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PG&E Letter DCL-04-082

U.S. Nuclear Regulatory Commission
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Docket No. 50-275, OL-DPR-80
Diablo Canyon Unit 1
30-Day Response to NRC Bulletin 2002-02, "Reactor Pressure Vessel Head and Vessel Head Penetration Nozzle Inspection Program," 60-Day Response to NRC Bulletin 2003-02, "Leakage From Reactor Pressure Vessel Lower Head Penetrations and Reactor Coolant Pressure Boundary Integrity," and 60-Day Response to Revision 1 of NRC Order EA-03-009, "Issuance of First Revised NRC Order (EA-03-009) Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors"

Dear Commissioners and Staff:

The first revision of NRC Order EA-03-009, dated February 20, 2004, requires 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.

NRC Bulletin 2002-02, dated August 9, 2002, requested that, within 30 days after unit restart following the next inspection of the reactor pressure vessel (RPV) head and vessel head penetration (VHP) nozzles to identify the presence of any degradation, licensees provide:

A. The inspection scope and results, including the location, size, extent, and nature of any degradation (e.g., cracking, leakage, and wastage) that was detected; details of the nondestructive examination used (i.e., method, number, type, and frequency of transducers or transducer packages, essential variables, equipment, procedure and personnel qualification requirements, including personnel pass/fail criteria); and criteria used to determine whether an indication, "shadow," or "backwall anomaly" is acceptable or rejectable.

B. The corrective actions taken and the root cause determinations for any degradation found.

A096
A109
A101

NRC Bulletin 2003-02, dated August 21, 2003, requested that, within 60 days of plant restart following the next inspection of the RPV lower head penetrations, the subject pressurized water reactor addressees should submit to the NRC a summary of the inspections performed, the extent of the inspections, the methods used, a description of the as-found condition of the lower head, any findings of relevant indications of through-wall leakage, and a summary of the disposition of any findings of boric acid deposits and any corrective actions taken as a result of indications found.

Enclosed are the 30-day and 60-day responses for Diablo Canyon Power Plant, Unit 1, requested by NRC Bulletin 2002-02 and NRC Bulletin 2003-02, respectively, and the 60-day response required by the first revision of NRC Order EA-03-009.

PG&E performed a bare metal visual inspection of greater than 95 percent of the RPV upper and 100 percent of the lower head surfaces. PG&E examined 100 percent of the upper and lower RPV head penetrations including 360 degrees around each VHP and bottom mounted instrumentation nozzle during the Unit 1 twelfth refueling outage, completed on June 7, 2004. As noted herein, the top head surface examination was limited by the control rod drive mechanism ventilation/insulation support structure and insulation. Greater than 95 percent coverage was obtained, as required by the order. 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,

Lawrence F. Womack
Vice President – Nuclear Services

mjrm/4557
Enclosures
cc: Edgar Bailey, DHS
Bruce S. Mallett,
David L. Proulx
Diablo Distribution
cc/enc: Girija S. Shukla

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of PACIFIC GAS AND ELECTRIC COMPANY Diablo Canyon Power Plant Unit 1	Docket No. 50-275 Facility Operating License No. DPR-80

AFFIDAVIT

Lawrence F. Womack, being of lawful age, first being duly sworn upon oath states that he is Vice President – Nuclear Services of Pacific Gas and Electric Company; that he has executed this response to NRC Bulletin 2002-02, NRC Bulletin 2003-02, and the first revision of NRC Order EA-03-009 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.

Lawrence F. Womack
Vice President – Nuclear Services

Subscribed and sworn to before me this 6th day of July 2004.

Notary Public
County of San Luis Obispo
State of California

CHUCK MACKEY
Commission # 1397547
Notary Public - California
San Luis Obispo County
My Comm. Expires Feb 1, 2007

30-Day Response to NRC Bulletin 2002-02, "Reactor Pressure Vessel Head and Vessel Head Penetration Nozzle Inspection Program"

NRC Requested Information:

NRC Bulletin 2002-02, dated August 9, 2002, requested that, within 30 days after unit restart following the next inspection of the RPV Head and VHP nozzles to identify the presence of any degradation, licensees provide:

A. The inspection scope and results, including the location, size, extent, and nature of any degradation (e.g., cracking, leakage, and wastage) that was detected; details of the nondestructive examination used (i.e., method, number, type, and frequency of transducers or transducer packages, essential variables, equipment, procedure and personnel qualification requirements, including personnel pass/fail criteria); and criteria used to determine whether an indication, "shadow," or "backwall anomaly" is acceptable or rejectable.

B. The corrective actions taken and the root cause determinations for any degradation found.

PG&E Response:

Scope of Inspection:

During the Diablo Canyon Power Plant (DCPP) Unit 1 twelfth refueling outage, PG&E performed a bare metal visual (BMV) inspection of greater than 95 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.

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 capability, 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 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 independent 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 five peripheral and top dead center/head vent 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 the 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.

