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SUBJECT: Application for amends to licenses DPR-80 & DPR-82, revising
TS 6.8.4f, to control operation of containment polar cranes
in jet impingement zones.

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Gregory M. Rueger
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September 11, 1998

PG&E Letter DCL-98-113



U.S. Nuclear Regulatory Commission
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Washington, DC 20555

Docket No. 50-275, OL-DPR-80
Docket No. 50-323, OL-DPR-82
Diablo Canyon Units 1 and 2
License Amendment Request 98-07
Revise Technical Specification 6.8.4f., "Containment Polar and Turbine Building Cranes"

Dear Commissioners and Staff:

Enclosed is an application for amendment to Facility Operating License Nos. DPR-80 and DPR-82 pursuant to 10 CFR 50.90. This license amendment request (LAR) proposes to revise Technical Specification (TS) 6.8.4f., "Containment Polar and Turbine Building Cranes," to control the operation of the containment polar cranes in jet impingement zones.

A description of the proposed TS change, and the basis for the change, are provided in Attachment A. The proposed TS change is noted on the marked up copy of the current TS page provided in Attachment B. The proposed new TS page is provided in Attachment C. This LAR also impacts a TS page included in LAR 97-09, "Technical Specification Conversion License Amendment Request," dated June 2, 1997. A marked up copy of the affected page of LAR 97-09 is included in Attachment D.

The change does not involve a significant hazards consideration, as defined in 10 CFR 50.92, or an unreviewed environmental question. Further, there is reasonable assurance that the proposed change will not adversely affect the health and safety of the public.

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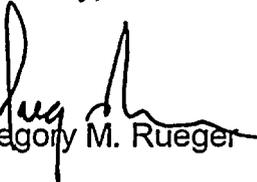




The proposed change is required to provide Diablo Canyon Power Plant, Units 1 and 2, operational flexibility to use the containment polar crane in Modes 1 through 4. Therefore, PG&E requests that the NRC complete its review and approval of this LAR on a medium priority.

PG&E requests that the proposed TS change become effective immediately upon issuance of the license amendment.

Sincerely,



Gregory M. Rueger

cc: Edgar Bailey, DHS
Steven D. Bloom
Dennis F. Kirsch
Ellis W. Merschoff
David L. Proulx
Diablo Distribution

Enclosure

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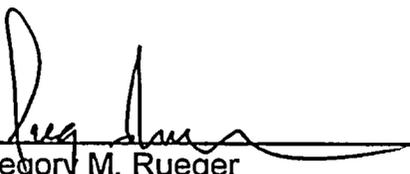


UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

_____)	Docket No. 50-275
In the Matter of)	Facility Operating License
PACIFIC GAS AND ELECTRIC COMPANY)	No. DPR-80
)	
Diablo Canyon Power Plant)	Docket No. 50-323
Units 1 and 2)	Facility Operating License
_____)	No. DPR-82

AFFIDAVIT

Gregory M. Rueger, of lawful age, first being duly sworn upon oath says that he is Senior Vice President - Nuclear Power Generation of Pacific Gas and Electric Company; that he has executed LAR 98-07 on behalf of said company with full power and authority to do so; that he is familiar with the content thereof; and that the facts stated therein are true and correct to the best of his knowledge, information, and belief.

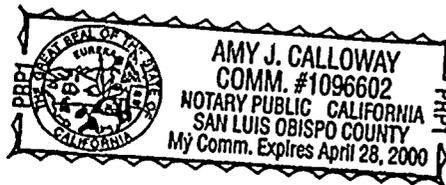


Gregory M. Rueger
Senior Vice President
Nuclear Power Generation

Subscribed and sworn to before me this 11th day of September 1998.
County of San Luis Obispo
State of California



Notary Public





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**REVISE TECHNICAL SPECIFICATION 6.8.4f.,
"CONTAINMENT POLAR AND TURBINE BUILDING CRANES"**

A. DESCRIPTION OF AMENDMENT REQUEST

This license amendment request (LAR) proposes to revise Technical Specification (TS) 6.8.4f., "Containment Polar and Turbine Building Cranes."

