Informal Report
EGG-HS-6722

OCTOBER 1984

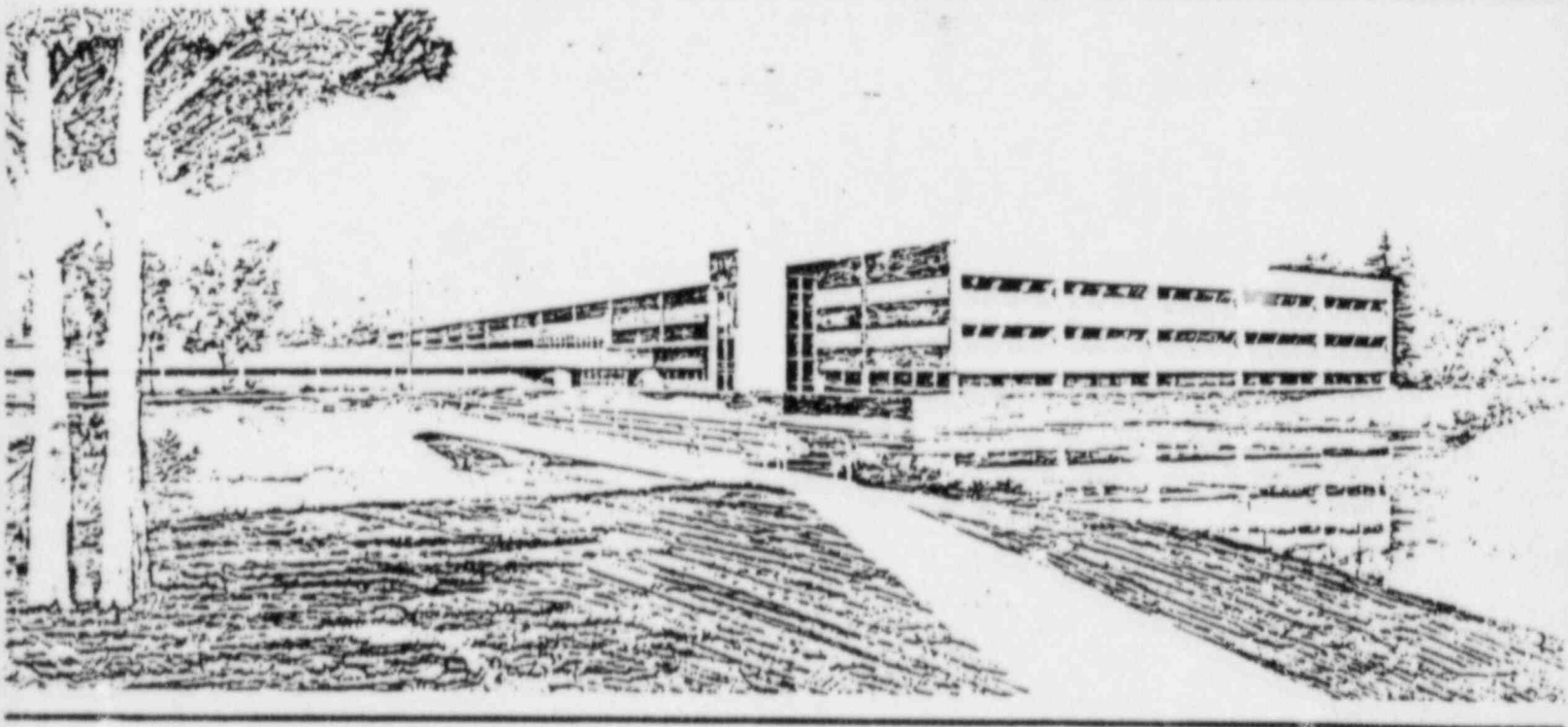
CONTROL OF HEAVY LOADS AT NUCLEAR POWER PLANTS

COMANCHE PEAK STEAM ELECTRIC STATION, UNITS 1 AND 2

(PHASE I)

T. C. Yen
T. H. Stickley

Idaho National Engineering Laboratory
Operated by the U.S. Department of Energy



Prepared for the
U.S. NUCLEAR REGULATORY COMMISSION
Under DOE Contract No. DE-AC07-76ID01570
FIN No. A6457

