CONTROL OF HEAVY LOADS AT NUCLEAR POWER PLANTS
SOUTH TEXAS PROJECT UNITS 1 AND 2
(PHASE I) DRAFT

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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 South Texas Project Units 1 and 2.

EXECUTIVE SUMMARY

South Texas Project Units 1 and 2 does not totally comply with the guidelines of NUREG-0612. In general, there is inconsistency in the following areas:

- Confirming that safe load paths are on equipment layout drawings
- Identifying the method of physically marking the safe load paths in the load handling areas, including those for loads handled by the single failure proof cranes
- The weight recognized as a heavy load at STP should be specified.

The main report contains recommendations which will aid in making the above items consistent with the appropriate guidelines.

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CONTROL OF HEAVY LOADS AT NUCLEAR POWER PLANTS
SOUTH TEXAS PROJECT UNITS 1 AND 2
(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 South Texas Project Units 1 and 2 (STP). 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 applicant 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 Houston Lighting and Power (HL&P), the applicant for STP requesting that the applicant review provisions for handling and control of heavy loads at STP, 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 December 19, 1983, HL&P provided the initial response [4] to this request.

2. EVALUATION AND RECOMMENDATIONS

2.1 Overview

The following sections summarize HL&P's review of heavy load handling at STP 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. HL&P's review of the facilities does not differentiate between the two units so it is assumed that both units are of identical design. The applicant has not indicated the weight of a heavy load for this facility (as defined in NUREG-0612, Article 1.2).

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 59 cranes and hoists as those which handle heavy

loads in the vicinity of irradiated fuel or safe shutdown equipment. These units handled 161 loads and introduced risk to 53 targets. HL&P made a detailed review to determine units that could be eliminated for valid reasons, such as separation, redundancy, etc.

The review indicated that 18 crane/hoist units and 99 loads could be eliminated. The remaining 41 crane/hoist units are shown in Table 2.1

Separately from the above tabulation an additional 110 crane/hoist units were evaluated and excluded because they do not satisfy the criteria of the general guidelines of NUREG 0612.

B. EG&G Evaluation

The information as presented, generally shows consistent, valid response to this guideline. However on many hoist units the tabulation presentation indicates that the hoist handles one or more loads that can be eliminated. Additional loads do not show an elimination category or, that the initially identified target remains at risk. EG&G considers the target listed initially for the hoist, remains at risk from the additional loads and has included the crane/hoist in Table 2.1.

C. EG&G Conclusions and Recommendations

Based on the information provided, EG&G concludes that the adjusted list, Table 2.1 includs all applicable hoists and cranes as these handling systems which must comply with the requirements of the general guidelines of NUREG-0612.

TABLE 2.1 NONEXEMPT HEAVY LOAD HANDLING SYSTEMS

Identification	Load Rating (tons)
Reactor Containment Building	
(RCB) Polar Crane Unit 1 Main Hoist	417
RCB Polar Crane Unit 1 Auxiliary Hoist	15
RCB Polar Crane Unit 2 Main Hoist	500
RCB Ploar Crane Unit 2 Auxiliary Hoist	15
Mechanical Electrical Auxiliary Building	
(MEAB) Monorail 9M101NCM 103A	7.5
MEAB Monorail 9M102NCM 203A	7.5
MEAB Monorail 9M101NCM 104A	7.5
MEAB Monorail 9M102NCM 204A	7.5
MEAB Monorail 9M101NCM 105A	7.5
MEAB Monorail 9M102NCM 205A	7.5
MEAB Monorail 9M101NCM 106A	3
MEAB Monorail 9M102NCM 206A	3
MEAB Monorail 9M101NCM 107A	3
MEAB Monorail 9M102NCM 207A	3
Fuel Handling Building	
(FHB) Overhead Crane Main Hoist	15
FHB Overhead Crane Auxiliary Hoist	2
FHB Monorail 9F101NCM 104A	5
FHB Monorail 9F102NCM 204A	5
FHB Monorail 9F101NCM 104B	5
FHB Monorail 9F102NCM 204B	5
FHB Monorail 9F101NCM 104C	5
FHB Monorail 9F102NCM 204C	5
FHB Monorail 9F101NCM 104D	5
FHB Monorail 9F102NCM 204D	5

TABLE 2.1. (continued)

