

January 18, 2007

Mr. John S. Keenan  
Senior Vice President and Chief Nuclear Officer  
Pacific Gas and Electric Company  
Diablo Canyon Power Plant  
P.O. Box 770000  
San Francisco, CA 94177-0001

SUBJECT: DIABLO CANYON POWER PLANT, UNIT NO. 2 - GENERIC LETTER 2004-02  
"POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON EMERGENCY  
RECIRCULATION DURING DESIGN BASIS ACCIDENTS AT PRESSURIZED-  
WATER REACTORS" EXTENSION REQUEST APPROVAL (TAC NO. MD3586)

Dear Mr. Keenan:

Generic Letter (GL) 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors," requested that all licensees complete actions related to the GL by December 31, 2007. By letter dated November 9, 2006, Pacific Gas and Electric Company (PG&E, the licensee) requested an extension to the completion date for the corrective actions to be taken at the Diablo Canyon Power Plant (DCPP), Unit No. 2. PG&E requested an extension to the DCPP, Unit No. 2, Refueling Outage 14 (designated 2R14), scheduled to start on February 4, 2008.

In Enclosure 1 to its November 9, 2006, letter, PG&E stated that in 2001, during the DCPP, Unit No. 2, 2R10 refueling outage, it had already replaced the DCPP, Unit No. 2, sump screen with a significantly larger one of new design having 760 square feet surface area.

In its November 9, 2006, letter, PG&E noted that in late 2005 and early 2006 uncertainties arose in the nuclear industry concerning the magnitude of chemical effects and the potential effect of fiber bypassing screens and blocking flow at the reactor core. Based on the uncertainties with chemical effects, PG&E has placed orders for replacement screens for DCPP, Unit Nos. 1 and 2, sized at approximately 4,000 square feet in surface area. PG&E expected these screens to be of a sufficient size to accommodate plant-specific debris and chemical loadings. The DCPP, Unit No. 2, screen will be designed based on testing for the lead DCPP, Unit No. 1 screen, with head-loss testing, including fiber bypass, fuel bottom nozzle head loss, and chemical effects testing scheduled to be performed in November and December 2006. PG&E has contracted for jet impact testing on several modifications planned for the 2R14 refueling outage to encapsulate debris sources, and will be installing debris interceptors during that outage.

In its November 9, 2006, letter, PG&E described the following existing mitigative measures:

- DCPP, Unit No. 2, containment spray is secured upon switchover to sump recirculation, reducing debris reaching the sump;

- The DCP, Unit No. 2, containment floor slopes away from the containment sump, a design feature which will be retained with GL 2004-02 corrective actions;
- The approved applicability of the leak-before-break principle to the DCP, Unit No. 2, main reactor coolant loop piping, demonstrating sufficient toughness that the piping will most likely leak rather than rupture; and
- PG&E also cited the following conditions applicable to DCP, Unit No. 2, (as discussed in GL 2004-02):
  - The DCP, Unit No. 2, containment is compartmentalized, reducing debris transport;
  - DCP, Unit No. 2, has 20-30 minutes after the loss-of-coolant accident (LOCA) initiation for debris settling before switchover to the recirculation mode of operation;
  - The probabilities of LOCA initiating events (large and medium break LOCAs) are extremely low; and
  - Low-pressure emergency core cooling system pumps would be able to operate for some period of time under cavitation conditions, providing operators with time to respond to the situation.

PG&E performed a plant-specific probabilistic risk assessment (PRA) to address the risk impact of extending the time for completing the sump strainer modification at DCP, Unit No. 2, until February 4, 2008. The PRA conservatively assumed that sump blockage would occur for all piping breaks larger than 6 inches in diameter, and did not take credit for actions taken in response to Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors," that could mitigate sump blockage. PG&E stated that its assessment demonstrated that the core damage risk increase due to a 5-week extension of the containment sump strainer modification schedule is  $4.82E-7$  per year, less than the  $1E-6$  per year acceptance limit, and that the large early release frequency risk increase is  $1.00E-8$  per year, which is less than the  $1E-7$  per year acceptance limit.

PG&E stated that it has implemented the following compensatory measures:

- Refueling water storage tank (RWST) level is maintained higher than required by technical specifications (90-percent level versus the technical specifications minimum indicated level of 81.5 percent), increasing inventory by 27,500 gallons, delaying switchover to recirculation, and increasing sump level by 4 inches;
- Material exclusion procedures exist to control loose debris following any activities undertaken after containment integrity (closeout) has been established;
- An aggressive, ongoing containment cleaning program has been developed and implemented. This includes general employee training, routine outage

containment cleaning work orders, the conduct of containment cleaning activities and inspections later in outages with involvement of management, radiation protection, senior operator and containment environment knowledgeable personnel, and the assignment of a containment cleanliness program "owner" with overall responsibility for containment cleanliness and related containment cleanliness procedures and work orders. Removal of dust and dirt has been enhanced using methods which include vacuuming of accessible cable trays and surfaces;

- Inspection procedures performed at the end of each refueling outage ensure that containment recirculation sump screens are free of adverse gaps and breaches;
- Classroom and simulator training is conducted on indications of and responses to sump clogging for both operator initial and requalification training;
- Appropriate awareness training has been conducted for engineering and Emergency Response Organization/Technical Support Center personnel;
- Two methods of RWST refill are provided in emergency operating procedure (EOP) ECA-1.1, "Loss of Emergency Core Cooling" (from the boric acid blender and the spent fuel pool), as well as guidance on direct injection from these two water sources; and
- EOP E-1.3, "Transfer to Cold Leg Recirculation," and EOP E-1, "Loss of Reactor or Secondary Coolant": (1) permit operator reduction of residual heat removal flow as reactor coolant system conditions permit as a continuous action step, (2) provide for re-filling the RWST in accordance with a new Appendix M "RWST Makeup," and (3) provide for continuous monitoring for containment recirculation sump blockage using sump level, pump flow, and pump motor amps as signs of loss of suction or cavitation.

PG&E stated that it had made physical improvements to reduce the potential for debris blockage of flow from the refueling cavity drain line (through installation of a "raised drain screen" to replace a grating flush with the floor), and through modifications to the structure of three doors installed in the biological shield wall while maintaining a "debris curb" function at the bottom of the three doors.

The NRC staff has confidence that PG&E has a plan that will result in the installation of modifications that provide acceptable strainer function with an adequate margin for uncertainties. Further, the NRC staff has concluded that PG&E has put mitigation measures in place to adequately reduce the risk for the requested short extension period, and that it is, therefore, acceptable to extend the completion date for the corrective actions for the issues discussed in GL 2004-02 until the completion of the DCP, Unit No. 2, February 2008 refueling outage, currently scheduled to begin on February 4, 2008. Should PG&E elect to begin the DCP, Unit No. 2, outage more than 30 days after February 4, 2008, PG&E will need to provide the NRC additional justification for further delay in completing corrective actions for GL 2004-02. PG&E should send in an "as complete as possible" GL 2004-02 supplemental and/or Request for Additional Information response by December 31, 2007. If any substantive GL

J. S. Keenan

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corrective action analytical results or technical details change in 2008 (e.g., during an outage in which GL corrective action modifications are completed), a GL supplemental response should be submitted within 90 days of the change or outage completion.

If you have any questions or comments regarding this approval, please contact Alan Wang at 301-415-1445.

Sincerely,

*/RA/*

David Terao, Branch Chief  
Plant Licensing Branch IV  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-323

cc: See next page

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