The proposed change would replace the word "position" with the words "parking location," and add the following language:

The procedures will control the operation of the containment polar cranes in jet impingement zones.

The proposed change will allow polar crane operation in jet impingement zones. It does not change the polar crane parking location restrictions, which prohibit parking the polar crane in jet impingement zones where it would be subject to jet impingement loads.

The proposed change is provided on the marked up copy of the current TS page in Attachment B. The proposed new TS page is provided in Attachment C. A marked up copy of the improved TS page submitted as part of LAR 97-09, "Technical Specification Conversion License Amendment Request," is included in Attachment D.

B. BACKGROUND

The polar crane is a cantilever gantry type crane. The function of the polar crane is lifting and handling the reactor vessel head and reactor internals assemblies during refueling operations and to assist in routine maintenance of other systems and equipment. The outline and configuration of major structural elements of the polar crane are shown in Figure 1, "Containment Polar Crane Location and Arrangement Inside Containment."

Design Background

The polar crane has no safety-related function; however, its structural elements are classified Design Class I. Its structure was classified as Design Class I to preclude consequential damage to the containment structure or safety-related components inside containment caused by the failure of the polar crane.

Polar crane qualification to Design Class I requirements did not qualify it to withstand the combined seismic load and jet impingement load required by the deterministic engineering method for qualifying a safety-related structure. Since



the polar crane is not qualified for combined seismic and jet impingement loads, it is parked outside the jet impingement zones shown on Figure 2, "CFCU Load Path Through Jet Impingement Zones." This limitation is incorporated into the administrative controls for polar crane operation.

Licensing Background

Supplemental Safety Evaluation Report (SSER) 32, Section 8.3, stated:

"As a result of its review of the Diablo Canyon Unit 1 and Unit 2 Technical Specifications, the staff determined that specifications should be included for the polar crane in the containment buildings ... or appropriate justification should be provided for not including them."

"At this time, the parking location for the polar crane is restricted to preclude jet impingement from a postulated pipe rupture. This restriction should be included in the specifications or PG&E shall demonstrate that the crane can withstand the jet impingement forces from a postulated pipe rupture."

The NRC letter from G. W. Knighton to J. D. Shiffer, dated July 26, 1985, requested that PG&E submit a LAR to include containment polar and turbine building crane operating restrictions in the TS. It reiterated the statements made in SSER 32. The NRC staff also stated that "in the interim, we find the administrative procedures adequate" to control the parking location of the polar cranes. The administrative procedure in effect at the time was Maintenance Procedure M-50.15, Rev. 0, "Plant Crane Operating Restrictions," dated March 22, 1985. It stated: "Do not park crane in an area, as defined in Attachment 3, where it would be exposed to jet impingement loads with the Plant operating in Modes 1 thru 4."

LAR 85-14, "Technical Specification 6.8.4.f, Containment Polar and Turbine Building Cranes Program Requirements," dated November 25, 1985, was submitted to comply with PG&E's commitment in DCL 85-259, dated July 30, 1985, regarding the NRC staff request that PG&E submit a LAR to include operating restrictions for the containment polar crane in the TS.

License Amendments (LA) 21 and 20, dated September 18, 1987, revised the TS as requested by LAR 85-14. LAs 21 and 20 added TS 6.8.4f., "Containment Polar and Turbine Building Cranes." TS 6.8.4f. requires:

"A program which will ensure that: 1) the position of the containment polar cranes precludes jet impingement from a postulated pipe rupture; and 2) the operation of the turbine building cranes is consistent with the restrictions associated with the current Hosgri seismic analysis of the turbine building. This program shall include the following:



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- 1) Training of personnel, and
- 2) Procedures for the containment polar and turbine building cranes operation.”

