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PG&E Letter DCL-03-045

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

Docket No. 50-323, OL-DPR-82  
Diablo Canyon Unit 2

30-Day Response to NRC Bulletins 2001-01, "Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles" and 2002-01, "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity"; 60-Day Response to NRC Order EA-03-009, "Issuance of Order Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors"

Dear Commissioners and Staff:

NRC Order EA-03-009, dated February 11, 2003, required that, within 60 days after returning a unit to operation, licensees provide a description of the inspections performed in accordance with the order and describe any leaks or boron deposits found during the inspection. This reporting requirement superseded the reporting requirements of NRC Bulletin 2002-02.

NRC Bulletin 2001-01, dated August 3, 2001, requested that, within 30 days after unit restart following the next refueling outage, licensees provide a description of the extent of reactor vessel head penetration (VHP) nozzle leakage and cracking detected, including the number, location, size, and nature of each crack detected; and, if cracking is identified, a description of the inspections (type, scope, qualification requirements, and acceptance criteria), repairs, and other corrective actions taken to satisfy applicable regulatory requirements.

NRC Bulletin 2002-01, dated March 18, 2002, requested that, within 30 days after unit restart following the next inspection of the reactor pressure vessel (RPV) head to identify any degradation, licensees provide the inspection scope (if different than that provided in response to Item 1.D of the bulletin) and results, including the location, size, and nature of any degradation detected; and the corrective actions taken and the root cause of the degradation.

Enclosed are the 30-day responses for Diablo Canyon Power Plant Unit 2 requested by NRC Bulletins 2001-01 and 2002-01 and the 60-day response required by NRC Order EA-03-009.

A101  
A095  
A088

PG&E performed a qualified bare metal visual inspection of 100 percent of the RPV head surface and 100 percent of the RPV head penetrations including 360 degrees around each VHP nozzle and the head vent penetration during the Unit 2 eleventh refueling outage, completed on March 26, 2003. No evidence of VHP nozzle leakage or cracking or degradation of the RPV head was identified.

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

Sincerely,



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*Vice President – Nuclear Services*

mjr/4557

Enclosures

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**30-Day Response to NRC Bulletins 2001-01, "Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles" and 2002-01, "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity"; 60-Day Response to NRC Order EA-03-009, "Issuance of Order Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors"**

NRC Requested Information for NRC Bulletin 2001-01

5. *Addressees are requested to provide the following information within 30 days after plant restart following the next refueling outage:*
  - a. *a description of the extent of VHP nozzle leakage and cracking detected at your plant, including the number, location, size, and nature of each crack detected;*
  - b. *if cracking is identified, a description of the inspections (type, scope, qualification requirements, and acceptance criteria), repairs, and other corrective actions you have taken to satisfy applicable regulatory requirements. This information is requested only if there are any changes from prior information submitted in accordance with this bulletin.*

NRC Requested Information for NRC Bulletin 2002-01

2. *Within 30 days after plant restart following the next inspection of the reactor pressure vessel head to identify any degradation, all PWR addressees are required to submit to the NRC the following information:*
  - A. *the inspection scope (if different than that provided in response to Item 1.D.) and results, including the location, size, and nature of any degradation detected,*
  - B. *the corrective actions taken and the root cause of the degradation.*

NRC Required Information for NRC Order EA-03-009

- E. *For each inspection required in Paragraph C, the Licensee shall submit a report detailing the inspection results within sixty (60) days after returning the plant to operation.<sup>4</sup> For each inspection required in Paragraph D, the Licensee shall submit a report detailing the inspection results within sixty (60) days after returning the plant to operation if a leak or boron deposit was found during the inspection.*

PG&E Response:

The following provides PG&E's responses for NRC Bulletin 2001-01, NRC Bulletin 2002-01, and NRC Order EA-03-009.

Scope of inspection:

During the Diablo Canyon Power Plant (DCPP) Unit 2 eleventh refueling outage (2R11) which ended on March 26, 2003, PG&E performed a qualified bare metal visual inspection of 100 percent of the reactor pressure vessel (RPV) head surface and 100 percent of the RPV head penetrations including 360 degrees around each reactor vessel head penetration (VHP) nozzle and the head vent penetration.

