BALTIMORE
GAS AND
ELECTRIC

CHARLES CENTER • P.O. BOX 1475 • BALTIMORE, MARYLAND 21203-1475

GEORGE C. CREEL
VICE PRESIDENT
NUCLEAR ENERGY
(301) 260-4455

July 2, 1991

U. S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Unit Nos. 1 & 2; Docket Nos. 50-317 & 50-318
Single-Failure-Proof Upgrade and Technical Specification Change Request;
Spent Fuel Cask Handling Crane

Gentlemen:

The Baltimore Gas and Electric (BG&E) Company hereby requests an Amendment to its Operating License Nos. DPR-53 and DPR-69 for Calvert Cliffs Unit Nos. 1 & 2, respectively, in accordance with 10 CFR 50.90 and 50.91, to incorporate changes to the technical specifications. Also included herein, for your review and approval, is information on the planned upgrade of the Calvert Cliffs spent fuel cask handling crane to a single-failure-proof design.

The proposed Technical Specification changes represent revisions to Technical Specification 3/4.9.7, "Crane Travel - Spent Fuel Storage Pool Building," and Technical Specification 3/4.9.13, "Spent Fuel Cask Handling Crane." The changes will eliminate restrictions on the movement of heavy loads (>1600 lbs) over fuel assemblies by the spent fuel cask handling crane. To effect this, BG&E is in the process of upgrading the spent fuel cask handling crane to "single-failure-proof" status as defined by NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants."

I. SINGLE-FAILURE-PROOF UPGRADE

A. CURRENT LICENSING BASES

By a Generic Letter (unnumbered) dated December 22, 1980 (Reference a), supplemented by Generic Letter 81-07, NRC requested all licensees to assess and report on the degree of compliance with the defense-in-depth guidelines of NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants." The NRC required this issue be addressed by licensees in two phases. Phase I addressed NUREG-0612 general guidelines, Section 5.1.1. Phase II addressed specific guidelines which included NUREG-0612, Section 5.1.2, "Spent Fuel Pool Area - PWR."

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Section 5.1.1 of NUREG-0612 established seven general guidelines to provide a defense-in-depth approach for the handling of heavy loads. These include safe load paths, load handling procedures, crane operator training, special lifting devices, lifting devices (not specially designed), cranes (inspection, testing, and maintenance), and crane design. By letter dated May 27, 1983 (Reference b), which was later supplemented by letter dated May 7, 1989 (Reference c), NRC approved BG&E's Phase I report as having satisfied these guidelines.

As part of the Phase II evaluation, Section 5.1.2 of NUREG-0612 required, in addition to satisfying the general guidelines of Section 5.1.1, one of the following should also be satisfied by the spent fuel cask handling crane:

1. Single-failure-proof guidelines of Section 5.1.6 of NUREG-0612.

OR

2. Restriction of crane travel through mechanical stops and electrical interlocks. Provide analyses to demonstrate that a postulated load drop in any location not restricted by electrical interlocks or mechanical stops would not cause damage that could result in criticality, cause leakage that could uncover the fuel, or cause loss of safe shutdown equipment.

OR

3. Same as option 2. above, except this option allows movement of a heavy load, such as a cask, into the pool while it contains "hot" spent fuel if the pool is large enough to maintain wide separation between the load and the "hot" spent fuel.

OR

4. Analyze the effects of drops of heavy loads to demonstrate that the evaluation criteria of Section 5.1 are satisfied.

Baltimore Gas and Electric Company chose to evaluate its spent fuel cask handling crane under Alternate 3 above as follows:

- Electrical interlocks prevent use of the main hook in areas over the spent fuel pools. However, the interlocks will permit use of the main hook only over the cask laydown area. Technical Specification 3.9.13 prohibits a spent fuel shipping cask from travel over any area within one shipping cask length of any fuel assembly. These restrictions are verified to be operable within seven days prior to use and at least once every seven days thereafter, per Technical Specification 4.9.13.

- In order to limit crane proximity to the pool area during daily operations, mechanical stops were installed on the crane bridge rails at a reasonable distance outside of the pool boundary. Technical Specification 3.9.7 prohibits loads weighing over 1600 lbs from being handled over stored spent fuel.

- The spent fuel cask drop analysis performed in accordance with the guidelines of Appendix A of NUREG-0612 indicates that the integrity of the pool will be maintained following a 50 kips cask drop into the pool from a maximum drop height of 42.5 ft. (3.5 ft. in the air, 39 ft. in the water).

On June 28, 1985, NRC issued Generic Letter 85-11 (Reference d) to close out NUREG-0612 issues. In this Generic Letter NRC indicated that " All licensees have completed the requirement to perform a review and submit a Phase I and a Phase II report. Based on the improvement on heavy loads handling obtained from implementation of NUREG-0612 (Phase I), further action is not required to reduce the risks associated with the handling of heavy loads . . . Therefore, a detailed Phase II review of heavy loads is not necessary and Phase II review is considered completed. However, while not a requirement, we encourage the implementation of any actions you identified in Phase II regarding the handling of heavy loads that you consider appropriate."

B. PROPOSED SINGLE-FAILURE-PROOF UPGRADE

Baltimore Gas and Electric Company is presently awaiting NRC's approval of its Application (Reference h) for a license to construct and operate a NUHOMS-24P Independent Spent Fuel Storage Installation (ISFSI), pursuant to the provisions of 10 CFR Part 72. NUHOMS-24P is a dry fuel storage system designed by Pacific Nuclear Fuel Services, Inc. to provide safe interim storage for irradiated fuel assemblies. The fuel assemblies are confined in a helium atmosphere by stainless steel canister. The canister is protected and shielded by a massive concrete module.

The canister containing twenty-four irradiated fuel assemblies is transferred from the spent fuel pool to the concrete module in a transfer cask. The maximum weight (loaded) of the NUHOMS-24P cask is 180 kips (90 ton) [Reference h] which is more than three times the maximum load drop weight analyzed (50 kips) for the existing crane to meet the guidelines of Section 5.1.2 of NUREG-0612 under Alternate 3. Subsequent reanalysis has shown that a cask load drop of 70 kips would produce actual punching shear stress that could compromise the integrity of the spent fuel pool. Therefore, it became necessary to upgrade the existing crane to single-failure-proof status to handle the NUHOMS-24P transfer cask. The upgraded crane will be able to safely lift and move the design critical weight of 125/15 ton (main hoist 125 ton, auxiliary hoist 15 ton) without any height or travel limitations except as noted in Appendix C and in accordance with BG&E's commitment to the seven general guidelines of Section 5.1.1 of NUREG-0612. The single-failure-proof crane will satisfy the guidelines of Section 5.1.2 of NUREG-0612 under Alternate 1 (see Section I-A above).

