Pacific Gas and Electric Company

Lawrence F. Womack
Vice President
Nuclear Services

Diablo Canyon Power Plant
P.O. Box 56
Avila Beach, CA 93424

805.545.4600
Fax: 805.545.4234

June 21, 2002

PG&E Letter DCL-02-071

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

Docket No. 50-275, OL-DPR-80
Diablo Canyon Unit 1
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"

Dear Commissioners and Staff:

NRC Bulletin 2001-01, dated August 3, 2001, requested that, within 30 days after plant 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 plant restart following the next inspection of the reactor pressure vessel 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 1 required by NRC Bulletins 2001-01 and 2002-01.

PG&E performed a qualified bare metal visual inspection of 100 percent of the VHP nozzles and visual inspection of the reactor pressure vessel head to identify any degradation during the Unit 1 eleventh refueling outage, completed on May 28, 2002. No evidence of VHP nozzle leakage or cracking, or degradation of the reactor pressure vessel head, was identified.

A088

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

Sincerely,

Lawrence F. Womack
Vice President – Nuclear Services

tcg
Enclosures
cc/encls: Edgar Bailey, DHS
Alexander Marion, NEI
Ellis W. Merschoff
David L. Proulx
Girija S. Shukla
Diablo Distribution

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 says that he is Vice President – Nuclear Services of Pacific Gas and Electric Company; that he has executed this response to NRC Bulletins 2001-01 and 2002-01 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.

Lawrence F. Womack
Vice President – Nuclear Services

Subscribed and sworn to before me this 21st day of June, 2002.

Notary Public
County of San Luis Obispo
State of California

CHUCK MACKEY
Commission # 1204640
Notary Public - California
San Luis Obispo County
My Comm. Expires Dec 12, 2002

30-Day Response to NRC Bulletin 2001-01, "Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles"

NRC Requested Information

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.*

PG&E Response:

Scope of inspection:

During the Diablo Canyon Power Plant (DCPP) Unit 1 eleventh refueling outage, PG&E performed a qualified bare metal visual inspection of 100 percent of the reactor pressure vessel head penetration (VHP) nozzles (VHP nozzle/reactor pressure vessel head interface). This inspection was performed in conjunction with the bare metal visual inspection of the reactor pressure vessel head required by NRC Bulletin 2002-01.

An engineering evaluation of DCPP Units 1 and 2 was performed to demonstrate that there would be a leak path to the reactor pressure vessel 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 a qualified analysis in accordance with NRC Bulletin 2001-01.

Methodology:

The inspections of the reactor pressure vessel head and VHP nozzles were done 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 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 reactor pressure vessel 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 reactor pressure vessel head and VHP nozzles. The entire examination was recorded on multiple high quality videotapes.

The proximity of the insulation to the reactor pressure vessel head close to top dead center precluded direct robotic crawler access to a number of VHP nozzles. This portion of the exam was conducted using the robotic crawler as a delivery vehicle for a video probe that had also been verified to have the required VT-2 direct examination equivalent visual resolution prior to the exam. This same video probe was used to examine the 10 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. One VHP nozzle (number 67) allowed less than a 360-degree examination due to the proximity of the insulation to the nozzle. Approximately 5-degrees of the nozzle circumference could not be directly observed due to robotic crawler access limitations. This nozzle is on the upper tier (top) and in a corner of the insulation. 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/reactor pressure vessel head interface areas were identified.

The examination encountered a number of areas on the uphill side of many of the VHP nozzles that were obscured by debris, consisting mostly of machining chips and other metallic debris from cutting and capping spare CRDM adaptor nozzles early in DCPP operation. A 40 psig nitrogen line carried by the robotic crawler was used to displace most of the machining chips allowing complete inspection of the area of interest. Debris on the peripheral nozzles was moved using a manually inserted special purpose tool. A thin accumulation of metallic debris near nozzle 42 held in place by an oil film (probably cutting oil) was easily removed by scraping. A noticeable depression in the head was observed near nozzle 56. A review of construction records indicated that this depression was evaluated and accepted during plant construction.

Results:

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

30-Day Response to NRC Bulletin 2002-01, "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity"

NRC Requested Information

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.*

PG&E Response:

Scope of inspection:

During the Diablo Canyon Power Plant (DCPP) Unit 1 eleventh refueling outage, PG&E performed a bare metal visual inspection of the reactor pressure vessel head. This inspection was performed in conjunction with the qualified bare metal visual inspection of the reactor pressure vessel head penetration (VHP) nozzles (VHP nozzle/reactor pressure vessel head interface), required by NRC Bulletin 2001-01. The scope of this inspection is 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.

Methodology:

The inspections of the reactor pressure vessel head and VHP nozzles were done 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 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 with the robotic crawler that would assure complete visual coverage of the reactor vessel head and VHP

nozzles. Inspection personnel used exam data sheets to verify the head penetration being inspected and record the location on the videotape record of each quadrant of a nozzle's inspection, providing independent verification of examination coverage for the reactor pressure vessel head and VHP nozzles. The entire examination was recorded on multiple high quality videotapes.

The proximity of the insulation to the reactor pressure vessel head close to top dead center precluded direct robotic crawler access to a number of VHP nozzles. This portion of the exam was conducted using the robotic crawler as a delivery vehicle for a video probe that had also been verified to have the required VT-2 direct examination equivalent visual resolution prior to the exam. This same video probe was used to examine the 10 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. One VHP nozzle (number 67) allowed less than a 360-degree examination due to the proximity of the insulation to the nozzle. Approximately 5-degrees of the nozzle circumference could not be directly observed due to robotic crawler access limitations. This nozzle is on the upper tier (top) and in a corner of the insulation. 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/reactor pressure vessel head interface areas were identified.

The examination encountered a number of areas on the uphill side of many of the VHP nozzles that were obscured by debris, consisting mostly of machining chips and other metallic debris from cutting and capping spare CRDM adaptor nozzles early in DCPP operation. A 40 psig nitrogen line carried by the robotic crawler was used to displace most of the machining chips allowing complete inspection of the area of interest. Debris on the peripheral nozzles was moved using a manually inserted special purpose tool. A thin accumulation of metallic debris near nozzle 42 held in place by an oil film (probably cutting oil) was easily removed by scraping. A noticeable depression in the head was observed near

nozzle 56. A review of construction records indicated that this depression was evaluated and accepted during plant construction.

Results:

No evidence of degradation of the reactor pressure vessel head was detected. Therefore, no corrective actions were necessary.