Identification	Load Rating (tons)
FHB Monorail 9F101NCM 104E	5
FHB Monorail 9F102NCM 204E	5
FHB Monorail 9F101NCM 104F	5
FHB Monorail 9F102NCM 204F	5
FHB Monorail 9F101NCM 104G	5
FHB Monorail 9F102NCM 204G	5
FHB Monorail 9F101NCM 104H	5
FHB Monorail 9F102NCM 204H	5
FHB Monorail 9F101NCM 104I	5
FHB Monorail 9F102NCM 204I	5
Essential Cooling Water (ECW) Intake Gantry 7P200NCG 001C	20
Diesel Generator Building (DGB) Overhead Crane 8D101NCB 101A	3
DGB Overhead Crane 8D102NCB 201A	3
DGB Overhead Crane 8D101NCB 101B	3
DGB Overhead Crane 8D102NCB 201B	3
DGB Overhead Crane 8D101NCB 101C	3
DGB Overhead Crane 8D102NCB 201C	3

1. Nine hoists each for STP Unit 1 and 2 were identified initially among the hoists from which a load drop may result in damage to a system required for plant shutdown or decay heat removal. These 18 hoists were subsequently eliminated by categories such as: adequate separation, redundancy, interlocks, site specific, or they were not required for safe shutdown, decay heat removal or spent fuel cooling.

2. A separate tabulation listed 110 hoist units exempt from the considerations of NUREG 0612.

Upon suitable advice concerning the tabulated loads that do not contain a hazard elimination category in the table the number of crane/hoist units of Table 2.1 could be further reduced.

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:

- 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

The submittal contains an attachment, titled "Safe Load Paths" which gives a brief description of each safe load path for the loads identified for handling by the cranes/hoists listed in Table 2.1.

The safe load paths follow, where practical, structural floor members, beams, etc., such that if the load is dropped, the structure is more likely to withstand impact. Safe load paths will be explicitly defined in procedures. These will specify the requirements to move heavy loads over the safe load paths. Deviations from established load paths will require written alternatives which have been approved by the plant Safety Review Committee. Should changes to safe load paths become necessary through design evaluation or operating constraints, revised safe load paths will be established and incorporated into plant procedures in accordance with the guidelines used to establish the initial safe load paths.

Loads handled by the Single Failure Proof FHB overhead crane have a path description given, but a statement is made to indicate that the single failure proof design provides

adequate assurance that a load drop will not occur. The location of safe load paths, spent fuel and safety related equipment of concern for the cranes are identified in Figures 1 through 38.

B. EG&G Evaluation

The NUREG 0612 guideline on safe load paths requires commitment on five components. The information submitted on these show:

- A commitment is made to have safe load paths follow structural floor members, beams etc.

- A commitment is made to define safe load paths in procedures.

- Safe load paths are reported to be illustrated in Figures 1 through 38 which are not a part of the submittal. There is no statement to confirm that this information is illustrated on equipment layout drawings.

- Floor markings to identify safe load paths in the plant area where the load is to be handled, has not been discussed, and no commitment relative to safe load path markings is made. The concept that a single failure proof crane eliminates the need for safe load paths is only partially valid. It does control risk of a drop but the path markings provide defense in depth by minimizing obstacles to safe movement of the load.

- A commitment is given to follow a system for control of deviations and their approval procedure.

C. EG&G Conclusions and Recommendations

The actions and commitments for three of the five components of Guideline 1 on safe load paths are consistent with requirements. Better information is needed for two components.

- Confirm that the information shown on Figures 1 through 38 is also on Plant Equipment Layout Drawings

- The method(s) of physically marking or indicating the safe load paths in the load handling area, should be specified. The paths should include loads handled by single failure proof cranes.

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

Procedure will be prepared to cover the requirements to move heavy loads over safe load paths. Load paths will be explicitly defined in the procedures. Deviations from established load paths will require written alternatives which have been approved by the plant safety review committee.

B. EG&G Evaluation

The commitment to prepare procedures that detail safe load paths and their use, will upon completion bring STP into consistency with the guideline.

C. EG&G Conclusions and Recommendations

The applicants commitment on procedure preparation will be consistent with NUREG-0612.

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

HL&P takes no exceptions to ANSI B30.2-1976, Chapter 2-3, "Qualifications for Operators."

B. EG&G Evaluation

Since the ANSI sections indicate all of the requirements in the sense of "shall be" and HP&L takes no exceptions, the EG&G evaluation is that they are agreeing to comply with all of the provisions. Therefore, when the actions have been taken they will be consistent with the guideline.

