U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report Nos. 50-275/86-28 and 50-323/86-26

Docket Nos. 50-275 and 50-323

License Nos. DPR-80 and DPR-82

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

Facility Name: Diablo Canyon Units 1 and 2

Inspection at: San Luis Obispo County and San Ramon, California

Inspection conducted: September 29 through October 3, 1986, and October 20-24 and 27, 1986.

Inspectors: C. A. Hooker — 11/25/86
C. A. Hooker, Radiation Specialist — Date Signed

C. A. Hooker for — 11/25/86
J. E. Russell, Radiation Specialist — Date Signed

Approved by: G P Yuhas — 11/25/86
G. P. Yuhas, Chief — Date Signed
Facilities Radiological Protection Section

Summary:

Inspection on September 29 - October 3, 1986 and October 20-24 and 27, 1986

Areas Inspected: Routine unannounced inspection of occupational exposure during extended outages for Unit 1; actions on previous inspection findings; external exposures control; internal exposure control; ALARA; radiological environmental monitoring; review of licensee reports; facility tours; and allegation followup. Inspection procedures addressed included 30703, 83727, 83726, 83724, 83725, 83728, 83729, 80721, 90713, 92701 and 90712.

Results: Of the areas inspected, no violations or deviations were identified.

DETAILS

1. Persons Contacted

A. PG&E Personnel

R. C. Thornberry, Plant Manager
J. A. Sexton, Plant Superintendent
*L. F. Womack, Operations Manager and Acting Plant Superintendent
J. V. Boots, Manager, Chemistry and Radiation Protection (C&RP)
*R. P. Powers, Senior C&RP Engineer
*J. E. Gardner, Senior C&RP Engineer
*D. P. Sisk, Regulatory Compliance Engineer
*J. A. Hays, General Foreman, Radiation Protection (RP)
T. P. Bast, Senior C&RP Coordinator
R. L. Johnson, General Foreman, Chemistry
P.A. Szalinski, Senior Health Physicist, Department of Engineering and Research (DER)
R. S. Snyder, Dosimetry Foreman
L. T. Moretti, RP Foreman
J. A. Ramirez, RP Foreman (Upgrade)
R. W. Clark, RP Foreman

B. Contractors

A. J. Flaherty, Acting RP Supervisor (Bartlett Nuclear, Inc.)
J. J. D'Angelo, Senior RP Technician (Bartlett Nuclear, Inc.)
C. D. Brown, Senior RP Technician (Bartlett Nuclear, Inc.)
R. J. Doran, Lead Electrical Superintendent (Bechtel)
C. E. Dennerlein, Electrical Foreman (Bechtel)
D. T. Krewson, Electrician (Bechtel)
T. F. Pyles, Electrician (Bechtel)
R. J. Cowan, Electrician (Bechtel)

C. NRC Inspectors

P. P. Narbut, Senior Resident Inspector
M. L. Padovan, Resident Inspector
K. E. Johnston, Resident Inspector

* Denotes those present at the exit interview on October 24, 1986.

In addition to the individuals identified above, the inspectors met and held discussions with other members of the licensee's and contractor's staffs.

2. Licensee Action on Previous Inspection Findings (Open) Followup (50-275/86-03-02 and 50-323/86-03-02):

Inspection Report Nos. 50-275/86-03, 50-323/86-03, 50-275/86-08, 50-323/86-08, 50-275/86-11, and 50-323/86-12 describe previous inspector efforts regarding effluent sampling concerns in regard to the licensee's

hot chemistry laboratory hood exhaust system. During this inspection the licensee was evaluating installating a new hood and routing the laboratory exhaust to the plant vent system. No final decisions had been made at this time. This item remains open.

3. Radiological Controls Units 1 and 2

This part of the inspection covered the areas of: occupational exposure during extended outages; external exposure control; internal exposure control; and ALARA. The inspection was focused primarily on radiological controls for the first refueling outage of PG&E's Diablo Canyon Power Plant (DCPP) Unit 1. Unit 2 was operating at 100% power.

