



**Pacific Gas and
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August 8, 2003

PG&E Letter DCL-03-097

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Docket No. 50-275, OL-DPR-80
Docket No. 50-323, OL-DPR-82
Diablo Canyon Units 1 and 2
Response to NRC Bulletin 2003-01, "Potential Impact of Debris Blockage on
Emergency Sump Recirculation at Pressurized-Water Reactors"

Dear Commissioners and Staff:

The U.S. Nuclear Regulatory Commission (NRC) issued NRC Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors," dated June 9, 2003, to inform licensees of the potential for additional adverse effects due to debris blockage of flowpaths necessary for emergency core cooling system (ECCS) and containment spray system (CCS) recirculation and containment drainage. These additional adverse effects were based on NRC-sponsored research that identified the potential susceptibility of pressurized-water reactor recirculation sump screens to debris blockage in the event of a high energy line break that would require ECCS and CCS operation in the recirculation mode.

All licensees have been requested to provide a response within 60 days of the date of the NRC Bulletin to either: (1) state that the ECCS and CCS recirculation functions have been analyzed with respect to the potentially adverse post-accident debris blockage effects identified in the NRC Bulletin and are in compliance with 10 CFR 50.46(b)(5) and all existing applicable regulatory requirements (Option 1), or (2) describe any interim compensatory measures that have been or will be implemented to reduce the risk which may be associated with the potentially degraded or nonconforming ECCS and CCS recirculation functions until an evaluation to determine compliance has been completed (Option 2).

The enclosure to this letter contains the PG&E response to Option 2 of the requested information in NRC Bulletin 2003-01.

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If you have questions regarding this response, please contact Mr. Stan Ketelsen at (805) 545-4720.

Sincerely,

A handwritten signature in black ink, appearing to read 'D. H. Oatley'.

David H. Oatley
Vice President and General Manager - Diablo Canyon

jer/3664
Enclosure
cc/enc:


Edgar Bailey, DHS
Thomas P. Gwynn
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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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

AFFIDAVIT

David H. Oatley, of lawful age, first being duly sworn upon oath states that he is Vice President and General Manager - Diablo Canyon of Pacific Gas and Electric Company; that he has executed this response to NRC Bulletin 2003-01 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.

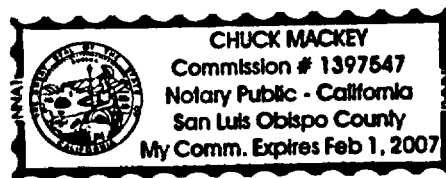


David H. Oatley
Vice President and General Manager - Diablo Canyon

Subscribed and sworn to before me this 8th day of August, 2003.



Notary Public
County of San Luis Obispo
State of California



Response to NRC Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors"

This response addresses Option 2 of the Requested Information in NRC Bulletin 2003-01 for Diablo Canyon Power Plant (DCPP) Units 1 and 2. This response discusses: (1) interim compensatory measures that have been implemented, (2) interim compensatory measures that will be implemented, (3) measures discussed in the bulletin that will not be implemented and the justification for not implementing them, and (4) implementation schedule and basis for planned interim measures that are not implemented.

(1) Interim compensatory measures that have been implemented

- **Operator training on indications of and responses to sump clogging**

An operations standing order has been issued to identify the generic concern regarding sump debris blockage and the potential impact on emergency operating procedures (EOP).

PG&E has also established a number of actions that may be credited as compensatory measures that are already in place. These are described below as they pertain to the actions recommended in the bulletin.

- **Ensuring that alternative water sources are available to refill the RWST or to otherwise provide inventory to inject into the reactor core and spray into the containment atmosphere**

The refueling water storage tank (RWST) level is maintained higher than required by Technical Specifications (TS). Surveillance Test Procedure R-20, "Boric Acid Inventory," requires maintaining RWST level at 90 percent level or greater. The minimum TS limit is 81.5 percent level (400,000 gallons as required by TS 3.5.4.2) or 84 percent including instrument error. Maintaining the level at 90 percent or greater adds an additional 27,500 gallons of water to the RWST inventory, taking into account instrument error. The extra 27,500 gallons, when injected into containment, will increase the water level at the sump screen by approximately 4 inches, and will gain an additional 75 ft² of screen area.