Baltimore Gas and Electric Company has contracted Ederer Incorporated to upgrade the existing Whiting Corporation (S/N10087) 150/15 ton Spent Fuel Cask Crane, which has been in use since initial commercial operation. The upgrade consists of replacement of the trolley and hoist system with an Ederer-designed system that meets the single-failure-proof criteria set forth in NUREG-0554 and NUREG-0612. The existing crane bridge and bridge-mounted equipment will be retained with some modifications in order to meet the single-failure-proof criteria. The upgrade work is scheduled to begin October 15, 1991, with a currently scheduled completion date of December 31, 1991.

The Ederer-designed trolley and hoist system that will be installed at Calvert Cliffs is comparable to that described in Ederer Incorporated generic licensing topical report EDR-I(P)-A, entitled "Ederer's Nuclear Safety-Related Extra Safety and Monitoring (X-SAM) Cranes," Revision 3 (Reference e). The topical report describes the design and testing of the "single-failure-proof" features which are included in Ederer's X-SAM cranes intended for handling spent fuel casks and other safety-related loads in a nuclear plant. By letter dated January 2, 1980 (Reference f), NRC issued a Topical Report Evaluation concluding that " . . . the design features described in the topical report [Revision 1] are acceptable for assuring that a single failure will not result in the loss of capability to safely retain a critical load." This was later updated by a NRC Safety Evaluation Report issued on August 26, 1983 (Reference g).

In accordance with the stipulation in the NRC's January 2, 1980 Topical Report Evaluation, we have enclosed as Attachments 1 and 2, the Appendix B and the Appendix C supplements to the generic licensing topical report EDR-I(P)-A. These supplements provide, respectively, a summary of plant-specific information supplied by Ederer Incorporated and by BG&E for the Calvert Cliffs spent fuel cask handling crane. We have also enclosed, as Attachment 3, the summary of a seismic qualification analysis for the existing bridge structure. This analysis was performed by Bechtel Power Corporation. The detailed analysis can be readily furnished upon request.

The following alternative methods are used in upgrading the crane to single-failure-proof and are required since the bridge portion of the crane is an existing structure in the plant. The methods used meet guidelines of NUREG-0612, Section 5.1.6 and NUREG-0554.

1. In order to maintain the existing designed head room clearance in the spent fuel pool building, both the main and the auxiliary hooks are designed with a single load path attaching point in lieu of the two load attaching points specified in NUREG-0554. However, per Appendix C of NUREG-0612, the safety factor was increased to 10:1 to compensate for the loss of the single-failure-proof feature and to equal the total safety factor for the wire rope. This is consistent with the requirements of NUREG-0612, Section 5.1.6, Paragraph 1(a) and ANSI N14.6, Section 7.2.1 for special lifting devices.

2. Paragraph 2.8 of NUREG-0554 recommends that preheat and post-weld heat treatment temperatures be provided in the weld procedures. The weldments on the existing bridge may not have received heat treatment, therefore, all accessible welds whose failure could result in the drop of a critical load will be non-destructively examined. The non-destructive examination will be a surface examination and will look specifically for cracks.

3. Since the material properties which determine brittle-fracture tendencies are not available for the existing bridge structure, a coldproof test will be performed in accordance with the alternative method proposed in Section 2.4 of NUREG-0554. The coldproof test will be followed by non-destructive examination of all accessible welds whose failure could result in the drop of a critical load. The non-destructive examination will be a surface examination and will look specifically for cracks.

II. TECHNICAL SPECIFICATION CHANGE REQUEST

A. DESCRIPTION OF CHANGES

The proposed change to Technical Specification 3/4.9.7 involves modifying the Limiting Condition for Operation to allow the use of a single-failure-proof spent fuel cask handling crane to move loads in excess of 1600 lbs over fuel assemblies in the storage pool. The surveillance requirement will also be modified to eliminate load weight verification when the single-failure-proof crane is in use. New surveillance requirements are added to visually inspect the operability of lifting devices, and to perform pre-operational and periodic tests and preventive maintenance. The bases section of the technical specification is changed to reflect the use of a single-failure-proof crane that meets the requirements of NUREG-0554 and NUREG-0612.

Technical Specification 3/4.9.13 and its bases are deleted.

B. REQUESTED CHANGE

Change pages 3/4 9-7, 3/4 9-16, B3/4 9-2, and B3/4 9-3 of Unit 1 and Unit 2 Technical Specifications as shown on the marked-up pages in Attachment 4.

C. JUSTIFICATION

The existing technical specification restrictions are no longer required for a single-failure-proof crane (see Section I). The restriction imposed by Technical Specification 3/4.9.7, prohibiting loads in excess of 1600 lbs from travel over fuel assemblies in the storage pool, would be unnecessary following installation of a single-failure-proof crane. The addition of the new surveillance requirement, Technical Specification 4.9.7.2 is in accordance with Section 6.2 of NUREG-0612. Technical Specification 4.9.7.3 is added to assure the maintenance of the single-failure-proof feature of the modified crane system.

The proposed technical specification amendment in conjunction with the single-failure-proof upgrade of the spent fuel cask handling crane will facilitate the inspection and transfer of spent fuel to the ISFSI when it becomes operational.

D. DETERMINATION OF NO SIGNIFICANT HAZARDS

The proposed changes have been evaluated against the standards in 10 CFR 50.92 and have been determined to involve no significant hazards considerations, in that operation of the facility in accordance with the proposed amendment would not:

(1) involve a significant increase in the probability or consequences of an accident previously evaluated.