The NRC staff safety evaluation, related to these LAs, recognized crane operation had been previously reviewed by the NRC staff as reported in SSERs 7, 8, 9, and 32. SSERs 7, 8, and 9 evaluated Hosgri seismic design issues. SSER 32 evaluated the TS as noted above. The NRC staff found the proposed TS 6.8.4f. acceptable based upon it being “responsive to the staff’s request in that it provides for training of personnel and procedures for the operation of the cranes within the limits of the staff accepted analysis for the cranes.”

Thus, the current license basis for polar crane operation is TS 6.8.4f., which was promulgated to ensure:

1. The parking location for the polar crane is restricted to preclude jet impingement.
2. Operation of the polar crane is within the limits of the staff accepted analysis for the cranes.

C. JUSTIFICATION

This LAR would provide Diablo Canyon Power Plant (DCPP) operational flexibility to use the polar cranes in Modes 1 through 4. It would clarify that the polar cranes may be operated in jet impingement zones for work activities that may require their use (e.g., moving heavy loads or replacing containment lights).

D. SAFETY EVALUATION

High Energy Line Break and Jet Impingement

A high energy line break (HELB) is a rupture or crack in a piping system whose normal operating temperature and/or pressure exceed 200°F or a pressure above 275 psig for more than 1 percent of the operational lifetime of the plant. A number of potential hazards may be created by a postulated HELB (e.g., jet impingement and pipe whip).

These effects can damage structures, systems, and components important to safety. Therefore, the overall purpose of HELB analysis is to ensure that, following a postulated HELB, the plant can be placed in a safe shutdown condition. Furthermore, limitations are imposed to prevent against propagation of postulated breaks to other lines and systems that could increase the severity of a loss of coolant beyond the capability of core cooling systems.



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NRC Generic Letter (GL) 87-11 relaxed the requirements relating to arbitrary intermediate pipe ruptures, such that, all intermediate pipe breaks that could impinge upon the polar crane have been eliminated at DCPP. The only remaining breaks postulated are at the terminal end or nozzle weld breaks. These breaks would induce a jet straight up in a conical pattern above the main steam line steam generator (SG) nozzles, and toward the crane wall penetration in a conical jet originating at the feedwater SG nozzles. The elimination of the intermediate breaks limits the potential damage and probability of the breaks occurring in relation to the original line break analysis. Thus, the feedwater and main steam line SG nozzle breaks are the only credible high energy lines that could impinge on the polar crane.