C. EG&G Conclusions and Recommendations

Crane operator training, qualification, and conduct during load handling operations at STP is indicated to be consistent with NUREG-0612, 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

Four special lifting devices are identified. They are:

- Reactor Vessel Head Lift Rig Assembly, including
  - Lift Rig
  - Missile Shield
  - Lift Rods
  - Upper Internals Lift Rod Assembly
- Reactor Vessel Internals Lift Rig
- Load Cell and Load Cell Linkage
- Reactor Coolant Pump Lifting Device (three loads).

A brief description of the function and use of these special lifting devices is given and a summary of results.

The reactor vessel head lift rig assembly, internals lift rig, load cell and load cell linkage generally meet the intent of the ANSI N14.6-1978 requirements for design and manufacture. The assembly and detailed manufacturing drawings and purchase order documents contain requirements equivalent to design specifications. The multi-functional items of the head lift rig assembly (a Class 1 support) have a design specification. Some exceptions are taken to the ANSI N14.6 requirements for acceptance testing, maintenance, and verification of continuing compliance.

The reactor coolant pump special lift device will be built to ANSI N14.6 requirements.

A stress report has been prepared for these devices, excluding the RCP lifting device, and a summary of the applicable results is included in Attachment B. The ANSI N14.6 criteria for stress limits associated with certain stress design factors for tensile and shear stresses are satisfied.

These devices were manufactured under Westinghouse (and in some instances, ASME Code) surveillance with identified hold points, procedure review, and personnel qualification which meet the related ANSI requirements. A 125 percent load test was performed on the head lift rig assembly, the upper internals lift rods, the internals lift rig, load cell and load cell linkage. The load test was performed at a fabricators shop and was followed by the appropriate nondestructive testing.

Exceptions to ANSI N14.6 and the justification of present design acceptability are presented.

B. EG&G Evaluation

The information presented on STP is well organized and effectively documents compliance in the submittal. Included are, identification, general discussions, a table tabulating exceptions to ANSI N14.6 with justifications of acceptability of STP design, and tables summarizing the result of component stress calculations. Overall, EG&G believes the presentation shows acceptable consistency with the guideline 4 requirements.

Three segments of the presentation justify specific comment.

- In the exceptions there is disagreement between the 150% proof test loading and the 125% industry standard actually used. Also the call for an annual 150% load test within the containment vessel. In the initial item EG&G concurs with HL&P that no beneficial result can be gained by subjecting the special lifting device to an additional 150% overload proof testing. In the latter item EG&G also concurs that the 100% load test prior to refueling, with visual examinations, supplemented by the load cell used with the head and internals lift rig, provides acceptable continuing safety.

- The rod housing of the reactor vessel internals lift rig does not meet the ANSI N14.6 criteria of 3W when analyzed for tensile stresses. This stress (32,400 psi) exceeds the minimum allowable yield stress (30,000 psi). However, since the actual mechanical properties for this item list the yield strength as 41,500 psi and the ultimate strength criterion of 5W is met, this item is considered acceptable.

- The guide sleeve of the reactor vessel internals lift rig does not meet the ANSI N14.6 criteria of 3W when analyzed for tensile stresses. This stress (31,800 psi) exceeds the allowable yield stress (30,000 psi). However, since the actual properties for this item list the yield strength as 35,000 psi and the ultimate strength criteria of 5W is met, this item is considered acceptable.

The above two comments are quoted verbatim from the STP submittal. They are self explanatory and EG&G concurs with their acceptable evaluation.

C. EG&G Conclusions and Recommendations

Although there are some exceptions and minor deviations from total literal compliance with the guideline, valid justification for the differences has been provided. EG&G believes STP is consistent with the intent of Guideline 4.

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

Slings may be used throughout the plant to lift equuipment. All slings will be procured to the requirements of

ANSI B30.9-1971 as modified by NUREG 0612. The rating identified on the sling will be in terms of the "static load" which produces the maximum static and dynamic loads. Where this restricts sling use to certain cranes, the slings will be clearly marked as to the cranes with which they may be used.

B. EG&G Evaluation

The procurement commitment and plans for marking given in the applicants statement will, upon completion be consistent with Guideline 5 requirements.

C. EG&G Conclusions and Recommendations

The planned procurement action is consistent with 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

A procedure has been approved which covers the inspection and testing of all plant cranes. This procedure is based on the requirements of ANSI B30.2-1976, Chapter 2-2, ANSI N45.2.2-1972, OSHA 2206 (29CFR1910), and the Manufacturers Instruction Manuals.