With a single-failure-proof crane, the probability of an accidental load drop while handling heavy loads over the spent fuel has been accepted to be insignificant in NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants." The spent fuel cask crane currently meets the evaluation criteria of Section 5.1 of NUREG-0612 through Technical Specification restrictions, mechanical stops, and electrical interlocks in conjunction with a spent fuel cask drop analysis (Alternate 3, Section 5.1.2 of NUREG-0612). Under the proposed amendment, the evaluation criteria of Section 5.1 will be met with a single-failure-proof crane that satisfies the guidelines of Section 5.1.6 of NUREG-0612 (Alternate 1). A fault tree evaluation performed by NRC to establish the bases for NUREG-0612 guidelines shows the potential for unacceptable consequences is comparable for these alternatives. Therefore, the proposed amendment will not involve a significant increase in the probability or consequences of an accident previously evaluated.

(2) create the possibility of a new or different type of accident from any accident previously evaluated.

The proposed change will allow the handling of loads in excess of 1600 lbs over the fuel assemblies in the storage pool which is an area previously off limits for such loads. It will also allow the movement of heavy loads up to the maximum critical load rating of the main hoist (125 ton) which is more than the 35 ton spent fuel cask that has been previously shown to cause actual punching shear stress to the spent fuel pool floor, if dropped from a height of 42.5 ft. (3.5 ft. in the air, 39 ft. in the water). However, the single-failure-proof design will eliminate the need to address drops in the previously restricted areas. Further the capability of a single-failure-proof crane to handle heavy loads has been accepted as the equivalent in overall risk to the currently established heavy load controls of a non single-failure-proof crane. Therefore, operation of the facility in accordance with the proposed amendment, will not create the possibility of a new or different kind of accident from any accident previously evaluated.

(3) involve a significant reduction in a margin of safety.

The four alternative guidelines provided in Section 5.1.2 of NUREG-0612 for the spent fuel pool area have been shown to provide an essentially equivalent level of safety. In addition, heavy load handling operations at Calvert Cliffs continues to meet the seven general defense-in-depth guidelines of Section 5.1.1. Therefore, operation of the facility in accordance with the proposed amendment, will not involve a significant reduction in a margin of safety.

In the March 6, 1986, Federal Register Notice, the NRC listed examples of changes which are considered not likely to involve significant hazards considerations. Example (iv) from this list states:

"A relief granted upon demonstration of acceptable operation from an operating restriction that was imposed because acceptable operation was not yet demonstrated. This assumes that the operating restriction and criteria to be applied to a request for relief have been established in a prior review and that it is justified in a satisfactory way that the criteria have been met."

The proposed amendment is similar to the above example in that Section 5.3 of NUREG-0612, "Safety Evaluation" considers restrictions imposed by technical specifications, comparable to Combustion Engineering Standard Technical Specification 3.9.7 (NUREG-0212), to be interim measures for operating plants without a single-failure-proof overhead crane in the fuel storage pool area. The proposed change to the technical specification would modify these "interim restrictions" based on the fact that the installation of the single-failure-proof crane would make the current restrictions unnecessary to ensure the safe handling of heavy loads over the spent fuel pool. Accordingly, we believe that the proposed amendments to Operating License Nos. DPR-53 and DPR-69 do not constitute a significant hazards consideration.

F. SAFETY COMMITTEE REVIEW

The proposed change to the Technical Specifications and our determination of significant hazards have been reviewed by our Plant Operations and Safety Review Committee and Off-Site Safety Review Committee, and they have concluded that implementation of this change will not result in an undue risk to the health and safety of the public.

Very truly yours,

STATE OF MARYLAND :
: TO WIT :
COUNTY OF CALVERT :

I hereby certify that on the 2nd day of July, 1991, before me, the subscriber, a Notary Public of the State of Maryland in and for Calvert County, personally appeared George C. Creel, being duly sworn, and states that he is Vice President of the Baltimore Gas and Electric Company, a corporation of the State of Maryland; that he provides the foregoing response for the purposes therein set forth; that the statements made are true and correct to the best of his knowledge, information, and belief and that he was authorized to provide the response on behalf of said Corporation.

WITNESS my Hand and Notarial Seal.

Michelle O. Hall
Notary Public

My Commission Expires:

February 2, 1994
Date

GCC/GT/gt/ilm

Attachments: (1) Appendix B Supplement to Generic Licensing Topical Report, EDR-1
(2) Appendix C Supplement to Generic Licensing Topical Report, EDR-1
(3) Summary of Seismic Qualification Analysis for the Existing Bridge Structure
(4) Revised Technical Specification Pages
(5) References

cc: D. A. Brune, Esquire
J. E. Silberg, Esquire
R. A. Capra, NRC
D. G. McDonald, Jr., NRC
T. T. Martin, NRC
L. E. Nicholson, NRC
F. C. Sturz, NRC
R. I. McLean, DNR
J. H. Walter, PSC

ATTACHMENT 1

Appendix B Supplement to Generic Licensing Topical Report, EDR-1

Baltimore Gas and Electric Company
Docket Nos. 50-317 & 50-318
July 2, 1991

EDR-1 APPENDIX B SUPPLEMENT
SUMMARY OF PLANT SPECIFIC CRANE DATA SUPPLIED BY EDERER
FOR CALVERT CLIFFS AUXILIARY BUILDING CRANE

Regulatory Position	Topical Report Section	Information to be Provided	Specific Crane Data
C.1.a	III.C (C.1.a)	1. The actual crane duty classification of the crane specified by the applicant.	1. The crane has a Class A crane duty classification in accordance with CMAA Specification #70.
C.1.b	III.C (C.1.b)	1. The minimum operating temperature of the crane specified by the applicant	1. The trolley was designed and fabricated for a minimum operating temperature of 60 degrees F.
C.2.b	III.C (C.2.b) III.E.4	1. The maximum extent of load motion and the peak kinetic energy of the load following a drive train failure	1. Both the main and auxiliary hoists were designed such that the maximum load motion following a drive train failure is less than 1 foot and the maximum kinetic energy of the load is less than that resulting from 1 inch of free fall of the maximum critical load.
		2. Provisions for actuating the Emergency Drum Brake prior to traversing with the load, when required to accommodate the load motion following drive train failure.	2. Provisions for automatically actuating the Emergency Drum Brake prior to traversing with the load are not required since the maximum amount of load motion and kinetic energy can be accommodated by the facility design.
C.3.e	III.C (C.3.e)	1. The maximum cable loading following a wire rope failure in terms of the acceptance criteria established in Section II.C. (C.3.e)	1. The maximum cable loading following a wire rope failure in either the main or auxiliary hoist meets the maximum allowed by the acceptance criteria established in Section III.C (C.3.e).