EG&G Idaho

EGG-HS-6722

CONTROL OF HEAVY LOADS AT NUCLEAR POWER PLANTS
COMANCHE PEAK STEAM ELECTRIC STATION, UNITS 1 AND 2
(PHASE I)
Docket Nos. 50-445, 50-446

Author
T. C. Yen

Principal Technical Investigator
T. H. Stickley

Published
October 1984

EG&G Idaho, Inc.
Idaho Falls, Idaho 83415

Prepared for the
U.S. Nuclear Regulatory Commission
Under DOE Contract No. DE-AC07-76IDO 1570

FIN No. A6457

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 Comanche Peak Steam Electric Station Units 1 and 2.

EXECUTIVE SUMMARY

Comanche Peak Units 1 and 2 are consistent with the intent of NUREG-0612, Article 5.1.1.

CONTENTS

TABLES

CONTROL OF HEAVY LOADS AT NUCLEAR POWER PLANTS
COMANCHE PEAK STEAM ELECTRIC STATION 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 Comanche Peak Units 1 and 2. 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 Texas Utilities Generating Company (TUGC), the applicant for Comanche Peak requesting that the applicant review provisions for handling and control of heavy loads at Comanche Peak Units 1 and 2, 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 August 7, 1981, TUGC provided the initial response [4] to this request. Additional information was provided on October 8, 1981 [5]. After EG&G's preliminary evaluation [12], TUGC submitted two revisions of the initial response on March 1, 1982 and June 8, 1983 [10,11]. Additional clarification [13] was provided on July 12, 1984.

2. EVALUATION AND RECOMMENDATIONS

2.1 Overview

The following sections summarize Texas Utilities Generating Company's (TUGC) review of heavy load handling at Comanche Creek Units 1 and 2 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. TUGC'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 indicated the weight of a heavy load for this facility (as defined in NUREG-0612, Article 1.2) as 2150 lbs.

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 numerous other cranes that have been excluded from satisfying the criteria of the general guidelines of NUREG-0612.

B. EG&G Evaluation

The applicant made thorough analysis of load handling systems which are not exempt from further consideration under the requirements of NUREG 0612. This information is presented as Table 1 of the June 1983 submittal [11], and is reproduced as Table 2.1 of this report. EG&G concurs with the evaluation.

C. EG&G Conclusions and Recommendations

Based on the information provided, EG&G concludes that the applicant 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.

TABLE 2 NONEXEMPT HEAVY LOAD HANDLING SYSTEMS--COMANCHE PEAK UNITS 1 AND 2

	Crane/Hoist Name	Crane/Hoist I.D. Number	Capacity (Tons)	Location	Elevation
1.	Fuel Building overhead crane	CPX-MESCFC-01	130-17-5	Fuel Building	Above 860 ft
2.	Containment auxiliary upper cranes	CP1-MESCCA-01 CP2-MESCCA-01	5	Containment Building	905 ft-6 in.
3.	Containment polar cranes	CP1-MESCPP-01 CP2-MESCPP-01	175-20	Containment Building	950 ft-7 in.
4.	Moderating HX and letdown chiller HX hoist	CP1-MEMHCH-16 CP2-MEMHCH-16	2	Safeguards Building	831 ft-6 in.
5.	Component cooling water pump hoist	CPX-MEMHCH-01	4	Auxiliary Building	810 ft-6 in.
6.	Safety related chiller hoist (Single-failure-Proof)	CP1-MEMHCH-04A CP2-MEMHCH-04A	3	Auxiliary Building	778 ft
7.	Centrifugal charging pumps hoist	CP1-MEMHCH-01, 02 CP2-MEMHCH-01, 02	4	Auxiliary Building	810 ft-6 in.
8.	Containment fuel handling bridge crane	CP1-MESCCF-01 CP2-MESCCF-01	1	Containment Building	Above 860 ft
9.	Auxiliary feedwater pump hoist (electric motor driven pump)	CP1-MEMHCH-13, 14 CP2-MEMHCH-13, 14	4	Safeguards Building	790 ft-6 in.
10.	Auxiliary feedwater pump hoist (turbine driven pump)	CP1-MEMHCH-12 CP2-MEMHCH-12	3	Safeguards Building	790 ft-6 in.
11.	Auxiliary filter hoist	CPX-MEMHWR-04	8	Auxiliary Building	852 ft-6 in.
12.	Reactor coolant pumps hoist	CP1-MEMHCH-42 CP2-MEMHCH-42	45	Containment Building	905 ft-9 in.
13.	Diesel generator (piston) hoist	CP1-MEMHCH-37, 38 CP2-MEMHCH-37, 38	1	Safeguards Building	810 ft-6 in.
14.	Spent fuel pool HX hoist	CPX-MEMHCH-43, 44	8	Fuel Building	838 ft-9 in.
15.	Service water traveling screen hoist and jib crane	CPX-MEMHCH-12 CPX-SWEHSG-01	20 3	Outside of service water intake structure	838 ft