- **More aggressive containment cleaning and increased foreign material controls**

Material exclusion procedures have been implemented to verify that no loose debris is left by an activity performed in containment when containment integrity has been established. Surveillance Test Procedure (STP) M-45B, "Containment Inspection When Containment Integrity is Established," is implemented for at-

power entries and requires that a visual inspection be performed and any debris found during the inspection be removed from containment. This procedure also requires that all tools, equipment and material used in a work activity be removed from containment.

An aggressive containment cleaning program has been developed and implemented. This program has evolved and undergone improvement over several years. Some of the features of the program include:

- General Employee Training has been augmented to include a segment on the importance of maintaining the containment free of debris.
- Routine work orders which provide the directions to clean the containment prior to Mode 4 have been revised to include a detailed list of areas for cleaning and inspection.
- Containment cleanup activities and inspections are now scheduled later in the outage. Containment inspections are performed by management personnel, radiation protection personnel, a senior licensed operator and personnel knowledgeable of the containment environment. These improvements allow the efficient use of manpower and assure that the containment is cleaned prior to entering Mode 4.
- A containment cleanliness program has been established and a program owner has been assigned. The program owner has the overall responsibility for containment cleanliness and establishes procedures and necessary work orders to maintain the containments clean.

More aggressive containment cleanup activities were performed on Unit 2 during its eleventh refueling outage, February through March 2003, to address dirt and dust, including vacuuming of accessible cable trays and other accessible surfaces.

- **Ensuring sump screens are free of adverse gaps and breaches**

PG&E has existing inspection procedures to assure the containment recirculation sump screens are free of adverse gaps and breaches. STP M-45A, "Containment Inspection Prior to Establishing Containment Integrity," verifies by inspection that the fine screening surfaces are free of holes and that there are no gaps greater than the acceptable gap distance. The acceptable gap distance and the fine screen openings are sized to protect the minimum flow clearances in systems served by the pumps performing the recirculation function. This inspection is performed at the completion of each refueling outage.

(2) Interim compensatory measures that will be implemented

- **Operator training on indications of and responses to sump clogging**

Classroom and simulator training on indications of and responses to sump clogging will be included in the next operator requalification training cycle scheduled for September through October 2003.

- **Ensuring that alternative water sources are available to refill the RWST or to otherwise provide inventory to inject into the reactor core and spray into the containment atmosphere**

EOP ECA-1.1, "Loss of Emergency Core Cooling," provides two methods to refill the RWST; (1) refill from the boric acid blender and (2) refill from the spent fuel pool (SFP) via the SFP pumps. ECA-1.1 also provides guidance for injecting into the reactor coolant system using the boric acid blender flow path and into containment using either the boric acid blender or the SFP flow path via the RWST to the containment spray system. PG&E is evaluating procedural enhancements (see discussion under item (3) below) that would identify these ECA-1.1 provisions early in the EOPs.

- **More aggressive containment cleaning and increased foreign material controls**

As stated above, more aggressive containment cleanup activities were performed on Unit 2 during its eleventh refueling outage, February through March 2003, to address dirt and dust, including vacuuming of accessible cable trays and other accessible surfaces. The same aggressive cleaning will be performed on Unit 1 during its twelfth refueling outage scheduled for March 2004.

- **Ensuring containment drainage paths are unblocked**

DCPP Units 1 and 2 have two configurations where the flow paths to the containment recirculation sump may be susceptible to blockage due to the accumulation of debris. These are the refueling cavity drain (at elevation 99 feet 6 inches) and the three doors installed in the crane wall (at elevation 91 feet 0 inches). The containment recirculation sump is installed on elevation 91 feet 0 inches.