EDR-1 APPENDIX B SUPPLEMENT
SUMMARY OF PLANT SPECIFIC CRANE DATA SUPPLIED BY EDERER
FOR CALVERT CLIFFS AUXILIARY BUILDING CRANE

Regulatory Position	Topical Report Section	Information to be Provided	Specific Crane Data
C.3.f	--	1. Maximum fleet angle	1. 3.5 degrees
		2. Number of reverse bends	2. None, other than the one between the wire rope drum and the first sheave in the load block.
		3. Sheave diameter	3. Per CMAA Specification #70
C.3.h	III.C (C.3.h) III.E.II	1. The maximum extent of motion and peak kinetic energy of the load following a single wire rope failure.	1. Both the main and auxiliary hoists were designed such that the maximum load motion following a single wire rope failure is less than one foot and the maximum kinetic energy of the load is less than that resulting from one inch of free fall of the maximum critical load.
C.3.i	III.c (C.3.i)	1. The type of load control system specified by the applicant.	1. Ederer D.C. adjustable voltage with 50:1 micro-speed capability.
		2. Weather interlocks are recommended by Regulatory Guide 1.13 to prevent trolley and bridge movements while fuel elements are being lifted and whether they are provided for this application.	2. The crane will not be used to lift fuel elements from the reactor core or spent fuel racks. Therefore, interlocks to prevent trolley and bridge movements while hoisting have not been provided.

EDR-1 APPENDIX B SUPPLEMENT
SUMMARY OF PLANT SPECIFIC CRANE DATA SUPPLIED BY EDERER
FOR CALVERT CLIFFS AUXILIARY BUILDING CRANE

Regulatory Position	Topical Report Section	Information to be Provided	Specific Crane Data
C.3.j	III.C (C.3.j)	1. The maximum cable and machinery loading that would result in the event of a high speed two blocking, assuming a control system malfunction that would allow the full breakdown torque of the motor to be applied to the drive motor shaft.	1. The Energy Absorbing Torque Limiters (EATL) were designed such that the maximum machinery load, which would result in the event of a two blocking occurs while lifting the rated load at the rated speed that allows the full breakdown torque of the motor to be applied to the drive shaft, will not exceed twice the design rated loading. In addition, the EATL designs do not allow the maximum cable loading to exceed the acceptance criteria established in Section III.C (C.3.e) during the above described two blockings.
		2. Means of preventing two blocking of auxiliary hoist, if provided.	2. The auxiliary hoist has the same X-SAM features as the main hoist to prevent two blockings and to protect the crane and load in the event that one occurs.
C.3.k	III.C (C.3.k)	1. Type of drum safety support provided.	1. The alternate design drum safety restraint shown in figure III.D.4 of EDR-1 is arranged to counter gear and brake forces as well as downward loads. These brackets act on the inside diameter of the ends of the drum. The alternate design restraint is also used for the auxiliary hoist. Since output shaft of the gear case also serves as the drum shaft, the alternate type of restraint has been extended to completely encircle the drum shell at both ends.

EDR-1 APPENDIX B SUPPLEMENT
SUMMARY OF PLANT SPECIFIC CRANE DATA SUPPLIED BY EDERER
FOR CALVERT CLIFFS AUXILIARY BUILDING CRANE

Regulatory Position	Topical Report Section	Information to be Provided	Specific Crane Data
C.3.o	--	1. Type of hoist drive to provide incremental motion.	1. 50:1 micro-speed is provided as a part of the adjustable voltage control.
C.3.p	--	1. Maximum trolley speed.	1. 30 F.P.M.
		2. Maximum bridge speed.	2. 40 F.P.M.
		3. Type of overspeed protection for the trolley and bridge drives.	3. Both the trolley and bridge drives are powered by the AC motors that can inherently not overspeed, since their maximum speed is limited by the 60 HZ line frequency. However, overspeed sensor that actuates the trolley drive brake has been provided.
C.3.q		1. Control station location.	1. The complete operating control system, including the emergency stop buttons, are located on a pendant and on a remote radio control console.
--	III.D.1	1. The type of Emergency Drum Brake used, including type of release mechanism.	1. A single pneumatically released band brake will be used in each hoist.
		2. The relative location of the Emergency Drum Brake	2. The Emergency Drum Brake engages the wire rope drum in each hoist.
		3. Emergency Drum Brake Capacity	3. The Emergency Drum Brake in each hoist has a minimum capacity of 130% of that required to hold the design rated load.

EDR-1 APPENDIX 3 SUPPLEMENT
SUMMARY OF PLANT SPECIFIC CRANE DATA SUPPLIED BY EDERER
FOR CALVERT CLIFFS AUXILIARY BUILDING CRANE

Regulatory Position	Topical Report Section	Information to be Provided	Specific Crane Data
--	III.D.2	1. Number of friction surfaces in EATL.	1. The EATLs have 21 friction surfaces, main hoist as well as aux. hoist.
		2. EATL Torque Setting.	2. The specified EATL torque setting is approximately 130% of the design rated load in each hoist.
--	III.D.3	1. Type of Failure Detection System.	1. A totally mechanical drive train continuity detector and emergency drum brake actuator have been provided in accordance with Appendix G Revision 3 of EDR-1 in each hoist.
--	III.D.5	1. Type of Hydraulic Load Equalization System.	1. In both hoists, the Hydraulic Load Equalization System includes both features described in this section.
--	III.D.6	1. Type of hook.	1. Both the main and auxiliary hooks have a single load path.
		2. Hook design load.	2. The main hook design critical lift load is 125 tons with a 10:1 factor of safety on ultimate. The auxiliary hook design load is 15 tons with a 10:1 factor of safety on ultimate.
		3. Hook test load.	3. The test load for each load path of the main hook will be 300 tons. The test load for each load path of the auxiliary hook will be 30 tons.