Feedwater Line Steam Generator Nozzle Integrity

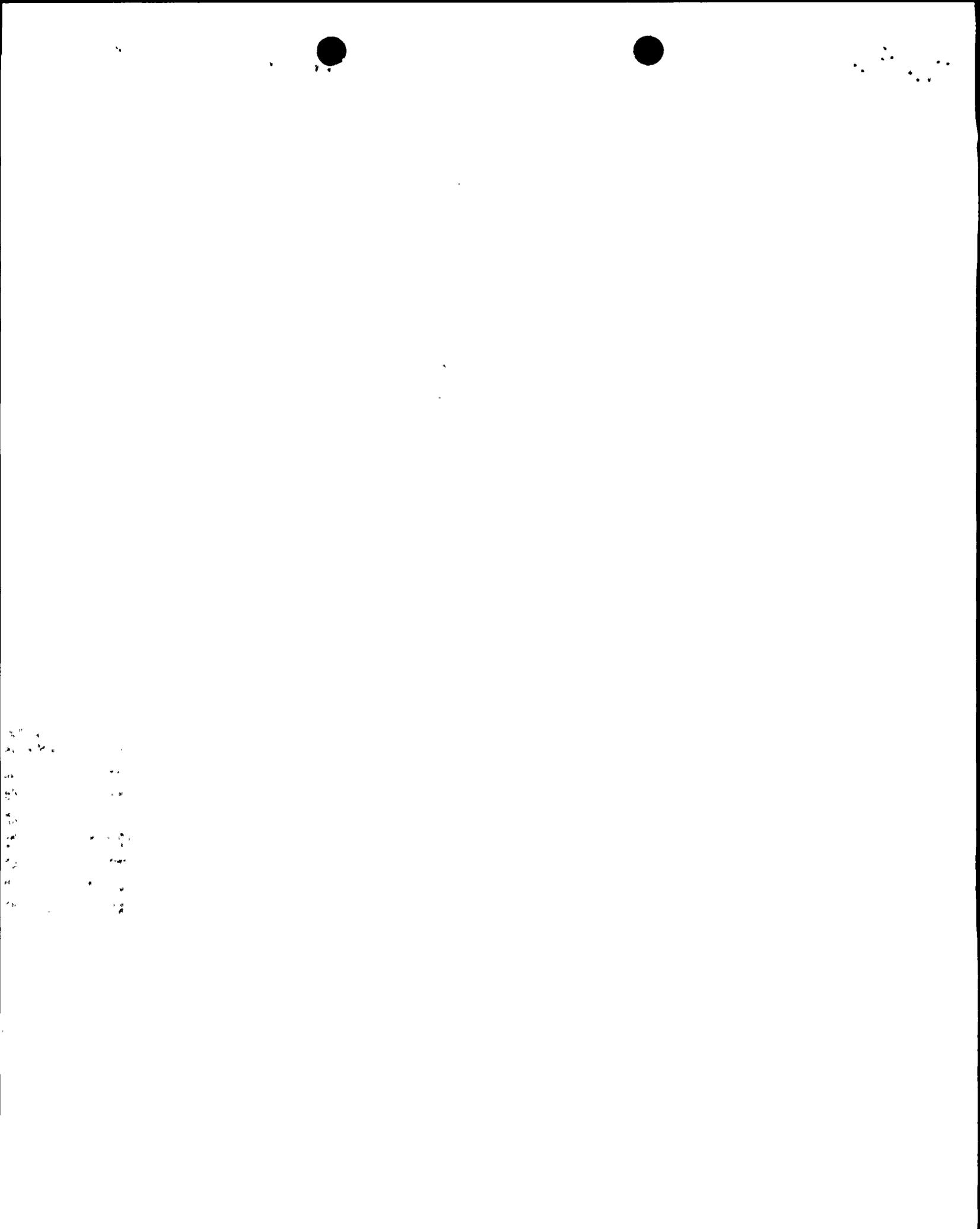
PG&E has replaced the feedwater nozzles due to auxiliary feedwater (AFW) thermal cyclic cracks discovered in the Unit 1 fifth refueling outage inspections. The nozzles and welds were replaced in the Unit 1 sixth refueling outage and 100 percent preservice inspection was performed. As a conservative step, PG&E also established a weld inspection program for these welds consisting of ultrasonic testing (UT) and visual inspections of one SG every other outage. The first such inspection was performed in the Unit 1 eighth refueling outage on SG 1-3 and was found acceptable with no reportable indications. In addition, the normal Inservice Inspection Program performs UT and visual exams of selected feedwater piping and welds. All inspections to date have been acceptable.

The root cause of the thermal cyclic cracking was established to be AFW cycles where cold water from the AFW system is pumped into the hot SG leading to high stresses at the nozzle welds. As a result of this cracking, PG&E has established a program of monitoring and minimizing the thermal cycles caused by AFW.

The result of these inspections and monitoring programs is that the condition of the feedwater nozzles and welds is well known and the material condition well maintained. Therefore, the probability of a feedwater break occurring is minimized.

Main Steam Line SG Nozzle Integrity

Main steam line welds are inspected in accordance with the DCPP ASME Section XI IST Program. Specifically, main steam line welds fall under examination category C-F-2, item number C5.50. In order to meet the requirements of this weld category of ASME Section XI, a sample of welds, which include a minimum of 7.5 percent but not less than 28 welds, is selected each 10 year inspection interval and inspected regularly. The current sample of welds are not the main steam line SG nozzle locations that result in jet



impingement on the containment polar crane. However, they are similar welds and they are representative of the welds that could result in jet impingement on the containment polar crane.