The inspectors reviewed licensee audits, selected procedures, records of radiation and contamination surveys, external exposure and personnel contamination reports, selected personnel exposure files, radiation work permits (RWP's) and special radiation work permits (SWP's), ALARA packages and records of RP overtime hours. In addition, the inspectors observed workers in radiologically controlled areas (RCA's), attended licensee meetings, held discussions with licensee representatives, and conducted facility tours to determine the licensee's compliance with 10 CFR Part 20, Technical Specifications, licensee procedures and recommendations as outlined in various industry standards.

A. Changes

The licensee had established a temporary access control point for Unit 1 containment at the 140 ft. elevation level in the turbine building adjacent to the containment air lock. The management of radiation exposure records for containment work by use of the Automatic Computer Access System (ACAS) and computerized Plant Information Management System (PIMS) were being utilized at for Unit 1 activities.

Work in the RCA's for the Unit 1 and 2 auxiliary buildings, fuel handling buildings, laundry facility, and Unit 2 containment was being controlled at the primary 85 ft. elevation RCA access control area.

No violations or deviations were identified.

B. Staffing, Planning and Preparation (Unit 1 Outage)

The C&RP department had made temporary onsite management changes and were provided four Health Physicists (HPs) from the Corporate General Office (GO) to augment supervision and perform internal quality control functions. Specifically, one on-site C&RP engineer was assigned to assist in supervision of back shift RP activities, one HP from the GO was assigned to dosimetry full time for supervision and review of radiation dose margins for containment work, one HP from the GO was assigned to the back shift to provide technical RP assistance, and two HPs from the GO alternated in performing on site QC audits and assistance in radiological protection activities.

The licensee had contracted 39 senior and 20 junior RP technicians to augment the normal plant staff for the refueling outage. Select on-site senior RP technicians were provided 20 hours of management training and given temporary upgrades to supervise and coordinate RP activities for specific jobs or tasks (e.g. containment, steam generator (S/G), and auxiliary building work) for days and backshifts.

Specialized training was provided in preparation for S/G work and reactor coolant pump (RCP) seal work. Workers were trained utilizing the licensee's newly acquired mockups to become familiar with specialized equipment and radiological controls for tasks they were to perform.

The licensee had available and was noted to be using portable HEPA filtered ventilation systems to support S/G work and other activities involving potential airborne radioactive materials. Survey instrumentation and protective clothing were well supplied.

The licensee had preplanned and set ALARA goals for identified tasks prior to the start of the outage. Jobs and tasks for the outage work were coordinated through the work planning department.

No violations or deviations were identified.

C. Training and Qualification of New Personnel

Inspection Report Nos. 50-275/86-19 and 50-323/86-19 document previous inspection efforts in this area for outage work.

No violations or deviations were identified.

D. Audits

Quality Assurance (QA) Audit, Report No. 86122T, was examined. The audit was conducted on June 16-24, 1986, to verify that DCPP and the Department of Engineering Research (DER) had effectively implemented the Code of Federal Regulations, DCPP Technical Specifications, Final Safety Analysis Report (FSAR), and departmental procedural requirements established for the radiation protection personnel monitoring program. The scope of the audit included a review of the adequacy and implementation of procedures. The inspectors noted that the audit was performed by qualified HP personnel from the GO staff.

The audit appeared extensive and included: interviews with cognizant management personnel and reviews of internal and external radiation dose assessment records; medical surveillance records; reports on dosimeter irregularities; dosimeter calibration records; dosimeter issuance, processing and control records; equipment calibration records; training records of DER and DCPP dosimetry technicians; and the Annual Exposure Report for 1985. The audit report listed some 45 documents that were examined with the number of samples examined.