EDR-1 APPENDIX B SUPPLEMENT
SUMMARY OF PLANT SPECIFIC CRANE DATA SUPPLIED BY EDERER
FOR CALVERT CLIFFS AUXILIARY BUILDING CRANE

Regulatory Position	Topical Report Section	Information to be Provided	Specific Crane Data
--	III.F.1	1. Design rated load.	1. Main hoist - 150 tons. Auxiliary hoist - 15 tons.
		2. Maximum critical load rating.	2. Main hoist - 125 tons. Auxiliary hoist - 15 tons.
		3. Trolley weight (net).	3. 80,000 lbs. (including hooks).
		4. Trolley weight (with load).	4. 340,000 lbs.
		5. Hook lift.	5. Main hook - 65 feet Auxiliary hook - 68 feet
		6. Number of wire rope drums.	6. The main and the auxiliary hoists each have one wire rope drum.
		7. Number of parts of wire rope.	7. Main hoist - 8 parts per wire rope. Auxiliary hoist - 4 parts per wire rope.
		8. Drum size (pitch diameter).	8. Main hoist - 48 inches. Auxiliary hoist - 15 inches.
		9. Wire rope diameter.	9. Main hoist - 1 1/8 inch. Auxiliary hoist - 5/8".
		10. Wire rope type.	10. 6x37 class IWRC.

EDR-1 APPENDIX B SUPPLEMENT
SUMMARY OF PLANT SPECIFIC CRANE DATA SUPPLIED BY EDERER
FOR CALVERT CLIFFS AUXILIARY BUILDING CRANE

Regulatory Position	Topical Report Section	Information to be Provided	Specific Crane Data
	III.F.1	11. Wire rope material.	11. Carbon Steel - Main Stainless Steel - Aux.
		12. Wire rope breaking strength.	12. Main hoist - 143,000 lbs. Auxiliary hoist - 31,300 lbs.
		13. Wire rope yield strength.	13. Main hoist - 114,400 lbs. Auxiliary hoist - 25,040 lbs.
		14. Wire rope reserve strength.	14. Main hoist - .563 Auxiliary hoist - .570
		15. Number of wire ropes.	15. The main and auxiliary hoists each have two ropes.

ATTACHMENT 2

Appendix C Supplement to Generic Licensing Topical Report, EDR-I

Baltimore Gas and Electric Company
Docket Nos. 50-317 & 50-318
July 2, 1991

EDR-1 APPENDIX C SUPPLEMENT
SUMMARY OF REGULATORY POSITIONS TO BE ADDRESSED BY THE APPLICANT
FOR CALVERT CLIFFS NUCLEAR POWER PLANT
AUXILIARY BUILDING CRANE MODIFICATIONS

Regulatory Position	Topical Report Section	Information to be Provided	Specific Crane Data
--	III.C (C.1.b(1))	1. The extent of venting of closed box sections.	1. Closed box sections are not vented since the auxiliary building that houses the crane is not pressurized.
C.1.b(3) C.1.b(4) C.4.d	III.C (C.1.b(3)) III.C (C.1.b(4)) III.C (C.4.d)	1. The nondestructive and cold proof testing to be performed on existing structural members for which satisfactory impact test data is not available.	1. Cold proof testing will be performed on the existing bridge. The cold proof test will be followed by a nondestructive examination of all accessible welds whose failure would result in the drop of a load. The nondestructive examination will be a surface examination and will look specifically for cracks. The ambient temperature when the 125% static load test is performed will be the minimum operating temperature for the crane. In the event that the crane must be operated at a lower temperature, another 125% static proof test will be performed at the lower temperature.
C.1.c	III.C (C.1.c)	1. The extent the crane's structures, which are not being replaced, are capable of meeting the seismic requirements of Regulatory Guide 1.29.	1. The crane structures are qualified for both Operating Basis Earthquake and Design Basis Earthquake while supporting the maximum critical loads. Ref.: Seismic Analysis Report by Bechtel Power Corporation (attachment 3).

EDR-1 APPENDIX C SUPPLEMENT
SUMMARY OF REGULATORY POSITIONS TO BE
ADDRESSED BY THE APPLICANT
FOR CALVERT CLIFFS NUCLEAR POWER PLANT
AUXILIARY BUILDING CRANE MODIFICATIONS

Regulatory Position	Topical Report Section	Information to be Provided	Specific Crane Data
C.1.d	III.C (C.1.d)	1. The extent welds joints in the crane's structures, which are not being replaced, were nondestructively examined, and	1. Nondestructive examinations of the existing bridge structure were not required by existing regulations at the time of bridge construction. However, the X-SAM system provides additional overload protection, and the inspections of the existing structure described in C.1.b(3) above are adequate to ensure the structural integrity of the existing bridge.
		2. The extent the base material, at joints susceptible to lamellar tearing, was nondestructively examined.	2. The weld joint geometries used in the existing bridge structure are not considered to be susceptible to lamellar tearing.
C.1.e	III.C (C.1.e)	1. The extent the crane's structures, which are not being replaced, are capable of withstanding the fatigue effects of cyclic loading from previous and projected usage, including any construction usage.	1. The crane was not used for any over-capacity construction lifts. All past and projected use of the crane, at a maximum loading of 150 Tons, is well within the cyclic loading capability of the existing crane structure and welds.
C.1.f	III.C (C.1.f)	1. The extent the crane's structures, which are not being replaced, were post-weld heat-treated in accordance with Subarticle 3.9 of AWS D1.1, "Structural Welding Code."	1. In accordance with NUREG-0612, Appendix C, the welds whose failure could result in the drop of a critical load will be nondestructively examined. The nondestructive examination will be a surface examination and will look specifically for cracks.

EDR-1 APPENDIX C SUPPLEMENT
SUMMARY OF REGULATORY POSITIONS TO BE
ADDRESSED BY THE APPLICANT
FOR CALVERT CLIFFS NUCLEAR POWER PLANT
AUXILIARY BUILDING CRANE MODIFICATIONS

Regulatory Position	Topical Report Section	Information to be Provided	Specific Crane Data
C.2.b	III.C (C.2.b) III.E.4	1. Provisions for accommodating the load motion and kinetic energy following a drive train failure when the load is being traversed and when it is being raised or lowered.	1. Administrative procedures will be used to assure that a minimum of 1 foot of clearance is maintained between the load and surfaces that cannot withstand the kinetic energy associated with 1 inch of free fall of the load involved. The surfaces, which will support the load, are designed to withstand a minimum of 1 inch of free fall of the load involved.
C.2.c	III.C (C.2.c)	1. Location of safe laydown areas for use in the event repairs to the crane are required that cannot be made with the load suspended.	1. Drawing "A", Sheet 1, shows the laydown areas that can be used in the event that repairs to the crane are required that cannot be made with the load suspended.
C.2.d	III.C. (C.2.d)	1. Size of replacement components that can be brought into the building for repair of the crane without having to break its integrity.	1. The replacement trolley components will be brought in through the Auxiliary Building, Cask Unloading Hatch, in accordance with Drawing "A", sheet 2. This means that any trolley component can be brought in to the Auxiliary Building if needed for crane repairs.