TABLE 2.1 (continued)

	Crane/Hoist Name	Crane/Hoist I.D. Number	Capacity (Tons)	Location	Elevation
16.	Residual heat removal HX and Containment Spray System hoist	CP1-MEMHCH-47, 59	10	Safeguards Building	831 ft-6 in.
17.	Main steam safety valves hoist	CP1-MEMHCH-48, 49, 50, 51 CP2-MEMHCH-48, 49, 50, 51	1	Safeguards Building	880 ft-6 in.
18.	Service water intake structure crane	CPX-MESCSW-01	7 1/2	Service water intake structure	Above 796 ft
19.	Containment dome access rotating platform hoist	CP1-MESCRP-01 CP2-MESCRP-01	1	Containment Building	1000 ft
20.	Fuel handling bridge crane (Fuel Building)	TBX-FHSCFB-01	2	Fuel Building	Above 860 ft
21.	Refueling machine (Containment Building)	TBX-FHSCMC-01 TCX-FHSCMC-01	2	Containment Building	Above 860 ft
22.	Service water intake stop gate hoist	CPX-MEMHCH-61	8	Service water intake structure	789 ft-9 in.
23.	Auxiliary filter hoist (Single-failure-Proof)	CPX-MEMHWR-04A	8	Auxiliary Building	852 ft-6 in.
24.	Miscellaneous hoist	CPX-MEMHCH-72	2	Fuel Building	838 ft-9 in.
25.	Residual heat removal pump hoist	CP1-MEMHCH-08 CP2-MEMHCH-09	3	Safeguards Building	773 ft

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

" 'Safe load areas' (areas serviced by a particular crane in which a load drop will not result in damage to shutdown or decay heat removal equipment or spent fuel) have been identified where applicable for the cranes listed in [Table 2.1]. Equipment handled by these cranes will be transported whenever possible within the identified safe load areas."

"Safe load areas" for 9 of the 25 listed in Table 2.1 are marked on submitted drawings. For the remaining hoists, the establishment of safe load areas is not applicable, since the hoists generally travel along a single monorail which allows the hoist to follow only one possible path.

"All 'safe load areas' and 'safe load paths' will be identified by drawing."

" 'Safe load paths' will also be identified and established for loads handled outside safe load areas prior to initial fuel load to ensure the safe operation of the crane during maintenance and normal operation of the plant."

" 'Safe load paths' will be defined in the CPSES maintenance procedure as attachments to load handling procedures. Procedures will be approved and handled in accordance with CPSES station procedures, as directed by the Station Operation Review Committee. Deviation from this maintenance procedure or load path will be handled in accordance with procedures governing deviation or revisions of safety related procedures, as directed by the Station Operation Review Committee."

In the July 12, 1984 submittal [13], TUGC states:

"Safe load areas are defined in CPSES plant procedures and operators training so that, to the extent practical, heavy loads are not carried over or near irradiated fuel or safe shutdown equipment."

"Safe load area sketches are provided in the appropriate plant procedures."

"Electrical interlocks are utilized on the Fuel Building Overhead Crane and are discussed in the appropriate plant procedures."

"The signalmen and crane operators at CPSES have been trained to use hand signals. These signals are discussed in the appropriate plant procedures."