The eight inch diameter refueling cavity drain is installed in a small depression (approximately 6 inches deep and 24 by 24 inches in area) in the refueling cavity floor. Floor grating is installed over the drain and is flush with the refueling cavity floor. During a design basis loss-of-coolant accident (LOCA), water from the containment sprays has the potential to collect in the refueling cavity. If the refueling cavity drain became blocked by debris, the inventory of water in the

refueling cavity would not drain onto the containment floor and reach the containment recirculation sump. The existing configuration, with the grating flush with the floor, lends itself to become a potential 'chokepoint' where the drain could be blocked due to the accumulation of debris. PG&E plans to modify this drain to replace the existing floor grating screen with a raised drain screen. The raised drain screen will provide a greater screen area and will significantly reduce the likelihood of this drain path becoming blocked. The drains are scheduled to be modified during the upcoming Unit 1 and Unit 2 twelfth refueling outages, currently scheduled for March 2004 and October 2004, respectively. Implementing these modifications during refueling outages is necessary to maintain radiation doses as low as reasonably achievable (ALARA).

The three doors (varying in width from approximately 37 to 52 inches) on elevation 91 feet 0 inches are fabricated from standard floor grating and are installed along the outside edge of the crane wall leading from the containment annulus area to the steam generator (SG) compartments. The containment recirculation sump is located on elevation 91 feet 0 inches, outside the SG compartments in the containment annulus area. During a design bases LOCA, a significant amount of the break flow will flow from the SG compartments through the crane wall doors into the containment annulus area and into the containment recirculation sump. The doors are installed to prohibit personnel from entering a high radiation area while the plant is at power. The existing grating bearing bars are installed vertically and are spaced at 1-3/16 inch centers with 1/4 inch square horizontal cross bars spaced at 4 inch centers. The bottom doorframe is constructed of a 4 inch high by 1-1/2 inch bent plate and functions as a debris curb. The use of grating for these doors makes them susceptible to blockage due to the transport and accumulation of floating debris. The current licensing and design bases credit the door's bottom frame as a debris curb for preventing the sliding transport of nonbuoyant reflective metal and calcium-silicate insulation from reaching the containment recirculation sump.

To assure that this drainage path does not become blocked due to transported floating debris, PG&E plans to modify these doors to replace the existing grating material with bars that are less restrictive. The new replacement bars will be spaced horizontally at 6 inch centers with one center bar. This configuration will allow the passage of most of the floating debris without causing a blockage of the flow path. The existing doorframe, with its 4-inch high bottom frame, will be utilized, thus the door's function as a debris curb will be maintained. To provide timely completion, the door modifications will be implemented at power, prior to the upcoming Unit 1 and Unit 2 refueling outages. The estimated radiation dose for implementing this modification at power is less than or equal to the dose when performed during a refueling outage. During the installation process, temporary debris curbs will be installed as compensatory measures to assure that sliding debris (e.g., reflective metal and calcium-silicate insulation) will not reach the containment recirculation sump during a LOCA. Additionally,

compensatory actions will be in place to assure personnel do not enter high radiation zones during the implementation of the modification.

- **Additional plant specific measures:**

NRC Bulletin 2003-01 information will be conveyed to Engineering Support Program (ESP) personnel through an introductory article in the third quarter ESP newsletter currently scheduled to be issued on August 22, 2003. A more extensive article will be issued in the fourth quarter ESP newsletter, currently scheduled for issue October 31, 2003, to raise engineer awareness of the more aggressive containment cleanliness requirements, the potential for containment recirculation sump blockage, and actions being taken to address the NRC Bulletin 2003-01 concerns.

PG&E will conduct training for the Emergency Response Organization (ERO) decision makers and evaluators in the Technical Support Center (TSC) on indications of sump blockage and compensatory actions. The training will be incorporated into the current ERO training schedule and be completed by December 31, 2003.

(3) Measures discussed in the bulletin that will not be implemented and the justification for not implementing them

- **Procedural modifications, if appropriate, that would delay the switchover to containment sump recirculation (e.g., shutting down redundant pumps that are not necessary to provide required flows to cool the containment and reactor core, and operating the CSS intermittently)**

Plant specific changes to the DCPD EOPs that take pre-emptive operator actions to shut down emergency core cooling system (ECCS) or containment spray system (CSS) pumps during the injection phase will be considered after the Westinghouse Owners Group (WOG) has completed its review to evaluate the generic impact of the changes. A schedule for DCPD implementation of changes, if required, will be established after the extent of WOG recommended changes, if any, are identified.