The scope of the inspection included that specified in PG&E's response to item 1.D, included in PG&E letter DCL-02-033, "Response to NRC Bulletin 2002-01, 'Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity,'" dated April 1, 2002.

DCPP Unit 2 has accumulated approximately 10.9 effective degradation years (EDY) prior to 2R11. Therefore, PG&E was required to perform an inspection in accordance with Order EA-03-009, Sections C (2) and D.

PG&E complied with Section C (2) (a) of the Order by performing a qualified bare metal visual inspection of 100 percent of the RPV head surface and 100 percent of the RPV head penetrations including 360 degrees around each VHP nozzle and the head vent penetration.

PG&E complied with Section D of the Order by performing a visual inspection to identify potential boric acid leaks from pressure-retaining components above the RPV head.

An engineering evaluation of DCPP Units 1 and 2 was performed to demonstrate that there would be a leak path to the RPV head top surface if there were a through-wall leak in any head penetration nozzle or attachment weld. The inspection was performed without intervening insulation or masking deposits of boric acid. Since the evaluation demonstrated leakage would be visible and the penetrations were not obstructed or masked, the examination was qualified in accordance with NRC Bulletin 2001-01.

Methodology:

The inspections of the RPV head and VHP nozzles were performed using a remote examination system consisting of a low profile robotic crawler with

traction devices, high-resolution forward and rear facing cameras, debris scraping attachments and a video probe delivery system. The remote examination system provided visual resolution equivalent to a direct VT-2 visual examination as specified in the 1992 Edition of American Society of Mechanical Engineers (ASME) Section XI Article IWA-2212 and ASME Section V Article 9 paragraph T-942. The remote examination system was demonstrated to resolve a near vision test chart exceeding the requirements of ASME Section XI Table IWA-2210-1 for VT-2 examination prior to the inspections.

An examination scan plan detailed the paths to be taken by the robotic crawler that would assure complete visual coverage of the RPV head and all VHP nozzles. Inspection personnel used exam data sheets to verify the head penetration being inspected and to record the location on the videotape record of each quadrant of a nozzle's inspection, providing verification of examination coverage for the RPV head and VHP nozzles. The entire examination was recorded on multiple high quality videotapes.

A video probe was used to examine portions of the 16 peripheral VHP nozzles that, because of the stepped insulation design, were not accessible with the robotic crawler. Wedges were used to shim up the insulation at the outer shroud ring/head interface allowing video probe access for a 360 degree examination of these VHP nozzles. The video probe was verified to have the required VT-2 direct examination equivalent visual resolution prior to the exam. All surrounding base metal was examined with no boric acid or degradation noted.

Personnel who performed the remote examination were certified VT-2 Level II or Level III visual examiners, in accordance with the requirements of ASME Section XI, 1989 Edition or later approved code editions. A certified Level II visual examiner reviewed the inspection findings. All examiners engaged in the inspections received familiarization training on photographs of industry examination results and the use of the examination procedure's decision tree for evaluation of indications.

Inspection:

No areas of boric acid accumulation, or signs of leakage from the VHP nozzle/RPV head interface areas were identified.

The examination identified a number of areas on the uphill side of many of the VHP nozzles that were obscured by debris, consisting mostly of metallic debris from construction and maintenance activities during the course of DCPD operation. A compressed nitrogen line carried by the robotic crawler was used to displace machining chips, allowing complete inspection of the area of interest. Debris on the peripheral nozzles was moved using a manually inserted special purpose tool. Evidence of previous water on the reactor head and penetration

tubes was identified, evidenced by very light water stains on the border of previous water flow. While no specific activity or documentation was found, PG&E believes this water is related to outage activities during previous refueling outages. At some penetrations, a small band of corrosion and debris was identified that could not be dislodged by compressed nitrogen. Several of these bands were cleaned and the edge of the head at the penetration was well defined and the metal condition was very good. The thickness of the debris/corrosion bands were small compared to a standard "BB" thickness (approximately 0.17in.), which was placed by some debris piles for relative scale comparisons.

**Results:**

No evidence of VHP nozzle leakage, cracking, or RPV head degradation was identified. No evidence of potential boric acid leakage from pressure-retaining components above the RPV head was identified. Therefore, no other inspections, repairs, or other corrective actions were necessary to satisfy the applicable regulatory requirements.