed at 5 year intervals which is believed to be adequate due to the limited dedicated service.

B. EG&G Evaluation

The intent of the RBS statement that there are 3 special lifting devices is not clear. Only two are identified and discussed. The related submittal, "Tabulation of Heavy Loads" (Submittal Table 4) mentions a "Lift Bar Shackle and Sling" under lifting equipment for the crated LPRM, which could be a special device. No other devices were discussed or were considered as special. All discussions are relative only to the Head Strongback Carousel and the Dryer/Separator Strongback.

Information presented on these two special devices provide good insight into the RBS position relative to their status and the guideline requirements. The specific exception taken to considering loads handled by the special strongbacks as "Critical Loads" is not adequately justified. One basic concept of NUREG 0612 is to identify and control risk of heavy load drops, especially if the drop adversely affects "a safety related system required for unit safety . . . ." The first part of the ANSI N14.6 definition of Critical Load emphasizes the same key components as NUREG 0612. Although the ANSI N14.6 Section 6 requirements relate primarily to the guidelines that must be answered for the Phase II evaluation, there is no basis to reject the loads handled by these special devices on the premise they

are not critical loads. Consistency with Phase I is a prerequisite to Phase II. The respective loads assigned to these two devices are listed in tons at: 84, 36, 49, 56.3 and 15.3. It is not premature to consider the risks they impose now, so deficiencies related to ANSI N14.6 Section 6, if discovered, can be corrected without creation of a crisis later.

The other considerations discussed on: stress design; fracture toughness; and the exceptions concerning inspection intervals, incident load testing, proof load testing, and NDE dimensional examinations are considered within the scope and meeting the intent of NUREG 0612 Guideline 4 or the interpretations given in the "Synopsis of Issues Associated with NUREG 0612."

C. EG&G Conclusions and Recommendations

(1) Confirm whether there are three or only two "Special Lifting Devices." If in fact there are three identify the third one and provide information to verify its consistency with NUREG 0612 Guideline 4 requirements.

(2) Revaluate the RBS position on critical loads handled by the Special Lifting Devices, to verify they are consistent with all Phase I [NUREG 0612 Section 5.1.1(4)] specifications.

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' [8]. 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 Applicant's Statements

With respect to lifting devices not specially designed (i.e., slings), the criteria of ANSI B0.9 apply.

Therefore, to assure that slings are appropriately used and maintained, load handling procedures are being developed which will require:

a) The use of ANSI B30.9 and NUREG 0612 Section 5.1.1 (5) criteria for sling selection and rigging techniques;

b) A preventive maintenance procedure specifying annual inspection of slings;

c) A visual inspection of slings for damage prior to making a lift;

d) A preventive maintenance procedure which includes tagging requirements to identify sling rating, application, last examination, and expiration date of examination;

e) Sling selection, use, and marking which will be based on rated loads, which include the sum of both maximum static and dynamic loads.

B. EG&G Evaluation

The commitment on procedure development for use of non-special lifting devices is consistent with NUREG 0612 Guideline 5. The interpretation of

2.3.5 A sub d) above concerning tagging for application, is considered to include marking a sling dedicated to service on a certain crane load, if slings are so dedicated.

C. EG&G Conclusions and Recommendations

The commitment for Lifting Devices, not Specially Designed is consistent with NUREG 0612 Guideline 5.

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 Applicant's Statements

Procedures for inspection, testing, and maintenance of the three overhead cranes (Reactor Building Polar Crane, Fuel Building Bridge crane, Spent Fuel Cask Trolley) will be prepared following the guidelines of ANSI B30.2-1976, Chapter 2-2. With the implementation of these procedures, the criteria of ANSI B30.2-1976 Chapter 2-2, are satisfied. No exceptions to the standard are taken.

ANSI B30.2-1976, Chapter 2-2 is not directly applicable to the inspection, testing, and maintenance of the monorail/hoist systems. The activities for these monorail/hoist systems are, however, covered extensively by

plant procedures which have been prepared following the guidelines of ANSI B30.16-1973, Section 16-2.2 and ANSI B30.11-1980, Chapter 11-2.

B. EG&G Evaluation

Procedure preparation and follow-up usage commitment RBS makes constitutes consistency with NUREG 0612 Guideline 6.