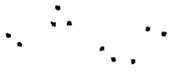
DCPP is in its second 10 year inspection interval and there are more welds selected in this interval than in the first interval. There is one main steam line SG nozzle weld selected on SG 1- 4 as part of this sample and several welds near the SG on each of the main steam lines. This inspection includes both surface and volumetric examinations (magnetic particle and ultrasonic examinations). Additionally, there were baseline radiographs performed on all the main steam line welds, including the nozzle welds, during the preservice period.

The inspection results have confirmed the integrity of the main steam line welds. Therefore, the chance of a main steam line break occurring is minimized.

Probabilistic Risk Assessment (PRA)

PG&E evaluated a dropped load scenario considering operation of the polar crane and a loss of offsite power. The core damage frequency (CDF) for this scenario is $8.6E-8$ per year assuming the dropped load damages a component that exacerbates the event and leads to core damage. The dropped load scenario PRA provides a reference for comparison for the HELB scenario PRA associated with the proposed change.

The proposed change to control the operation of the polar cranes in jet impingement zones does not affect the probability of a postulated pipe rupture or HELB, but it does affect the probability that the polar crane may be subject to jet impingement. PG&E evaluated a HELB scenario for CDF considering operation of the polar crane in jet impingement zones. A postulated HELB would have to damage the crane or cause its load to drop in a manner that damages a component that exacerbates the HELB event and leads to core damage. The PRA evaluation for this scenario concluded the CDF is $1.6E-9$ per year. It is not a significant increase in CDF compared to never operating the polar crane in jet impingement zones. It is nonrisk significant when compared to the industry standard threshold for risk significance, which is $1E-6$ per year.



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Factors that further lower the probability of the above scenario include:

1. The movement of a heavy load will be done in accordance with the DCPP Heavy Loads Program. This program provides assurance that a dropped load would not lead to core damage.
2. The polar crane has been evaluated to withstand jet impingement loads without the seismic loads. Therefore, the polar crane would not fail due to a HELB event. There would be no consequential failures that could lead to core damage.

Compensatory Measures

The following guidance will be included in the procedures that control the operation of the polar crane while in Modes 1 through 4. They are compensatory measures that help manage the risk of CDF.

1. Polar crane operation will be controlled to maintain CDF nonrisk significant.
2. The polar crane will be positioned outside jet impingement zones while it is not involved in a lift or move activity.
3. The polar crane operator will remain on station while the polar crane is in jet impingement zones.
4. Both offsite power sources will be verified operable and maintenance in the switchyard will not be allowed during polar crane operation in jet impingement zones.

Based on the robust design and material condition of the feedwater and main steam lines, compensatory measures, and the fact that the change does not involve a significant increase in risk, there is reasonable assurance that the health and safety of the public will not be affected by the proposed change.

Need for Polar Crane Operation in Jet Impingement Zones

A hypothetical work plan to illustrate how the polar crane could be operated in jet impingement zones is similar to the proposed activities to move a heavy load such as a containment fan cooler unit (CFCU) motor from containment. The heavy load evaluation for these activities in containment during Modes 1 through 4 would require no back-face spalling, shear, or flexural failure of the floor structures. This would ensure no secondary missile generation, no consequential damage to safe shutdown components, and no unreviewed safety questions.

In the hypothetical work plan for the CFCU motor move, the load path using the polar crane is illustrated in Figure 2, "CFCU Load Path Through Jet Impingement Zones." The major work activities include:

1. Move the polar crane through the jet impingement zones to align the auxiliary hook over the CFCU eye bolts.
2. Rig the CFCU motor for lifting.
3. Lift the CFCU motor complying with heavy load evaluation lift height restrictions and move it to its cart.
4. Move the CFCU motor and cart through the jet impingement zones to the personnel hatch area.
5. Move the CFCU motor and cart out of containment.

The Plant Safety Review Committee (PSRC) would review and approve the procedure and the associated 10 CFR 50.59 safety evaluation for these types of work activities.