B. EG&G Evaluation

CPSES has developed safe load areas for heavy load handling. Safe load paths will be established for loads handled outside safe load areas prior to initial fuel loading. The safe load paths are defined in CPSES

procedures. Deviations from safe load paths must be approved in accordance with procedures established by the Station Operation Review Committee.

As the alternate to marking safe load paths on the floor, CPSES has elected to provide a signalperson to walk the load through the safe load path.

C. EG&G Conclusions and Recommendations

Based on the information provided, EG&G concludes that CPSES is consistent with the intent of Guideline 1.

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 some heavy loads, it may be necessary to operate outside the safe load area and transport the load over or near plant shutdown or decay heat removal equipment or spent fuel. For these loads and all oversize loads, special precautions or procedures will be utilized with the purpose of minimizing the risk of a heavy load drop in these areas. The procedure will consist of load drop prevention measures, such as a list of required equipment, inspection, acceptance criteria for the movement of the load, sequence of steps, etc. These procedures will be available for NRC review."

B. EG&G Evaluation

The applicant's statements imply that the development of the load handling procedures is covered by the designation of the "safe load areas."

TUGC has committed to providing procedures in accordance with Guideline 2.

C. EG&G Conclusions and Recommendations

Based upon the information supplied, EG&G considers that Comanche Peak units 1 and 2 are consistent with the intent of Guideline 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

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

Procedures governing crane operator training qualifications and conduct will be available for NRC review prior to fuel load."

B. EG&G Evaluation

The applicant has committed to compliance with guideline 3.

C. EG&G Conclusions and Recommendations

Based upon the information provided, EG&G considers Comanche Peak units 1 and 2 to be 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

"Although a special lifting device for a spent fuel shipping container weighing 10,000 lbs or more has not yet been procured, ANSI N14.6-1978 and NUREG-0612 Guidelines for special lifting devices will be invoked when this device is obtained. Although it is anticipated at this time that the standards for the lifting devices will be met, it may later be determined that alternatives to the standard are required. In that event, written notification will be made to the Nuclear Regulatory Commission describing the alternatives and their equivalency in terms of load handling reliability."

"Reactor vessel head and reactor internals lifting rigs meet the intent of ANSI N14.6-1978 and NUREG-0612 for design, fabrication, assembly and operation. The analysis for these devices is provided in [the Westinghouse report WCAP-10156]"
"These rigs meet the intent of mentioned NUREG and ANSI standard for design, fabrication, assembly and operation, but do not meet all the specific load verification testing.
"These special lifting devices are used during plant refueling which is approximately once per year. During plant operation these special lifting devices are inaccessible since they are permanently installed and/or remain in the containment. They cannot be removed from the containment unless they are disassembled and no known purposes exist for disassembly. Load testing to 150 percent of the total weight before each use would require special fixtures and is impractical to perform. Crane capacity could also be limiting. It is suggested that a check (visual) or critical welds and parts be conducted at initial lift prior to moving to full lift and movement for these devices. Further note that with the use of the load cell for the head and internals lift rig, all lifting and lowering is monitored at all times."

The ANSI requirements for periodic checking and functional load testing appear to be most difficult to demonstrate compliance. It is almost impractical to perform the 150 percent load test prior to each use. In accordance with the "Synopsis of Issues Associated with NUREG 0612", TUGC proposes [13] that a nondestructive surface examination of critical welds and parts be performed every ten years as part of an inservice inspection outage.

"The failed fuel assembly lifting tool has been deleted from Table 4 of [Report WCAP-9198] because our review indicated that this tool is not required."

In Table A-4 [11], the applicant indicates that special lifting devices will be used only on:

(1) Spent fuel cask

(2) Reactor vessel head

(3) Reactor internals

In the July 12, 1984 submittal [13], TUGC states:

"Reactor vessel head and reactor internal lifting rigs meet the intent of ANSI 14.6-1978 and NUREG-0612 for design, fabrication, assembly and operation. Refer to Section 6 of the enclosed WCAP-10156, Rev. 1.

A detailed analysis of an alternate load verification, testing, and stress design factor is included in Attachment B of WCAP-10156, Rev. 1."