EDR-1 APPENDIX C SUPPLEMENT
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Regulatory Position	Topical Report Section	Information to be Provided	Specific Crane Data
C.2.d	III.C. (C.2.d)	2. Location of area where repair work can be accomplished on the crane without affecting the safe shut-down capability of the reactor, and	2. Repair work, involving heavy lifts by non-single failure proof equipment, can be safely accomplished on the crane when it is positioned over the areas shown in Drawing "A", subject to the provisions therein. There are no nuclear safety restrictions on crane repairs that do not involve handling heavy components.
		3. Any limitations on reactor operations that would result from crane repairs.	3. There are no limitations on reactor operations that would result from crane repairs.
C.3.b	III.C (C.3.b)	1. The design margin and type of lifting devices that are attached to the hook to carry critical loads.	1. As an alternate to a dual load path system, the normal stress design factors have been doubled. Each lifting device attached to the hook to carry critical loads will support a load six times the static plus dynamic load being handled without permanent deformation. The safety factor is 10:1 when compared to ultimate. This is in accordance with NUREG-0612, Section 5.1.6, Paragraph 1(a) and ANSI N14.6, Section 7.2.1.

EDR-1 APPENDIX C SUPPLEMENT
SUMMARY OF REGULATORY POSITIONS TO BE
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FOR CALVERT CLIFFS NUCLEAR POWER PLANT
AUXILIARY BUILDING CRANE MODIFICATIONS

Regulatory Position	Topical Report Section	Information to be Provided	Specific Crane Data
C.3.t	III.C (C.3.t)	1. The extent construction requirements for the crane's structures, which will not be replaced, are more severe than those for permanent plant service.	1. The construction requirements for the crane were the same as for plant service.
		2. The modifications, and inspections to be accomplished on the crane following construction use, which was more severe than those for permanent plant service.	2. No special modifications or inspections were required when the carne was converted from construction use to permanent plant service, since the requirements for both types of service were the same.
C.3.u	--	1. The extent of installation and operating instructions.	1. The installation and operating instructions will be updated by Ederer to fully comply with the requirements of section C.3.u of Regulatory Guide 1.104 and Sections 7.1 and 9 of NUREG-0554.

EDR-1 APPENDIX C SUPPLEMENT
SUMMARY OF REGULATORY POSITIONS TO BE
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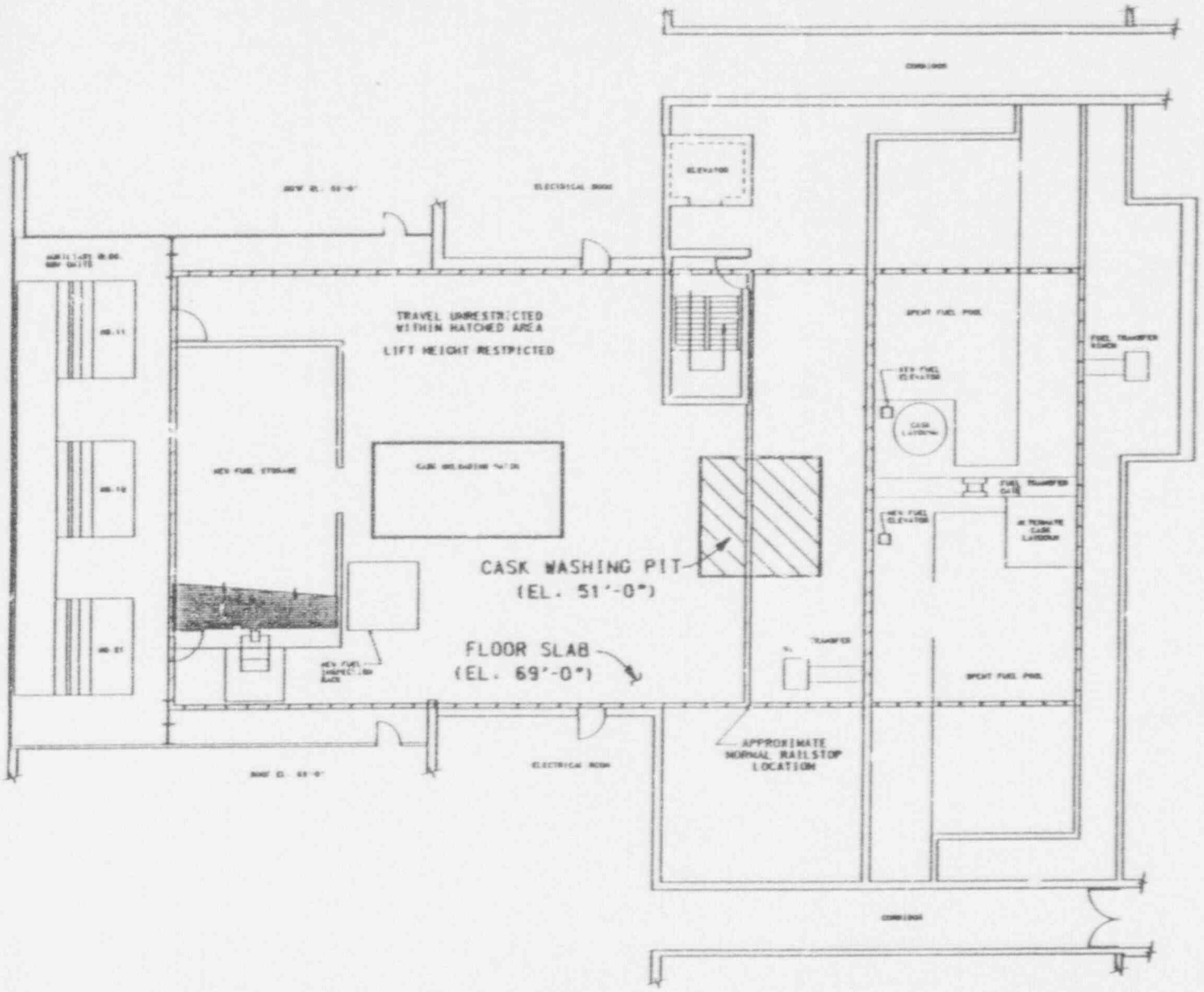
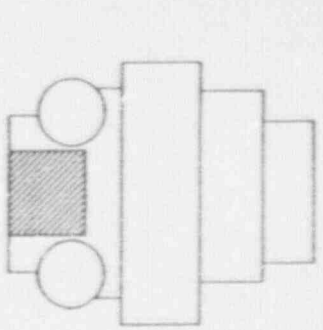
FOR CALVERT CLIFFS NUCLEAR POWER PLANT
AUXILIARY BUILDING CRANE MODIFICATIONS