C. EG&G Conclusions and Recommendations

The commitments are consistent with the NUREG 0612 Guideline 6.

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' [9]. 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 Applicant's Statements

The overhead cranes listed in response to Item 1 are the Reactor Building Polar Crane, the Spent Fuel Cask Trolley and the Fuel Building Bridge Crane. The SWEC design specifications for these cranes were compared to the 1975 revision of CMAA-70 and to the additional safety requirements of ANSI B30.2-1976, Section 2-1. Based on these comparisons, we find that the Reactor Building Polar Crane, Spent Fuel Cask Trolley and the Fuel Building Bridge Crane comply with the guidelines of CMAA-70-1975 and ANSI B30.2-1976, with one minor exception with respect to initial testing.

With regard to the monorail lifting systems, the guidelines of CMAA-70 and ANSI B30.2-1976 are not directly applicable. However, the design of these monorail systems does meet the applicable industry standards as described below.

The monorails used at River Bend Station were either designed by SWEC or procured under a special specification. The appropriate industry standards applicable to these systems are ANSI B30.16, "Overhead Hoist--1973" and ANSI B30.11, "Monorail Systems and Underhung Cranes." In all cases, the monorails at River Bend Station comply with the appropriate sections of these two ANSI standards

B. EG&G Evaluation

There is generally acceptable information (one exception) to confirm consistency with Guideline 7, or its intent. The identified exception concerning initial testing of overhead cranes should be expanded to show:

- o If it is for all three of the cranes discussed in paragraph 3.f page 46 of the March 1, 1984 submittal
- o If there is an alternate acceptable to show that the intent of the requirement has been met
- o What is planned in lieu of specific compliance to show consistency wih the intent of the guideline requirement.

C. EG&G Conclusions and Recommendations

A suitable resolution of the inconsistent exception concerning initial testing will bring RBS into acceptable consistency with the NUREG 0612 Guideline 7.

2.4 Interim Protection Measures

The NRC staff has established (NUREG-0612, Article 5.3) that six measures 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, Article 5.1, is complete. Four of these six interim measures 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:

- o Heavy load technical specifications
- o Special review for heavy loads handled over the core.

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

2.4.1 Interim Protection Measure 1--Technical Specifications

"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 PWRs and Standard Technical Specification 3.9.6.2, 'Crane Travel,' for BWRs, 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 Applicant's Statements

River Bend Station Unit 1 is under construction and the interim measures for operating reactors do not apply.

B. EG&G Evaluation

The RBS position is valid and is consistent with the present construction status.

C. EG&G Conclusions and Recommendations

Interim measures intended for operating reactors do not apply to facilities under construction.

2.4.2 Interim Protection Measures 2, 3, 4, and 5 - Administrative Controls

"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 Applicant's Statements

Summaries of applicant's statements are contained in discussions of the respective general guidelines in Sections 2.3.1, 2.3.2, 2.3.3, and 2.3.6, respectively.

B. EG&G Evaluations, Conclusions, and Recommendations

EG&G evaluations, conclusions, and recommendations are contained in discussions of the respective general guidelines in Sections 2.3.1, 2.3.2, 2.3.3, and 2.3.6.

2.4.3 Interim Protection Measure 6--Special Review for Heavy Loads Over the Core

"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: (a) 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; (b) 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; (c) appropriate repair and replacement of defective components; and (d) 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 Applicant's Statements

As reported in 2.4.1 above RBS is in the construction phase and interim measures for operating reactors are not addressed.

B. EG&G Evaluation

The RBS position is valid for a facility which is under construction.

C. EG&G Conclusions and Recommendations

Interim measures intended for operating reactors do not apply to facilities under construction.

3. CONCLUDING SUMMARY

3.1 Applicable Load-Handling Systems

The list of cranes and hoists supplied by the applicant as being subject to the provisions of NUREG-0612 is apparently complete (see Section 2.2.1). However, additional evaluation on 8 cranes is needed. This may result in exemption for some of these cranes.