B. EG&G Evaluation

A study of WCAP 10156, Rev. 1 shows that the special lifting devices at CPSES are consistent with the stress factors required by ANSI N14.6, including the dynamic loading requirements of Guideline 5 of NUREG 0612. The acceptance load test of 125%, in lieu of the required 150% test, is acceptable.

EG&G concurs that strict compliance with the ANSI N14.6 requirements for verification of continuing compliance is impractical and non-productive. The proposed alternate for this type of testing, which was recommended in WCAP 10156, Rev. 1 (see 2.3.4A of this TER), is acceptable. CPSES committed that the special lifting device that is to be used to handle the spent fuel cask will meet the intent of Guideline 4.

C. EG&G Conclusions and Recommendations

Based on the information provided, EG&G concludes that CPSES is consistent with the intent of NUREG 0612, 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

"Lifting devices that are not specially designed for use with heavy loads, as defined by NUREG-0612, will comply with the guidelines of ANSI B30.9-1971."

"Sling ratings will be identified on the sling in terms of the static load, which produces the maximum static and dynamic load; (i.e., load x 0.005 x hoist speed + maximum static load). The hoist speed is expressed in feet per minute. Where this restricts slings to use on only certain cranes, the slings will be clearly marked as to the cranes with which they may be used."

B. EG&G Evaluation

CPSES has committed to comply with Guideline 5.

C. EG&G Conclusions and Recommendations

Based on the information provided, EG&G concludes that CPSES 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

"ANSI B30.2-1976, Chapter 2-2, will be invoked with respect to crane inspections, test and maintenance.

With respect to Section 2-2.1.1.1 of ANSI B30.2, cranes located within containment will be inspected every scheduled refueling outage in accordance with the requirements of ANSI B30.2. This is necessary because periodic inspections during power operations are impractical due to high radiation levels in containment.

These measures will be implemented prior to fuel handling. Procedures and inspection records will be retained and available for NRC review."

B. EG&G Evaluation

As stated, the applicant has committed to implement the measures consistent with the intent of this guideline prior to fuel handling, and to retain the procedures and the inspection records for review.

C. EG&G Conclusions and Recommendations

Based on the information provided, EG&G considers that Comanche Peak units 1 and 2 are consistent with the intent of 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

"Table A-3 lists the load handling systems identified in Table A-1 and the applicable codes and standards as specified in the CPSES Equipment Purchase Specifications. In all cases, the crane design complies with the guidelines of CMAA Specification 70 and Chapter 2-1 of ANSI B30.2-1967 and all hoists are designed in accordance with the requirements of ANSI B30.16-1973."

Table A-3 [11] is a revised version of Table 3 in the applicant's early response [10]. In Table 3, the applicant indicated that all nonexempt cranes were designed per ANSI B30.2-1976, Chapter 2-1 or to the criteria of both CMAA-70 and ANSI B30.2, Chapter 2-1. In response to EG&G's comments [12] on the specified weight of a heavy load and rated capacities of some cranes, the applicant states:

"Table 4 of Reference [10] has been corrected to eliminate the discrepancies concerning rated capacity of cranes [in question] and their maximum loads. (See Attachment A, Table A-4 [11])."

B. EG&G Evaluation

As shown in Table A-3 [11], the applicant has apparently classified the overhead load handling systems into two categories: cranes and hoists. Even though a hoist may run on a monorail, it is not considered as a crane. All the overhead load handling systems designated as hoists are specified to meet the criteria of ANSI B30.16-1973: "overhead hoist (underhung)", not the criteria of CMAA-70 and ANSI B30.2-1976 specified by this guideline. Cranes are designed according to the criteria of ANSI B30.2-1967 instead of ANSI B30.2-1976. Inasmuch as there exist only some minor differences between the 1967 edition and the 1976 edition of ANSI B30.2, the use of the 1967 version in lieu of the 1976 edition for crane design is acceptable.

C. EG&G Conclusions and Recommendations

Based on the information provided, EG&G concludes that CPSES is consistent with the intent of Guideline 7.

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 complete.

3.2 Guideline Recommendations

Compliance with the seven NRC guidelines for heavy load handling (Section 2.3) are satisfied at Comanche Peak Units 1 and 2. This conclusion is represented in tabular form as Table 3.1.