Regulatory Position	Topical Report Section	Information to be Provided	Specific Crane Data
C.4.a C.4.b C.4.c C.4.d	--	1. The extent of assembly checkout, test procedures, load testing and rated load marking of the crane.	1. Prior to handling critical loads, the crane will be given a complete assembly and operational checkout by Ederer, and then given a no load test of all motions in accordance with updated procedures provided by Ederer. A 125% static load test and a 100% performance test will also be performed at this time in accordance with updated test procedures provided by Ederer. A two blocking test will be performed by Ederer prior to delivery of the crane per Topical Report EDR-1. The maximum Critical Load is plainly marked on each side of the crane.
C.5.d	III.C(C.5.a)	1. The extent the procurement documents for the crane's structures, which will not be replaced, required the crane manufacturer to provide a quality assurance program consistent with the pertinent provisions of Regulatory Guide 1.28.	1. The procurement documents for the existing bridge structure did not invoke 10CFR50 Appendix B, since the bridge was built prior to the issuance of this federal regulation. However, the bridge was built to the crane manufacturer's quality control process in effect at the time of construction. Quality assurance provisions denoted in procurement specifications for the existing crane covered such items as design control, material selection, and inspection and testing.



AUXILIARY BLDG. EL. 69'-0"

DRAWING A, SH. 1

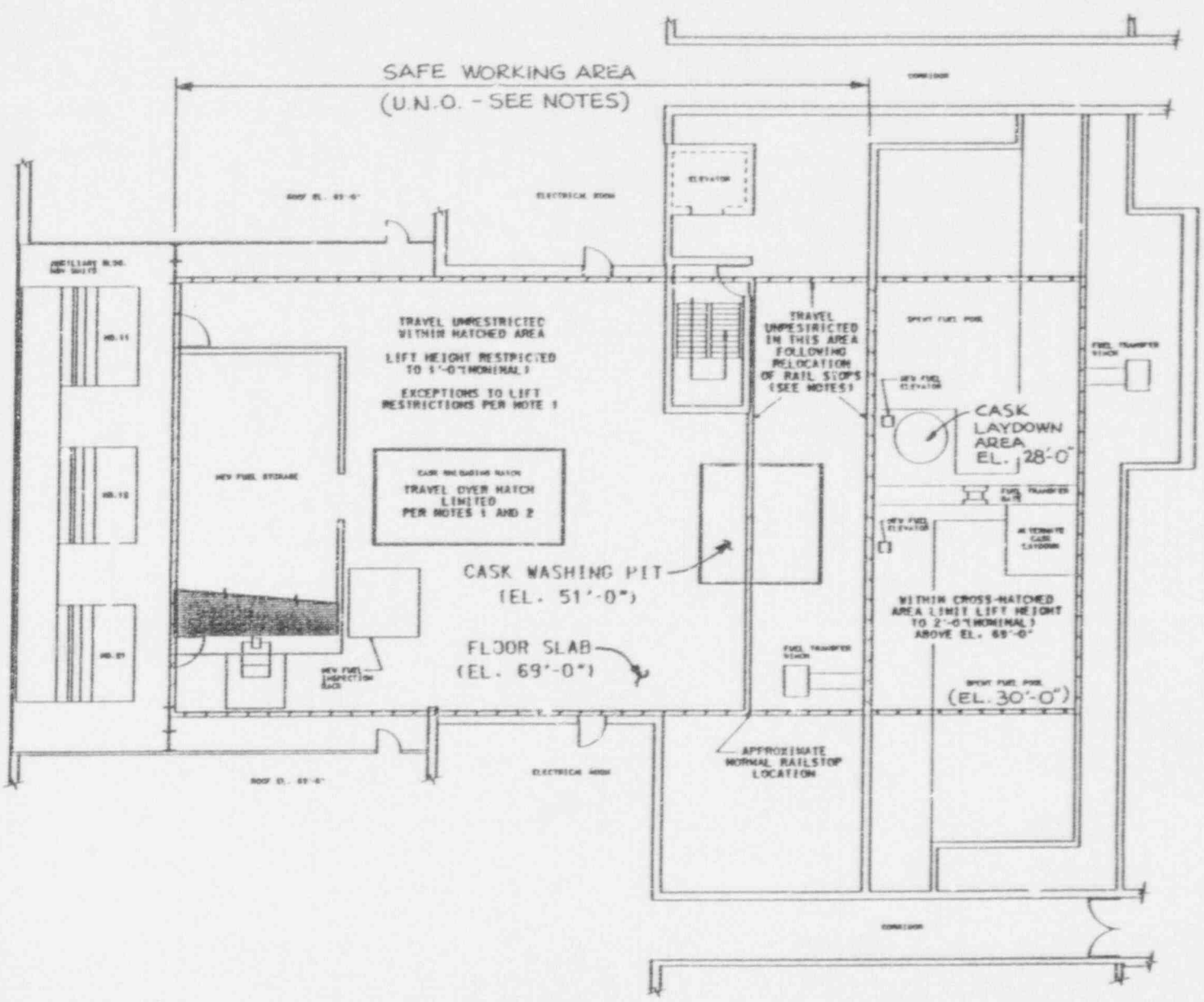


KEY PLAN

NOTE:

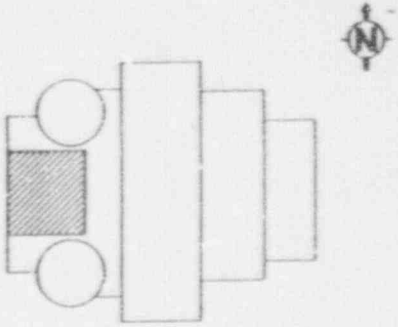
THIS DRAWING DEFINES THE SAFE LAYDOWN AREA FOR "HEAVY LOADS" SUSPENDED FROM THE SPENT FUEL CASK HANDLING CRANE AFTER THE CRANE HAS LOST SINGLE-FAILURE-PROOF CAPABILITY. A HEAVY LOAD IS DEFINED AS ANY LOAD GREATER THAN 1600 POUNDS PER NUREG 0612. THE SAFE LAYDOWN AREA IS LIMITED TO THE CASK WASHING PIT AT EL. 51'-0".

LAYDOWN AREA TO PLACE LOAD FOLLOWING LOSS OF SPENT FUEL CASK HANDLING CRANE'S SINGLE-FAILURE-PROOF CAPABILITY



AREA TO PARK CRANE AND PERFORM REPAIRS AFTER CRANE HAS LOST SINGLE-FAILURE-PROOF CAPABILITY

DRAWING A, SH. 2



KEY PLAN

NOTES:

1. THE PURPOSE OF THIS DRAWING IS TO SHOW THE AREA TO PARK THE SPENT FUEL CASK HANDLING CRANE AFTER THE CRANE HAS LOST SINGLE-FAILURE-PROOF CAPABILITY AND REPAIRS NEED TO BE MADE. LIFTS REQUIRED TO MAKE REPAIRS MAY BE PERFORMED WITH NON SINGLE-FAILURE-PROOF CRANE SUBJECT TO RESTRICTIONS PROVIDED ON THE DRAWING AND IN THE FOLLOWING NOTES:

   a. FOR LOADS CARRIED OVER FLOOR AREA WEST OF SPENT FUEL POOL, LIFT HEIGHT IS RESTRICTED AS FOLLOWS:

      ≤ 14,000# -18'-0" (NOMINAL)
      ≤ 50,000# - 3'-6" (NOMINAL)
      ≥ 50,000# - 1'-6" (NOMINAL)

      ANY LIFT OVER 1'-6" (NOMINAL) REQUIRES APPROVAL OF APPROPRIATE AUTHORITY. LOADS SHOULD BE CARRIED AS LOW AS PRACTICAL.

   b. RAISING, LOWERING, OR TRAVELING LOADS OVER THE UNLOADING HATCH AREA IS TO BE AVOIDED. LOAD ≥ 6000# REQUIRE APPROVAL OF APPROPRIATE AUTHORITY.

2. REFER TO SHEET 1 FOR LOCATION OF LAYDOWN AREA TO USE FOR PLACEMENT OF LIFTED LOAD FOLLOWING LOSS OF SINGLE-FAILURE-PROOF CAPABILITY.

ATTACHMENT 3

Summary of Seismic Qualification Analysis for the Existing Bridge Structure

Baltimore Gas and Electric Company
Docket Nos. 50-317 & 50-318
July 2, 1991

"SEISMIC EVALUATION OF SPENT FUEL CASK HANDLING CRANE"

Calvert Cliffs must modify and upgrade its Auxiliary Building Crane for the Independent Spent Fuel Storage Installation (ISFSI). This will be accomplished by replacing the existing Whiting trolley with an Ederer X-SAM single failure proof trolley. Compliance with the requirements of NUREG 0554 (Single Failure Proof Crane for Nuclear Power Plants) must be demonstrated through appropriate testing and analysis of the new trolley and modifications to the bridge structure.

Requirements for the upgrade include a seismic analysis to be performed on the existing bridge structure, the trolley main and auxiliary girts, the trolley end trucks and the wire ropes. In order to satisfy these requirements, the following analyses were performed and tabulated as outlined below:

- o response spectrum seismic analysis using response spectra as outlined in BG&E Specification SP-601;
- o stress analysis of the main and auxiliary trolley girders and end trucks as proposed by Ederer, Incorporated;
- o stress analysis of the existing bridge structure;
- o tables of seismic member end forces for the trolley and wire rope loads; and
- o tables of accelerations along the bridge girders and trolley.

The seismic and stress analyses were performed in accordance with the project's current licensing basis and governing specifications standards and design codes as follows:

- o Calvert Cliffs Nuclear Power Plant Final Safety Analysis Report (FSAR);
- o BG&E Specification SP-601, Modification of Spent Fuel Cask Crane;
- o NRC NUREG 0554, "Single Failure Proof Cranes for Nuclear Power Plants"; and
- o CMAA Specification No. 70.

Design parameters considered in the seismic analysis include:

- o bridge girder positions along the runway girders, including differential building movements across isolation and expansion joints;
- o trolley positions at the end, quarter span, and mid-span of the bridge girder;
- o high hook and low hook lift positions;
- o variations in the lifted load from 0 kips to 300 kips; and
- o limitations on accelerations based on available wheel friction restraint.

The analysis consists of a three dimensional finite element, spectrum analysis using the verified Bechtel computer program BSAP. A schematic plan of the trolley assembly, existing bridge girder assembly, and adjacent structural steel is provided.

The analysis uses an average for the required response spectra (RRS) at elevations 69'-0" and 117'-0" as provided in Bechtel Calculation C-1007.1, Rev. 1. Worst case horizontal and vertical directions are assumed to act simultaneously per the project FSAR. Modes have been combined by the square-root of the sum of the squares (SRSS) method except for closely spaced modes, which have been combined by the absolute sum method.

The results of the analysis show that stresses for all original bridge structure members were determined to be within allowable stresses except for the bridge girders, trolley rail anchorage clips, and end tie bolted connections.

The original bridge girder was determined to have an overstress at its center span and thus must be modified. The trolley rail clips and end tie bolted connections were also determined to have overstress conditions and also require modifications. Proposed modifications will be evaluated and implemented.