U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report Nos. 50-275/88-27 and 50-323/88-25

License Nos. DPR-80 and DPR-82

Licensee: Pacific Gas and Electric Company
77 Beale Street
Suite 1451
San Francisco, California 94106

Facility Name: Diablo Canyon Power Plant - Units 1 and 2

Inspection at: Diablo Canyon Site - Seven Miles North of Avila Beach, California

Inspection Conducted: October 3-7, 1988

Inspected by: W. K. TenBrook, Radiation Specialist — 10/26/88 Date Signed

Approved by: H. S. North, Acting Chief, Facilities Radiological Protection Section — 10/31/88 Date Signed

Summary:

Areas Inspected: Routine unannounced inspection of quality assurance for chemistry activities, water chemistry control, chemical and radiochemical analyses, and onsite follow-up of inspector-identified items. Inspection procedures 30703, 84750 and 92701 were addressed.

Results: Strengths were observed in the following areas: Control of ionic impurities in the secondary system, improvement of water chemistry regimes for primary and secondary systems. Weaknesses were observed in condensate dissolved oxygen control and timeliness of actions by QA and chemistry departments pursuant to audit findings. Overall, the licensee's chemistry program performance was satisfactory in accomplishing tasks important to safety.

DETAILS

1. Persons Contacted

Licensee

P. Baxter, Instructor, Technical & Maintenance Training
*J. Boots, Manager, Chemistry
K. Cortese, Chemistry Foreman
*K. Doss, Senior Engineer, Onsite Safety Review Group
*C. Eldridge, Manager, Quality Control
*J. Gardner, Senior Engineer, Chemistry
*J. Gisclon, Assistant Plant Manager, Support Services
L. Goyett, Engineer, Onsite Engineering
F. Guerra, Radiochemistry Foreman
*R. Harris, Supervisor, Quality Assurance Audits
R. Johnson, General Chemistry Foreman
*W. Kelly, Engineer, Regulatory Compliance
M. Leppke, Onsite Project Engineer
*J. Shoulders, Assistant Onsite Project Engineer
*D. Taggart, Director, Quality Support
H. Thailer, Lead Engineer, Corporate Engineering
E. Wessel, Chemical Engineer
*L. Womack, Assistant Plant Manager, Operations

Contractor

J. Bellows, Quality Assurance Consultant, Cygna

USNRC

P. Narbut, Senior Resident Inspector, Diablo Canyon

2. Follow-up (92701)

Open Item 50-275/87-24-01 (OPEN) This item concerned the clarification of criteria for decisions to repair secondary piping thinned by erosion/corrosion. The licensee had not addressed this issue, citing a lack of reliable pipe wall thinning data and the absence of widely-accepted criteria for repair and replacement decisions. During the interim, the licensee relied upon case-by-case evaluations to make pipe repair and replacement decisions. The licensee stated that an Engineering Instruction addressing pipe repair and replacement decisions would be issued following Unit 2 piping inspections and the March 1989 meeting of the Erosion/Corrosion Task Force. The licensee agreed to supply a written commitment describing the timetable for issuance of the Engineering Instruction. This item will remain open pending NRC review of the Engineering Instruction regarding pipe repair and replacement decisions.

3. Water Chemistry and Radiochemical Analysis (84750)

A. Quality Assurance

The inspector reviewed the involvement of the licensee's Quality Assurance and Quality Control organizations in the chemistry and radiochemistry areas pursuant to 10 CFR 50, Appendix B and ANSI-N18.7.

The last programmatic audit covering these areas was documented in audit report 87093T, dated July 30, 1987, which fell within the designated two year audit cycle. One Audit Finding Report, AFR 87-126, stated that quality-related and safety-related chemistry activities had not been defined pursuant to administrative procedures.

The licensee had deliberated over this audit finding for fifteen months without resolution. The Chemistry Department had been reluctant to classify procedures as safety-related or quality-related and hence be required to revise the designated procedures to comply with the QA Manual, insisting that certain QA Manual requirements were inappropriate for nuclear chemistry activities. As an alternative, the Chemistry Department had drafted a QA Manual procedure intended to guide auditing personnel in evaluating chemistry activities. During the inspection, negotiations were proceeding between Quality Assurance and Chemistry on defining safety-related chemistry procedures versus the acceptability of the draft QA manual procedure on chemistry.