All preventative and corrective maintenance will be performed using procedures which invoke ANSI B30.2-1976, Chapter 2-2.

B. EG&G Evaluation

Compliance with the procedure and follow-up maintenance as indicated in the applicants statement is consistent with Guideline 6 requirements.

C. EG&G Conclusions and Recommendations

Inspection, testing, and maintenance according to procedure specified for STP are consistent with 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 design of the Polar Cranes, the FHB 15/2 overhead cranes and the ECW gantry cranes comply with the guidelines of CMAA-70 and Chapter 2.1 of ANSI B30.2-1976.

The criteria in CMAA-70 is not directly applicable to the DGB crane because it is a top running single girder overhead crane. The design of this system was compared to the guidelines of CMAA-74 "Specification for Top Running and Under Running Single Grider Electric Overhead Traveling Cranes." The crane meets the requirements of CMAA-74 and Chapter 2.1 of ANSI B30.2-1976.

Because the criteria in CMAA-70 and ANSI B30.2 are not directly applicable to monorails and their hoists, the design of these handling systems was compared to the guidelines of ANSI B30.11-1973 "Monorail Systems and Underhung Cranes" and ANSI B30.16-1973 "Overhead Hoists." All of the monorails identified in Table 1 were designed to meet these guidelines.

B. EG&G Evaluation

The information presented indicates there is consistency with the guideline. The use of CMAA-74, ANSI B30.11 and B30.16 where they are the appropriate guide is acceptable for this guideline.

C. EG&G Conclusions and Recommendations

The design and fabrication of the overhead handling systems required to meet NUREG-0612 at STP are consistent with 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

STP is under construction, therefore the interim measures for operating reactors has not been addressed.

B. EG&G Evaluation

The STP facility, still under construction, without an operating reactor has no basis for interim actions.

C. EG&G Conclusions and Recommendations

The applicant, without operating reactors, has no basis for Interim Protection Measures.

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

The STP is under construction, specific interim actions related to operation of the reactor are not presented.

B. EG&G Evaluation

The scope of the overall submittal indicates that procedure development is underway and will include considerations of reviews, visual inspections, components, training, etc., necessary for safe operation. No basis for other interim action is recognized during construction.

C. EG&G Conclusion

Interim Protective Measure 6 is not required for the STP reactors that are 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).

3.2 Guideline Recommendations

Compliance with the seven NRC guidelines for heavy load handling (Section 2.3) are partially satisfied at STP. 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	a. Confirm that the illustrated safe load paths of Figures 1-33 are on STP equipment layout drawings
	b. The method of physically marking safe load paths in the load handling area should be specified. Paths for loads handled by single failure proof cranes should be marked also.
2. Section 2.3.2 Load Handling Procedures	a. Procedures prepared according to the STP commitment will be consistent with NUREG 0612 Guideline 2.

TABLE 3.1 SOUTH TEXAS PROJECT UNITS 1 AND 2 NUREG 0612 COMPLIANCE MATRIX

Identification	Load Rating (Tons)	Safe Loads Paths	Load Handling Procedures	Crane Operator Training	Special Lifting Devices	Lifting Devices Not Special Design	Crane Inspection Test and Maintenance	Crane Design
Reactor Containment Building								
(RCB) Polar Crane Unit 1 Main Hoist	417	I	C	C	C	C	C	C
RCB Polar Crane Unit 1 Auxiliary Hoist	15	I	C	C	C	C	C	C
RCB Polar Crane Unit 2 Main Hoist	500	I	C	C	C	C	C	C
RCB Polar Crane Unit 2 Auxiliary Hoist	15	I	C	C	C	C	C	C
Mechanical Electrical Auxiliary Building								
(MEAB) Monorail 9M101NCM 103A	7.5	I	C	C		C	C	C
MEAB Monorail 9M102NCM 203A	7.5	I	C	C		C	C	C
(MEAB) Monorail 9M101NCM 104A	7.5	I	C	C		C	C	C
MEAB Monorail 9M102NCM 204A	7.5	I	C	C		C	C	C
MEAB Monorail 9M101NCM 105A	7.5	I	C	C		C	C	C
MEAB Monorail 9M102NCM 205A	7.5	I	C	C		C	C	C
MEAB Monorail 9M101NCM 106A	3	I	C	C		C	C	C
MEAB Monorail 9M102NCM 206A	3	I	C	C		C	C	C
MEAB Monorail 9M101NCM 107A	3	I	C	C		C	C	C
MEAB Monorail 9M102NCM 207A	3	I	C	C		C	C	C
Fuel Handling Building								
(FHB) Overhead Crane Main Hoist	15	I	C	C		C	C	C
FHB Overhead Crane Auxiliary Hoist	2	I	C	C		C	C	C
FHB Monorail 9F101NCM 104A	5	I	C	C		C	C	C
FHB Monorail 9F102NCM 204A	5	I	C	C		C	C	C
FHB Monorail 9F101NCM 104B	5	I	C	C		C	C	C
FHB Monorail 9F102NCM 204B	5	I	C	C		C	C	C
FHB Monorail 9F101NCM 104C	5	I	C	C		C	C	C
FHB Monorail 9F102NCM 204C	5	I	C	C		C	C	C
FHB Monorail 9F101NCM 104D	5	I	C	C		C	C	C
FHB Monorail 9F102NCM 204D	5	I	C	C		C	C	C
FHB Monorail 9F101NCM 104E	5	I	C	C		C	C	C
FHB Monorail 9F102NCM 204E	5	I	C	C		C	C	C