Surrounding base metal was examined with no boric acid or degradation noted. Where the CRDM ventilation/insulation support structure and insulation limited access to the reactor head surface downslope from the outermost RPV penetrations, the examination included those areas of the RPV head upslope and downslope of the interference to identify any evidence of boron or corrosive product. None was detected. The structure access limitations occluded less than 5 percent of the general surface area of the head; greater than 95 percent of the surface area was examined and found to be free of boric acid induced degradation.

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. As a benefit of DCPP's involvement with our STARS partners' BMV examinations, this was the ninth examination that the DCPP inspection team members have been involved in.

Inspection Results:

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

The examination identified a limited number of areas on the uphill side of a few of the VHP nozzles that were slightly obscured by debris, consisting mostly of metallic debris (machining chips) from construction and maintenance activities during the course of DCPP operation. A compressed air line carried by the robotic crawler was used to displace the debris, allowing complete inspection of

the area of interest. Evidence of non-borated water on the RPV head and penetration tubes was identified, evidenced by very light water stains on the border of previous water flow. While no specific work activity or documentation was found, this water is believed to have been related to outage activities during previous refueling outages.

Since no evidence of VHP nozzle leakage or cracking was identified, no other inspections, repairs, or other corrective actions were necessary to satisfy the applicable regulatory requirements.

60-Day Response to NRC Bulletin 2003-02, "Leakage From Reactor Pressure Vessel Lower Head Penetrations and Reactor Coolant Pressure Boundary Integrity"

NRC Requested Information:

NRC Bulletin 2003-02, dated August 21, 2003, requested that, within 60 days of plant restart following the next inspection of the RPV lower head penetrations, the subject pressurized water reactor addressees should submit to the NRC a summary of the inspections performed, the extent of the inspections, the methods used, a description of the as-found condition of the lower head, any findings of relevant indications of through-wall leakage, and a summary of the disposition of any findings of boric acid deposits and any corrective actions taken as a result of indications found.

PG&E Response:

Scope of Inspection:

During the DCPP Unit 1 twelfth refueling outage, PG&E performed a bare metal visual inspection of all 58 reactor pressure vessel (RPV) lower head bottom mounted instrument (BMI) penetrations, including 100 percent of the circumference of each penetration as it enters the RPV lower head, and the areas surrounding the penetrations.

A design change to the Unit 1 bottom insulation was performed to provide added access space for visual examination of 360 degrees of all lower reactor vessel head penetrations. The design permanently lowered the hemispherical-shaped conforming insulation approximately five inches, allowing access for this and future examinations.

Methodology:

The inspections of the RPV lower head and BMI penetrations were performed using a remote examination system consisting of a low-profile robotic crawler with traction devices and a high-resolution forward camera system. The remote examination system provided visual resolution equivalent to a direct VT-2 visual examination as specified in the 1992 Edition of 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 lower head and all BMI

penetrations. Inspection personnel used exam data sheets to verify the lower head penetration being inspected and to record the location on the videotape record of each segment of a nozzle's inspection, providing independent verification of examination coverage for the RPV lower head and BMI penetrations. The entire examination was recorded on multiple high-quality videotapes.

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 or Level III 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 Results:

No areas of boric acid accumulation, or signs of leakage from the BMI penetration/RPV lower head interface areas were identified.

The examination identified some slight residue trails from above the lower head, which appear to be boric acid residue. These trails were similar to those seen at upper elevations of the vessel insulation exterior, which originate at the cavity seal/vessel interface area. None of the trails ran onto the interface area of the BMI penetration/lower head due to built up Inconel pads surrounding the penetration tubes that diverted any tracks away. Hence, there were no deposits in the penetration tube/head crevice that would obscure or mask boron emanating from a pressure boundary flaw. The trails on the vessel surface were translucent and non-three-dimensional, with no visible attack on the carbon steel of the vessel head. To a much greater extent, similar boron trails are visible on the outside of the vessel insulation and on the concrete bio-shield wall, supporting the conclusion that they are the result of cavity seal leakage.

Since no evidence of degradation of the RPV lower head was detected, no corrective actions were necessary.

60-Day Response to NRC Order EA-03-009, "Issuance of First Revised NRC Order (EA-03-009) Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors"

NRC Required Information:

The first revision of NRC Order EA-03-009, dated February 20, 2004, required that, for each inspection required in Paragraph C of the Order, the Licensee shall submit a report detailing the inspection results within 60 days after returning the plant to operation. For each inspection required in Paragraph D of the Order, the Licensee shall submit a report detailing the inspection results within 60 days after returning the plant to operation if a leak or boron deposit was found during the inspection.

PG&E Response:

DCPP, Unit 1, has accumulated approximately 10.25 total effective degradation years prior to the Unit 1 twelfth refueling outage (1R12). 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 bare metal visual inspection of 100 percent of the reactor pressure vessel (RPV) head penetrations, including 360 degrees around each of the vessel head penetration (VHP) nozzles and the head vent penetration, during 1R12, completed on June 7, 2004. PG&E also performed a visual inspection of greater than 95 percent of the RPV head surface to identify any degradation. No evidence of VHP nozzle leakage or cracking, or degradation of the RPV head, was identified.

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. No evidence of leakage was identified.