For larger LOCAs that require ECCS injection flow and CSS spray, pre-emptive operator actions to stop pumps or throttle flow solely for the purpose of delaying switchover to containment sump recirculation are not recommended until the impact of the changes can be evaluated on a generic basis for the following reasons:

- Operator actions to stop ECCS or CSS pumps or throttle flow may result in conditions that are either outside of the design basis safety analyses

assumptions or violate the design basis safety analyses assumptions (single failure). This would result in the potential for creating conditions that would make the optimal recovery more challenging (e.g., stopping containment spray impacts containment fission product removal).

- These actions would be inconsistent with the overall WOG Emergency Response Guideline (ERG) philosophy. The WOG ERGs are symptom-based procedures that provide for the monitoring of plant parameters and prescribe actions based on the response of those parameters. To avoid the risk of taking an incorrect action for an actual event, the WOG ERGs do not prescribe contingency actions until symptoms that warrant those contingency actions are identified.
- These actions would be inconsistent with the current operator response using the WOG ERGs that has been established through extensive operator training. The expected operator response is based on the optimal set of actions considering both design basis accidents and accidents outside the design basis. The WOG ERG operator response is not limited to a specific accident progression in order to provide optimal guidance for a wide range of possible accidents.
- To be effective in delaying the switchover to containment sump recirculation, operator actions to stop ECCS or CSS pumps must be taken in the first few minutes of an accident. This introduces a significant opportunity for operator errors based on other actions that may be required during this time frame. Any new operator actions to stop ECCS or CSS pumps, when modeled in the probabilistic risk assessment, are likely to result in increased risk due to operator error.

Any generic changes to the WOG ERGs will need to be evaluated as part of an owners group program.

PG&E is evaluating procedural enhancements that can be made without affecting the WOG ERG response strategies for LOCA events. Examples are changes that would (1) reduce recirculation flows, when appropriate, to reduce the amount of debris transported to the sump and reduce head loss across the sump screen, (2) provide increased monitoring of the condition of the sump, (3) start makeup to the RWST earlier, and (4) provide improved strategies to mitigate sump blockage. These and other proposed changes identified through industry benchmarking will be considered. Those changes determined to be acceptable by PG&E will be incorporated into plant EOPs and implemented by December 31, 2003.

(4) Implementation schedule for planned interim measures and basis for concluding that their implementation is not practical until a later date.

- The operator classroom and simulator training will be included in the next available operator requalification cycle scheduled for September through October 2003. The current requalification cycle has already been completed for some crews, so the next cycle will be used for this training. The standing order that has been issued to the crews has alerted them to the issue.
- The refueling cavity drain modifications will be implemented in the next refueling outages, starting in March 2004 (Unit 1) and October 2004 (Unit 2). The modifications should only be performed during a refueling outage due to ALARA concerns.
- The crane wall door modifications can be done on line and will be done prior to the next Unit 1 and Unit 2 refueling outages. PG&E first considered making these modifications after reviewing Draft Regulatory Guide 1107, "Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident," dated February 2003. A long-term plan scoping document was issued in March 2003 proposing that these modifications be implemented in the next refueling outages scheduled for March 2004 (Unit 1) and October 2004 (Unit 2). With issuance of NRC Bulletin 2003-01, PG&E has determined it is prudent to implement these modifications prior to the next refueling outages.
- EOP enhancements that do not affect the WOG ERGs are under review. Those found to be acceptable will be implemented by December 31, 2003. Sufficient time needs to be taken to review and evaluate these enhancements to assure they produce the desired results without compromising the effectiveness of the EOPs.
- ESP personnel notification is being accomplished via third and fourth quarter 2003 newsletter articles currently schedule to be issued August 22, 2003, and October 31, 2003, respectively. System and design engineers responsible for containment recirculation sump screen issues are already cognizant of the issues raised by Bulletin 2003-01. Notifying the general ESP population via newsletter is considered to be the most effective method and is considered to be timely.
- PG&E will conduct training for the ERO decision makers and evaluators in the TSC on sump blockage. The training will be incorporated into the current schedule to be completed by December 31, 2003. ERO decision makers and evaluators assigned to the TSC will have received timely notice of Bulletin 2003-01 issues via the ESP newsletters and/or the operations standing order. Actual training on containment recirculation sump screen blockage will require time for analysis and development, and completion by the end of the year 2003 is considered timely.