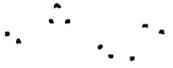
Diablo Canyon Heavy Loads Program

PG&E's plans and capabilities to handle heavy loads at DCPD are described by and are consistent with PG&E's submittals made in response to NUREG-0612. The program consists of identification of cranes, hoists, and monorails that could carry heavy loads; identification of safe load paths, procedures for handling heavy loads; crane operator training; and equipment inspection, testing, maintenance, and design.

PG&E's responses to NUREG-0612 and NRC Bulletin 96-02 state that in the unlikely event that it became necessary to lift a heavy load with the polar crane during Modes 1 through 4, the specific lift would be approved by the PSRC as complying with the guidelines of NUREG-0612. Any such heavy load handling activities would be reviewed under 10 CFR 50.59, as appropriate, and prior approval by the NRC would be sought, as necessary.

Part of the evaluation for heavy load handling activities, undertaken by PG&E to ensure compliance with NUREG-0612, is a structural analysis and evaluation of building floors subjected to the postulated heavy load drop. PG&E Design Criteria Memorandum (DCM) C-58, Revision 0, "Structural Analysis & Evaluation of Building Floors Subjected to Accidental Drop of Heavy Loads Diablo Canyon Nuclear Power Plant - Units 1 & 2," provides the methodology and evaluation criteria for generic and bounding evaluations of load-drop resisting capability of impacted floor structures.

DCM C-58 evaluation criteria for reinforced concrete floor structures require a determination of resistance to local perforation, resistance to back-face spalling, and overall structural resistance against shear or flexural failure. These evaluation criteria were used in the original load drop evaluations that were



submitted as part of PG&E's response to NUREG-0612. The minimum concrete thickness to preclude back-face spalling is taken as the calculated thickness at the threshold of spalling plus the lesser of 25 percent of this thickness or 10 inches. These criteria are based on the "Design of Structures for Missile Impact," Bechtel Power Corporation, Topical Report BC-TOP-9A, Revision 2, September 1974. Shear or flexure failure acceptance criteria are based on either an energy-balance or dynamic response method.

EG&E Idaho, Inc., under a technical assistance contract with the NRC, prepared the Draft Technical Evaluation Report (TER), "Control of Heavy Loads at Nuclear Power Plants Diablo Canyon Unit 1 (Phase II)," published October 1983. This TER summarized PG&E's DCM C-58 "intervening floors" methodology and concluded that it was consistent with NUREG 0612, Article 5.1.5 (2). Article 5.1.5(2) provided an alternate heavy load drop methodology that credited intervening floors if the load drop did "not penetrate the ceiling or cause spalling that could cause failure of the safe shutdown equipment." This methodology is used by PG&E for heavy load drop evaluations in containment during Modes 1 through 4.

Heavy load drop evaluations, for movement of a heavy load in containment during Modes 1 through 4, that meet DCM C-58 evaluation criteria, do not result in:

1. Secondary missile generation.
2. Consequential damage to safe shutdown components.
3. Unreviewed safety questions.

Heavy load drop evaluations, for movement of a heavy load in containment during Modes 1 through 4, that do not meet DCM C-58 evaluation criteria are considered a potential unreviewed safety question. PG&E will then initiate discussions regarding the potential for an unreviewed safety question with the NRC staff prior to moving the heavy load.

E. NO SIGNIFICANT HAZARDS EVALUATION

PG&E has evaluated the no significant hazards considerations (NSHC) involved with the proposed amendment, focusing on the three standards set forth in 10 CFR 50.92(c) as set forth below:

"The commission may make a final determination, pursuant to the procedures in paragraph 50.91, that a proposed amendment to an operating license for a facility licensed under paragraph 50.21(b) or paragraph 50.22 or for a testing facility involves no significant hazards considerations, if operation of the facility in accordance with the proposed amendment would not:



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- (1) *Involve a significant increase in the probability or consequences of an accident previously evaluated; or*
- (2) *Create the possibility of a new or different kind of accident from any accident previously evaluated; or*
- (3) *Involve a significant reduction in a margin of safety."*

The following evaluation is provided for the NSHC.