Guideline	Recommendation
1. Section 2.3.1	Consistent with Guideline 1.
2. Section 2.3.2	Consistent with Guideline 2.
3. Section 2.3.3	Consistent with Guideline 3.
4. Section 2.3.4	Consistent with Guideline 4.
5. Section 2.3.5	Consistent with Guideline 5.
6. Section 2.3.6	Consistent with Guideline 6.
7. Section 2.3.7	Consistent with Guideline 7.

TABLE 3.1. COMANCHE PEAK UNITS 1 AND 2 NUREG-0612 COMPLIANCE MATRIX

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 Design
1. Fuel building overhead crane	New and spent fuel casks, handling tools and transfer canal gate. 1 to 110 tons	130-17-5	C	C	C	C	C	C	C
2. Containment auxiliary upper crane	Reactor vessel studs, stud tensioner, stud baskets, control rod drive vent ducts 0.3 to 3.1 tons	5	C	C	C	--	C	C	C
3. Containment polar crane	RV head, reactor internals, reactor coolant pump and fuel storage area stop gate. Weights given for 16 components: 1.5 to 168.1 tons	175-20	C	C	C	C	C	C	C
4. Moderating HX and letdown chiller HX	Moderating HX and letdown chiller HX components. 0.2 to 1.3 tons	2	C	C	C	--	C	C	C
5. Component cooling water pump hoist	CCW pump components, 24 in. valve and fan/coil motor. 0.1 to 3.3 tons	4	C	C	C	--	C	C	C
6. Safety related chiller hoist	All weights given less than "heavy weight."	3	C	C	C	--	C	C	C
7. Centrifugal charging pump hoist	CCP components, lube oil cooler and fan/coil motor. 0.1 to 3.8 tons	4	C	C	C	--	C	C	--
8. Containment fuel handling bridge	Fuel assembly and lifting tool. 1.04 tons (less than "heavy head").	1	C	C	C	--	C	C	C

TABLE 3.1. (continued)

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 Design
9. Auxiliary feedwater pump hoist (motor driven)	AF pump components. 0.6 to 3.6 tons	4	C	C	C	--	C	C	C
10. Auxiliary feedwater pump hoist (turbine driven)	AF pump and turbine components. 0.6 to 2 tons	3	C	C	C	--	C	C	C
11. Auxiliary filter hoist	Filter, spent filter cask and concrete floor plug. 0.01 to 6.4 tons	8	C	C	C	--	C	C	C
12. Reactor coolant pump hoist	RC pump and motor components. 3.5 to 42.4 tons	45	C	C	C	--	C	C	C
13. Diesel generator (piston) hoist	Piping and structure components. 1 ton	1	C	C	C	--	C	C	C
14. Spent fuel pool HX-hoist	SFC pump, motor, HX shell, HX tubes and concrete floor plugs. 1.1 to 4.5 tons	8	C	C	C	--	C	C	C
15. Service water traveling screen hoist and jibe crane	Traveling screen, miscellaneous parts and stop gates. 2.3 to 10.8 tons	20-3	C	C	C	--	C	C	C
16. Residual heat removal HX and containment spray system HX hoist	RHR HX and CSS HX components and valves. 0.1 to 8.5 tons	10	C	C	C	--	C	C	C
17. Main steam safety valves hoist	Main steam safety valves. 0.8 ton (less than "heavy load")	1	C	C	C	--	C	C	C
18. Service water intake structure crane	Service water pump motor and fire pump components. 0.09 to 4.9 tons	7.5	C	C	C	--	C	C	C

TABLE 3.1. (continued)

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 Design
19. Containment dome access rotating platform hoist	Miscellaneous tools and welding equipment. 0.2 ton (less than "heavy weight")	1	C	C	C	--	C	C	C
20. Fuel handling bridge crane (Fuel bldg)	Fuel assembly plus tool and lighting fixture. 0.15 to 1.04 tons	2	C	C	C	--	--	C	C
21. Refueling machine (containment bldg)	Fuel assembly, rod control cluster plus gripper and CRD shaft plus handling fixture. 0.2 to 0.9 ton	2	C	C	C	--	--	C	C
22. Service water intake stop gate hoist	SW pump compartment stop gates. 6.2 tons	8	C	C	C	--	C	C	C
23. Auxiliary filter hoist	Filter, spent filter cask and concrete floor plug. 0.01 to 6.4 tons	8	C	C	C	--	C	C	C
24. Miscellaneous hoist	Spent fuel pool cooling pump inlet isolation valve. 1.3 tons	2	C	C	C	--	C	C	C
25. Residual heat removal pump hoist	RHR pump. 3 tons	3	C	C	C	--	C	C	C

C = Applicant action consistent with NUREG-0612 guideline.