The inspector also reviewed a sample of Quality Assurance technical specification surveillance reports and Quality Control surveillance reports for the period January 1988 to the date of the inspection. No technical specification (TS) noncompliance was identified within the sample. Quality Control surveillance 88-39 identified problems involving attention to detail during Reactor Coolant System (RCS) hydrogen analyses. These problems appeared unrelated to other difficulties in RCS hydrogen control described in Section 2.B., below. The licensee also addressed INPO findings in the QC surveillance program.

The involvement of Quality Assurance and Quality Control in the chemistry area has been satisfactory. However, some outstanding QA findings had not been expeditiously resolved. The Chemistry and QA Departments' inability to reach a satisfactory compromise with regard to QA requirements in the chemistry area suggests a weakness in the licensee's ability to promptly integrate specialized plant activities into their overall QA oversight program.

B. Water Chemistry Control and Analysis

The inspector reviewed monthly reports of chemistry data, laboratory logs, and observed instrument indications during tours to assess overall chemistry performance with respect to the technical specifications, EPRI and vendor guidelines, and licensee procedures.

RCS ionic impurities were held well below action levels, and chloride levels were particularly low. RCS TS fluoride levels were not approached, but occasionally appeared in chemistry data at levels below

the 50 ppb detection limit for the specific ion electrode method employed.

The licensee had identified continuing problems involving RCS hydrogen control. The inspector noted that the licensee's target control band of 30-40 cc/kg RCS dissolved hydrogen is relatively restrictive, and approximated the EPRI recommended 25-35 cc/kg for alloy 600 steam generator tubes. Over the past year, operating unit RCS hydrogen levels were out of the procedural control band from 10% to 30% of the time. To improve hydrogen control, the licensee had decreased the high pressure alarm setpoint on the volume control tank (VCT) and increased hydrogen addition regulator settings, as well as improving communications between operations and chemistry. The inspector observed that Unit 1 operating hydrogen levels were generally within the control band the month prior to the inspection, exhibiting improved performance. Corrective actions for Unit 2 were to be completed prior to startup.

Licensee procedure OP F-5:I, "...Control Limits and Action Guidelines for Primary Systems...," contained a new lithium/boron coordinated chemistry, which provided an RCS pH increase from 6.9 to 7.5 during the middle and later portions of the operating cycle. This pH regime would decrease deposition rates of corrosion products on RCS surfaces, hence decreasing radiation dose rates in and around RCS components.

The inspector noted that the licensee's coordinated RCS lithium concentration band at the beginning of the cycle did not provide for a RCS pH of 6.9 or above, as recommended in the EPRI Primary Water Chemistry Guidelines. The inspector reviewed a letter from the licensee's reactor/fuel vendor, dated August 2, 1988, which contained the approved lithium control program. The program specified a pH lower than 6.9 prior to constant lithium operation in order to conservatively decrease the risk of primary water stress corrosion cracking (PWSCC) due to sustained high RCS lithium concentration.

Ionic impurities in secondary water systems had generally decreased, in terms of ppb-days. Periodic excursions of sulphate and sodium were observed in condensate polisher discharge and steam generator blowdown, associated with operating transients. The excursions were generally attributed to polisher operation and reappearance of hide-out from previous polisher impurity ingress. Concentrations greater than action level one were corrected within one week of diagnosis, per procedure OP F-5:II, "Chemistry...Action Guidelines for Secondary Systems".

Condensate dissolved oxygen frequently exceeded action levels. This condition had been attributed to condensate system inleakage, and the licensee had taken appropriate steps to identify such leakage. However, recent contractor studies suggested that the condenser air removal system was inefficient, allowing significant dissolved oxygen concentrations to remain in the condensate. Preliminary results indicated that the inefficiency was caused by fouling of the condenser near the air ejectors, causing air binding, high and uneven hotwell water level, inappropriate location of condensate polisher recycle line discharge, and low-biased instrument indications of offgas flow rate. The inspector

will examine the licensee's actions to improve condensate dissolved oxygen performance during a future inspection (50-275/88-27-01).

The licensee had initiated a boric acid addition program for secondary water at the request of their steam generator vendor. The boric acid addition is intended to prevent tube denting by borate intrusion into crevices and pores, passivating the surface, and thereby preventing attack by other chemical species. Secondary water chemistry effects were generally subtle, except for a changed relationship between specific conductivity and ammonia concentration. The inspector calculated the peak boron injection rate as approximately equivalent to the boron ingress to the steam generators resulting from the TS identified leakage limit, 10 gpm, at 1000 ppm boron operation. Given the low boron concentrations involved, the process did not appear to impair any safety systems or place systems in an unanalyzed condition.

