Pacific Gas and
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PG&E Letter DCL-01-057

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
Inservice Inspection Relief Request – Control Rod Drive Mechanism Canopy Multiple Pass Seal Weld Repair in Very High Radiation Areas

Dear Commissioners and Staff:

Pursuant to 10 CFR 50.55a(g)(5)(iii), enclosed is an Inservice Inspection relief request (RR) from the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, 1989 Edition with no Addenda, IWA-4000, which would require liquid penetrant (PT) examination of a Control Rod Drive Mechanism (CRDM) canopy multiple pass seal weld repair.

The 1989 Edition, IWA-4000, requires that repairs be performed in accordance with the owner's original construction Code of the component or system, or later editions and addenda of the Code. The Diablo Canyon Power Plant CRDMs were designed and fabricated as ASME B&PV Code, Section III, 1965 Edition, Class A components. The repair of the CRDM canopy will be by multiple pass seal weld repair technique as performed by a qualified weld service.

During a routine scheduled inspection of the reactor head area as part of the Unit 2 tenth refueling outage (2R10), PG&E identified boric acid crystal buildup from CRDM location H-10. The buildup was the result of a small leak in the intermediate CRDM canopy seal weld. This seal weld is required to be repaired prior to completion of 2R10. The multiple pass seal weld repair is considered a repair in accordance with ASME B&PV Code, Section XI, Paragraph IWA-4000, because the weld is performed on an appurtenance to a pressure-retaining component.

Relief is requested from the requirements of IWA-4000 on the basis that the Code examination is impractical due to the high radiological dose associated

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with strict compliance with the requirement. Performance of a PT examination would be contrary to the intent of ALARA radiological controls program. The RR requires an 8X visual examination of the repair and pressure verification testing in lieu of a PT examination.

Similar relief requests have been granted to Carolina Power and Light Company's Shearon Harris Nuclear Power Plant, by letter dated November 6, 1998, Northern States Power's Prairie Island Nuclear Generating Station, by letter dated January 22, 1999, Tennessee Valley Authority's (TVA) Watts Bar Nuclear Plant, by letter dated August 25, 1999, and TVA's Sequoyah Nuclear Plant, by letter dated September 12, 2000. The most recent request was submitted by Carolina Power and Light's H. B. Robinson Steam Electric Plant by letters dated April 20 and 23, 2001.

PG&E requests approval of this RR for use during repair examinations to be performed during the 2R10 currently in progress. Approval by May 18, 2001, is requested to permit effective completion of repairs prior to restoration of the reactor coolant system during 2R10.

Sincerely,

David H. Oatley
Vice President, Diablo Canyon Operations

cc: Ellis W. Merschoff
David L. Proulx
Girija S. Shukla
State of California
Diablo Distribution

Enclosure

DDM/469/A0531070

INSERVICE INSPECTION (ISI) RELIEF REQUEST #CRDR-1

Component for Which Relief is Requested

Relief is requested from performance of liquid penetrant (PT) examinations of multiple pass seal weld repairs on the reactor control rod drive mechanism (CRDM) canopy seals.

ASME Section XI Code Requirements

American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, 1989 Edition with no Addenda, IWA-4000, requires repairs be performed in accordance with the owner's original construction Code of the component or system, or later editions and addenda of the Code. The Diablo Canyon Power Plant CRDMs were designed and fabricated as ASME B&PV Code, Section III, 1965 Edition, Class A components. The construction code would require PT examination be applicable to an appurtenance to a pressure-retaining component, specifically the multiple pass seal weld repair of CRDM canopy seal welds.

Code Requirement from Which Relief is Requested

Relief is requested to perform visual (VT-1) examinations and pressure verification testing in lieu of performance of PT examinations of multiple pass CRDM seal weld repairs.

Basis for Relief Request

Pacific Gas and Electric Diablo Canyon Power Plant(DCPP) requests relief in accordance with 10 CFR 50.55a(a)(3)(ii) from the required surface examinations on the basis that compliance with the Code would result in hardship or unusual difficulty without a compensating increase in the level of quality or safety.

During routine scheduled inspection of the reactor head area as part of the Unit 2 tenth refueling outage (2R10), PG&E identified boric acid crystal build up from CRDM location H-10. The build up was the result of a small leak in the intermediate CRDM canopy seal weld. This seal weld is required to be repaired prior to completion of 2R10. Industry experience of failure analyses performed on leaking canopy seal welds removed from service at other plants have attributed the majority of the cases to transgranular stress corrosion cracking (SCC). The size of the opening where the leakage occurs has been extremely small, normally a few thousandths of an inch. The crack orientations vary, but often radiate outward such that a pinhole appears on the surface, as opposed to a long crack. The SCC results from exposure of a susceptible material to

INSERVICE INSPECTION RELIEF REQUEST #CRDR-1

Basis for Relief Request (continued)

residual stress, which is often concentrated by weld discontinuities, and to a corrosive environment, such as water trapped in the cavity behind the seal weld that is mixed with the air initially in the cavity, resulting in higher oxygen content than is in the bulk primary coolant.

As allowed by the guidance of Code Case N-504-1, "Alternative Rules for Repair of Class 1, 2, and 3 Austenitic Stainless Steel Piping Section XI, Division 1," the CRDM canopy seal weld flaws will not be removed, but an analysis of the repaired weldment will be performed using Paragraph (g) as guidance to assure that the remaining flaw will not propagate unacceptably. This analysis establishes the critical flaw size used to qualify the VT-1 examination method to ensure capability of detecting a flaw sufficiently small to assure an adequate margin of safety is maintained. The canopy seal weld is not a structural weld, nor a pressure-retaining weld, but provides a seal to prevent reactor coolant leakage. The weld buildup is considered a repair in accordance with the ASME B&PV Code, Section XI, reference to the original Code of construction, because the weld is performed on an appurtenance to a pressure-retaining component.

Proposed Alternative

The alternative CRDM canopy seal multiple pass weld repair uses a Gas Tungsten Arc Welding (GTAW) process and VT-1 examination controlled remotely. The VT-1 examination will use a video camera with approximately 8X magnification, within several inches of the weld, qualified to ensure identification of a flaw significantly smaller than the analyzed critical flaw size. Alloy 52 nickel-based weld repair material was selected rather than austenitic stainless steel as required by Code Case N-504-1, Paragraph (b), for the repair because of it's resistance to stress corrosion cracking. Consequently, the ferrite requirements of Code Case N-504-1, Paragraph (e) do not apply. The repair will be documented on Form NIS-2, reviewed by the Authorized Nuclear Inspector, and maintained in accordance with the requirements for archiving of permanent plant records.

The GTAW multiple pass weld repair and VT-1 examination methods result in significantly lower radiation exposure because the equipment is remotely operated after setup. The radiation field typical for this type of repair has been measured to be between 0.7 and 1.3 rem/hour.

INSERVICE INSPECTION RELIEF REQUEST #CRDR-1

Justification for Granting of Relief

The remote controlled GTAW multiple pass canopy seal weld repair and VT-1 examination methods significantly reduce total radiological exposure to workers involved with the activity. The construction code required repair method would involve excavation of the flaws and restoration to the original configuration. The construction code repair method requires manual evacuation of the flaws, manual repair welding, and has a higher risk of failure due to the difficulty of making a quality weld on the canopy seal accompanied by the required back-purging and cleaning. The construction code repair method also requires surface examinations in close proximity to the weld area and would incur a significantly higher total radiological exposure to workers.

Implementation Schedule

This relief request will be implemented during the DCPP Units 1 and 2 second ISI intervals.