NC = Applicant action not consistent with NUREG-0612 guideline.

-- = Guideline is not applicable to this handling system.

I = Insufficient information was provided to determine consistency.

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, 17 May 1978.

3. *SNRC, Letter to Texas Utilities Generating Company. Subject: NRC Request for Additional Information on Control of Heavy Loads Near Spent Fuel, 22 December 1980.

4. H. C. Schmidt Texas Utilities Services Inc. (TUSI), Letter to S. Burwell (NRC). Subject: Comanche Peak Steam Electric Station Control of Heavy Loads: NUREG-0612, August 7, 1981.

5. H. C. Schmidt (TUSI), Letter to S. Burwell (NRC). Subject: Comanche Peak Steam Electric Station Control of Heavy Loads: NUREG-0612, October 8, 1981.

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- J, Specifications for Electric Overhead Traveling Cranes.

10. H. C. Schmidt (TUSI), Letter to S. Burwell (NRC). Subject: Comanche Peak Steam Electric Station Control of Heavy Loads: NUREG-0612, March 1, 1982.

11. H. C. Schmidt (TUSI), Letter to B. J. Youngblood (NRC). Subject: Comanche Creek Steam Electric Station, Docket Nos. 50-445 and 50-446, Final Response to NUREG-0612, June 8, 1983.

12. B. W. Dixon (EG&G), Phase I Interim Report. Subject: Control of Heavy Loads at Nuclear Plants-Comanche Peak Steam Electric Station Units 1 and 2, March 1982.

13. H. C. Schmidt (TUGC), Letter to B. J. Youngblood (NRC). Subject: Comanche Peak Steam Electric Station Docket No. 50-445 and 50-446. Response to B. J. Youngblood Letter to M. D. Spence Dated May 17, 1984.

NRC FORM 335 (11-81)

U.S. NUCLEAR REGULATORY COMMISSION

BIBLIOGRAPHIC DATA SHEET

1. REPORT NUMBER (Assigned by DDC)
EGG-HS-6722

4. TITLE AND SUBTITLE
Control of Heavy Loads at Nuclear Power Plants
Comanche Peak Steam Electric Station, Units 1 and 2
(Phase I)

2. (Leave blank)

3. RECIPIENT'S ACCESSION NO.

7. AUTHOR(S)
T. C. Yen, T. H. Stickley

5. DATE REPORT COMPLETED
MONTH: October | YEAR: 1984

9. PERFORMING ORGANIZATION NAME AND MAILING ADDRESS (Include Zip Code)
EG&G Idaho, Inc.
Idaho Falls, ID 83415

DATE REPORT ISSUED
MONTH: December | YEAR: 1984

6. (Leave blank)

8. (Leave blank)

12. SPONSORING ORGANIZATION NAME AND MAILING ADDRESS (Include Zip Code)
Division of Systems Integration
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

10. PROJECT/TASK/WORK UNIT NO.

11. FIN NO.
A6457

13. TYPE OF REPORT

PERIOD COVERED (Inclusive dates)

15. SUPPLEMENTARY NOTES

14. (Leave blank)

16. ABSTRACT (200 words or less)

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 Comanche Peak Steam Electric Station Units 1 and 2.

17. KEY WORDS AND DOCUMENT ANALYSIS

17a. DESCRIPTORS

17b. IDENTIFIERS/OPEN-ENDED TERMS

18. AVAILABILITY STATEMENT
Make available only as specifically approved by program office.

19. SECURITY CLASS (This report)
Unclassified

21. NO. OF PAGES

20. SECURITY CLASS (This page)
Unclassified

22. PRICE
$

NRC FORM 335 (11-81)