The inspector frequently toured the primary and secondary system laboratories and the condensate polisher rooms during the inspection. The secondary water chemistry laboratory was a significant addition to chemistry facilities. The inspector observed that housekeeping in the primary water laboratory had improved since previous inspections, as the new laboratory performed much of the secondary system analytical workload. Fume hood flow and maximum sash openings were uniformly established, but some secondary lab hood sashes were left wider than maximum. No wet chemistry activities were observed in hoods opened beyond maximum. Coats and safety glasses were worn within all laboratories. A precautionary frisk was required to exit the secondary lab, located outside the controlled area boundary.

The inspector examined the instrumental control program for water chemistry analyses. RCS fluoride, by the specific ion electrode method, had exhibited some off-normal behavior with independent control standards at 20 ppb, which was at or beyond the sensitivity of the technique. Control standard concentration was changed to 100 ppb, which was within the capabilities of the method, and response was improved. Also, the licensee now considers instrumental systematic bias in control chart evaluation by identifying seven consecutive control points above or below the mean as a bias trend.

The inspector reviewed the results of chemical analysis intercomparisons conducted using spiked samples from a vendor laboratory. Poor results were obtained for the intercomparison of a secondary water matrix sample containing 20 ppb fluoride. The licensee did not routinely perform fluoride analysis for secondary water, and the specific ion electrode (SIE) method was routinely used for RCS fluoride. The poor intercomparison results reflected the 50 ppb fluoride detection limit by SIE. Although it was agreed that SIE was acceptable for routine RCS fluoride, the licensee stated it was their intention to use ion chromatography to improve the accuracy and sensitivity of routine fluoride analyses.

The licensee had implemented a superior program for control of primary and secondary water chemistry, chiefly by the prompt implementation of improved RCS coordinated chemistry, boron passivation for steam

generators, and incremental reduction of secondary water impurities. Weak areas remained in condensate oxygen control, and the improving effectiveness of VCT hydrogen control.

B. Radiochemical Analysis

The inspector reviewed the licensees procedures and practices for sampling and analysis of waste oil and other mixtures. Procedure RCP D-611, "...Release of...Sludges, Slurries and Oils from the RCA," instructed radiation protection personnel to mix these wastes thoroughly, but also cautioned the reader to take samples of each phase when mixing was not achievable. Criteria for unconditional release were less than 0.1 pCi/ml gamma activity, less than 1000 pCi/ml tritium, and administrative approvals. The procedure addressed NRC Information Notice IN-83-33, "Nonrepresentative Sampling of Contaminated Oils."

The inspector verified that adequate measurement control checks were performed for radioanalytical instruments per procedures and industry standard practices. Areas for improvement regarding width of control limits were being addressed in response to recent independent audit findings.

The inspector conducted tours of the 85' elevation of the Auxiliary Building, principally to observe operation of the Unit One Post Accident Sampling System (PASS). Area radiation monitors and air monitors were observed to be within their calibration dates, and postings were properly maintained. The inspector observed reactor coolant and containment atmosphere sampling using the PASS during a training exercise. Boron concentrations obtained by the carminic acid method in the PASS laboratory were in excellent agreement with routine measurements. The Inspector also reviewed attachments to Surveillance Test Procedure STP G-14 which contained intercomparisons for all measurements required by NUREG-0737, II.B.3. for the period January to June 1988. Intercomparison with routine measurements indicated that representative samples and accurate measurements were obtained using PASS equipment for those concentrations observable with PASS lab techniques.

The licensee's program for radiochemical measurements was satisfactory. Procedures for sampling two-phase mixtures were considered superior, given that personnel properly follow instructions for sampling each phase as necessary.

4. Exit Meeting (30703)

The Inspector met with licensee management on October 7, 1988, to discuss the scope and findings of the inspection. The inspector recognized that the resolution of AFR 87-126 remained subject to continued internal negotiation. However, the inspector also stated that programmatic audits of the chemistry program were expected to be performed as required, and should not to be delayed contingent on the resolution of past audit findings, including AFR 87-126. The inspector also confirmed that the licensee would prepare and submit a written commitment containing a schedule for issuance of a pipe repair/replacement decision instruction.