1. *Does the change involve a significant increase in the probability or consequences of an accident previously evaluated?*

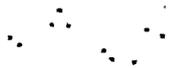
The Technical Specification (TS) 6.8.4f. requirement to have a program that will ensure the position of the polar cranes precludes jet impingement from a postulated pipe rupture was previously evaluated in the NRC staff's safety evaluation for License Amendments (LA) 20 and 21. The proposed change is to control the operation of the containment polar cranes in jet impingement zones.

PG&E evaluated a high energy line break (HELB) scenario for core damage frequency (CDF) considering operation of a polar crane. A postulated HELB would have to damage the crane or cause its load to drop in a manner that damages a component that exacerbates the HELB event and leads to core damage. The PRA evaluation for this scenario concluded the CDF is 1.6E-9 per year. It is not a significant increase in CDF compared to never operating the polar crane in jet impingement zones. The CDF for this scenario is nonrisk significant when compared to the industry standard threshold for risk significance for an operational evolution, which is 1E-6 per year. Several factors that further lower the risk of CDF include: 1) the movement of heavy loads is done in accordance with the DCPH Heavy Loads Program, which provides assurance that a dropped load would not lead to core damage, 2) the polar crane has been evaluated to withstand jet impingement loads without the seismic loads, and 3) the probability of simultaneous seismic and HELB events is low.

Therefore, based on probabilistic considerations, the risk associated with this proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. *Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?*

Deterministic engineering methods required combining both the seismic and jet impingement loads to qualify Design Class I structures. The polar cranes



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were not originally qualified for these combined loads. This resulted in administrative controls that prohibited parking the polar cranes in jet impingement zones to preclude jet impingement loads from a postulated pipe rupture. The proposed change does not involve a physical change to the plant, but it does involve a change to the TS required program for containment polar crane operation.

The proposed change is to control the operation of the containment polar cranes in jet impingement zones. It recognizes that there are jet (HELB) and target (polar crane) interactions. They were previously not considered for postulated jet impingement analyses because administrative controls prohibited parking the polar cranes in jet impingement zones. PG&E has evaluated jet impingement loads on the polar crane and determined it is able to withstand these loads without the seismic loads. Based on this evaluation, the polar crane would not fail due to a HELB event. The movement of a heavy load would be done in accordance with the DCPH Heavy Loads Program. Thus, there would be no consequential failures that would lead to core damage.

Therefore, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. *Does the change involve a significant reduction in a margin of safety?*

The current TS 6.8.4f. requirement to have a program that will ensure the position of the polar cranes precludes jet impingement from a postulated pipe rupture was previously evaluated in the NRC staff's safety evaluation for LAs 20 and 21.

The credible HELB sources that could impinge on the polar crane were identified and evaluated. The feedwater and main steam line steam generator nozzles are the only credible HELBs that could impinge upon the polar crane. The structural integrity of these lines was evaluated and determined to be of robust design.

The margin of safety affected by the proposed change involves a comparison between the margin of safety afforded by no operation of the polar crane and operation that is controlled by procedures. The margin of safety in this case is the increase in risk for CDF caused by a scenario that postulates that operation of the polar crane would lead to core damage. The risk for CDF has been evaluated and determined to be nonrisk significant. The CDF value is well below the industry standard threshold for acceptable risk for an operational evolution, which is 1E-6 per year.

Therefore, the proposed change does not involve a significant reduction in a margin of safety.

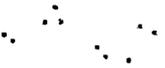


F. NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

Based on the above safety evaluation, PG&E concludes that the changes proposed by this LAR satisfy the NSHC standards of 10 CFR 50.92(c), and accordingly a no significant hazards finding is justified.