3.2 Guideline Recommendations

Compliance with the seven NRC guidelines for heavy load handling (Section 2.3) are partially satisfied at RBS Unit 1. 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 Safe Load Paths	Additional evaluation and information as discussed in 2.3.1B is needed to show consistency with Guideline 1.
2. Section 2.3.2 Load Handling Procedures	Supplement the commitment to develop procedures by confirming that all the requirements of NUREG 0612 Section 5.1.1(2) are incorporated.
3. Section 2.3.3 Crane Operator Training	The commitment for operator training, qualification and conduct is consistent with Guideline 3.

TABLE 3.1. RIVER BEND STATION UNIT 1, NUREG 0612 SECTION 5.1.1 COMPLIANCE MATRIX

No.	Handling System Identification	Load Rating (Tons)	Safe Load Paths	Load Handling Procedures	Crane Operator Training	Special Lifting Devices	Lifting Devices Not Special Design	Crane Inspection Test Maintenance	Crane Design
1	Reactor Bldg. Polar Crane/Aux. Hoist	100/5	I	I	C	I	C	C	I
2	Drywell MSIV and Relief Valve Monorail	3	I	I	C		C	C	C
3	Fuel Bldg. Bridge Crane	15	I	I	C		C	C	I
4	Spent Fuel Cask Trolley/Aux. Hoist	125/15	I	I	C		C	C	I
5	MSIV Monorails	8/5	I	I	C		C	C	C
6	MSIV Feedwater Isolation Valve Monorails	3	I	I	C		C	C	C
7	Feedwater Valve Hoists	3	I	I	C		C	C	C
8	RHR A Pump Monorail	8	I	I	C		C	C	C
9	RHR B & C Pump Monorail	8	I	I	C		C	C	C
10	Aux. Bldg Tunnel Plug Monorail	6	I	I	C		C	C	C
11	Hoist Area Monorails	5	I	I	C		C	C	C
12	Floor Plug Monorail	5	I	I	C		C	C	C
13	Cont. Bldg. Eqpt. Handling Area Monorail	5	I	I	C		C	C	C

C = Applicant action complies with NUREG 0612 Guideline.
NC = Applicant action does not comply with NUREG 0612 Guideline.
R = Applicant has proposed revision/modifications designed to comply with NUREG 0612 Guidelines.
I = Insufficient information provided by the applicant.

Guideline	Recommendation
4. Section 2.3.4 Special Lifting Devices	a. Confirm if there are three special lifting devices, if so, provide information on the third one. b. Revaluate the RBS position on critical loads, to assure consistency with NUREG 0612 Section 5.1.1(4).
5. Section 2.3.5 Lifting Devices, Not Specially Designed	The commitments on Guideline 5 are consistent with requirements.
6. Section 2.3.6 Cranes Inspection Testing and Maintenance	The commitments are consistent with NUREG 0612 Section 5.1.1(6) Guidelines.
7. Section 2.3.7 Crane Design	Present a suitable resolution to one exception and RBS will be consistent with Guideline 7.

3.3 Interim Protection

EG&G's evaluation of information provided by the applicant indicates that the following actions are necessary to ensure that the six NRC staff measures for interim protection at RBS are met:

Interim Measure	Recommendation
All	RBS is under construction, therefore the interim measures for operating reactors do not apply.

3.4 Summary

Progress has been made toward showing consistency with the requirements of NUREG 0612 Section 5.1.1. Segregation (incomplete) of the hoists for consideration has been made from those exempted and commitments consistent with NUREG 0612 has been made for Guidelines 3, 5, and 6. This report discusses additional needs to aid in developing consistency with Guidelines 1, 2, 4 and 7.

4. REFERENCES

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

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

3. USNRC, Letter to Gulf States Utilities Co. Subject: NRC Request for Additional Information on Control of Heavy Loads Near Spent Fuel, NRC, 22 December 1980.

4. E. L. Draper, Jr., Gulf States Utilities Co., to Darrell G. Eisenhut, NRC. Subject: RBG-10,612 File No. G9.11 Control of Heavy Loads, June 24, 1981.

5. J. E. Brooker, Gulf States Utilities Co., to Harold R. Denton, NRC. Subject: River Bend Station-Unit 1 Docket No. 50-458 March 1, 1984.

6. ANSI B30.2-1976, "Overhead and Gantry Cranes."

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

8. ANSI B30.9-1971, "Slings".

9. CMAA-70, "Specifications for Electric Overhead Traveling Cranes."

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