TABLE 3.1 (continued)

Identification	Load Rating (Tons)	Safe Loads Paths	Load Handling Procedures	Crane Operator Training	Special Lifting Devices	Lifting Devices Not Special Design	Crane Inspection Test Maintenance	Crane Design
FHB Monorail 9F101NCM 104F	5	I	C	C		C	C	C
FHB Monorail 9F102NCM 204F	5	I	C	C		C	C	C
FHB Monorail 9F101NCM 104G	5	I	C	C		C	C	C
FHB Monorail 9F102NCM 204G	5	I	C	C		C	C	C
FHB Monorail 9F101NCM 104H	5	I	C	C		C	C	C
FHB Monorail 9F102NCM 204H	5	I	C	C		C	C	C
FHB Monorail 9F101NCM 104I	5	I	C	C		C	C	C
FHB Monorail 9F102NCM 204I	5	I	C	C		C	C	C
Essential Cooling Water (ECW) Intake Gantry 7P200 NCG 001C	20	I	C	C		C	C	C
Diesel Generator Building (DGB) Overhead Crane 8D101NCB 101A	3	I	C	C		C	C	C
DGB Overhead Crane 8D102NCB 201A	3	I	C	C		C	C	C
DGB Overhead Crane 8D101NCB 101B	3	I	C	C		C	C	C
DGB Overhead Crane 8D102NCB 201B	3	I	C	C		C	C	C
DGB Overhead Crane 8D101NCB 101C	3	I	C	C		C	C	C
DGB Overhead Crane 8D102NCB 201C	3	I	C	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	
3.	Section 2.3.3 Operator Training	a.	Completing operator training, qualifications and conduct to ANSI B30.2 1976 requirements will be consistent with NUREG 0612, Guideline 3.
4.	Section 2.3.4 Special Lifting Devices	a.	Some exceptions have been identified and a justification provided for them. Actions are consistent with the intent of NUREG 0612, Guideline 4.
5.	Section 2.3.5 Lifting Devices Not Specially Designed	a.	Planned procurement actions are consistent with the Guideline 5.
6.	Section 2.3.6 Cranes Inspection, Test and Maintenance	a.	Reported procedures and plans indicate consistency with NUREG 0612, Guideline 6.
7.	Section 2.3.7 Crane Design	a	Information provided indicates consistency with NUREG 0612, 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 STP are met:

Interim Measure	Recommendation

The STP is under construction, with no operating reactors. Interim protection measures have no basis at this time.

3.4 Summary

The report of actions taken and pending toward compliance with NUREG 0612 Article 5.1.1 guidelines has been presented and a careful evaluation made. Although much remains to be done, the data submitted indicates that STP is proceeding correctly. The major recommendations for improvement, at this time, relate to Safe Load Paths in 2.3.1.

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 Houston Lighting and Power. Subject: NRC Request for Additional Information on Control of Heavy Loads Near Spent Fuel, NRC, 22 December 1980.

4. H. J. Golberg, Houston Lighting and Power Co. to Mr. D. G. Eisenhut, US, NRC Washington, D.C. Subject: South Texas Project Units 1 and 2, Schedule for Submittal of response to generic letter 81-07, Control of Heavy Loads, December 19, 1983.

5. This is intentionally left without a reference at this time.

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."