G. ENVIRONMENTAL EVALUATION

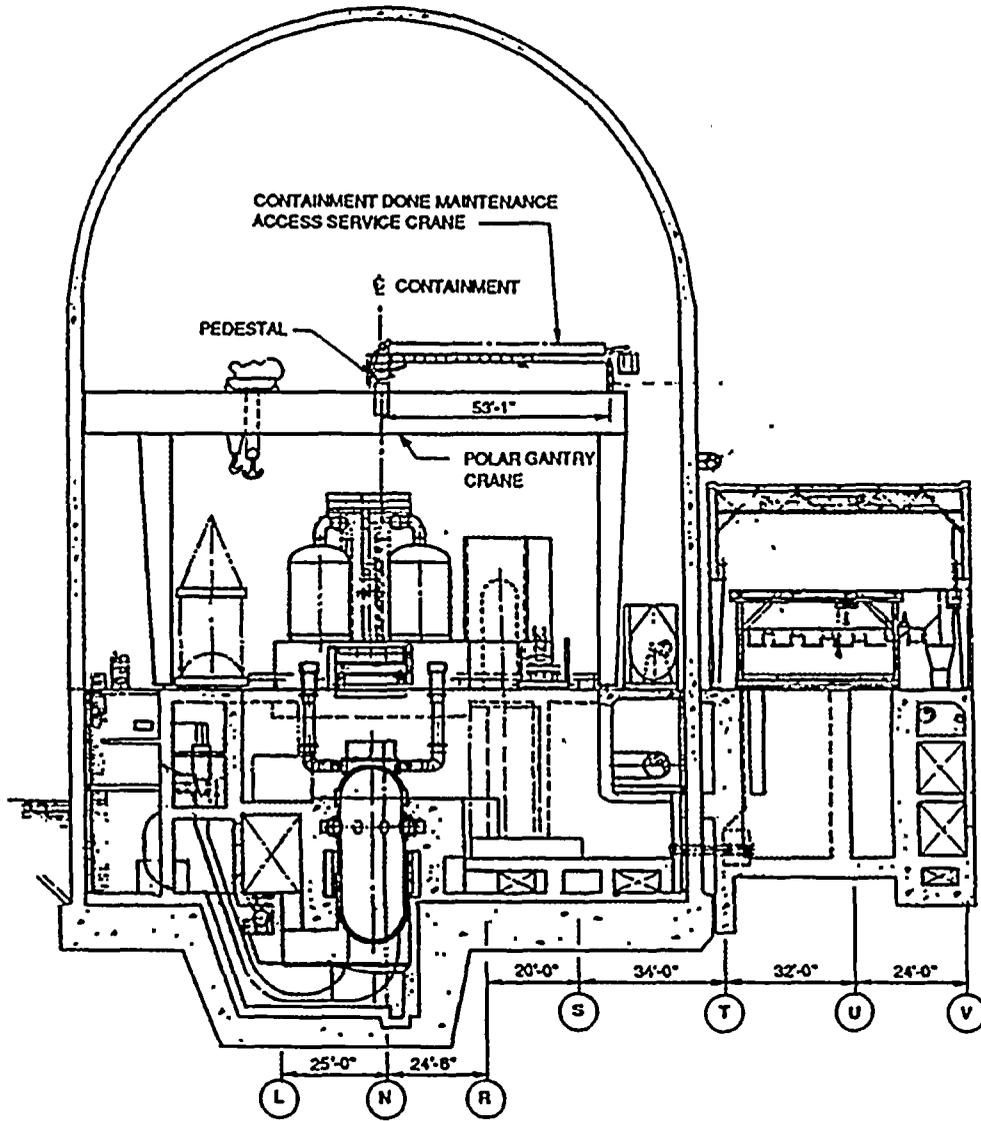
PG&E has evaluated the proposed change and determined the change does not involve: (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed change meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), an environmental assessment of the proposed change is not required.



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Figure 1 -
Containment Polar Crane Location and
Arrangement Inside Containment



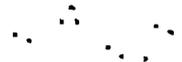


Figure 2 -
CFCU Load Path Through Jet Impingement Zones