The audit identified one deficiency involving DER's control of damaged thermoluminescent dosimeters (TLDs) that resulted in one audit finding report (AFR) being issued to DER. The audit included one recommendation for DCPP concerning procedure changes to address training requirements for dosimetry technicians. The QA audit verified that training had been performed and documented; however, the requirements were not outlined in DCPP's procedures. No Nonconformance Reports (NCRs) were issued to DER or DCPP.

The audit concluded that with the exception of the one deficiency DCPP and DER had been effectively implementing the radiation protection program for personnel monitoring.

No violations or deviations were identified.

E. External Exposure Control

Personnel monitoring was based on the use of TLD's and pocket ion chambers (PICs). The TLDs were issued and controlled by the licensee and TLD processing was performed by PG&Es Department of Engineering Research (DER) on a contract basis. The TLD processing service (DER) has received accreditation by the National Voluntary Laboratory Accreditation Program (NAVLAP). The licensee conducts a monthly testing and evaluation program of DER's processing service using their own gamma and neutron irradiated TLDs. Exposure data from TLDs can be provided within a few hours in cases of urgent need and less than one hour in emergencies since the DER processing service is located on site. The licensee required as a minimum a TLD and PIC for entries into the RCAs. In addition to routine badging, supplementary TLD packets were prepared for special tasks. S/G platform and S/G bowl workers were provided head, chest, back, arm and leg TLDs. In addition, low and high range PICs were located on the chest and high range PICs at all other TLD locations. A sacrificial PIC was utilized on the outside of the air-fed hoods. The sacrificial PIC data, along with time keeping, were used for recalculation of stay time between entries. Observations by the inspectors during tours revealed no failures to properly use dosimetry devices.

The licensee had recently started using a subsystem of the plant computerized (PIMS) system as the master control for personnel dosimetry and record tracking for entries into the RCAs. The licensee uses the PIMS at the RCA access control stations and dosimetry office. Prior to being issued a TLD, each worker must have had the required radiological training, provide past exposure history, and received a whole body count (WBC). Radiation exposure data, both TLD and PIC, is retained in the computer based system which provides prompt data recovery. PIC measured exposures were entered upon each workers exit from the RCAs. Daily exposure updates were provided to general foreman, each department, and general contractor. Exposures were reviewed on a continuing basis by a C&RP engineer assigned to maintain the licensee's ALARA data.

The following procedures and documents were reviewed for implementation of the licensee's external radiation exposure control program:

Procedures

- NPAP C-200 General Requirements for Radiation Protection Programs
- RCS-1 External Radiation Dose Control
- RCP G-110 Personnel External Exposure Dosimetry Control
- RCP D-300 Responsibilities for Personnel Dosimetry Reports and Recordkeeping
- RCP D-310 External Dosimetry Requirements and Records
- AP B-60 Access Control
- RCP G-130 Control of Access for Radiation Protection Purposes
- RCS-7 Surveys
- RCP-G-100 Radiation Work Permits
- RCP D-320 TLD/Film Badge Issue and Control
- RCP D-220 Entry Into Plant Areas Which Have a High Potential for Radiation Overexposure
- RCP D-600 Personnel Decontamination Evaluation
- RCP S-3 Westinghouse/EPRI Standard Radiation Monitoring Program
- TP TC-8501 Fuel Transfer Tube Survey

Documents

- Fuel Assembly Transfer Report - Summary Report of Unit 1 Radiation Surveys During Fuel Assembly Transfer (TP TC-8501)
- Memo from DER to R. P. Powers dated September 18, 1986, Steam Generator TLD Tree Dose Measurements
- Memo from DER to R. P. Powers dated September 26, 1986, Beta Exposure from TLD Tree Using UD808 Dosimeters

Based on review of the above procedures and documents, discussions with licensee representatives, and facility tours the following observations were made:

- RCS-1 describes the external radiation dose limits and requirements set forth in 10 CFR Part 20 and procedure RCP G-110 discusses methods and policies utilized to implement the provisions of RCS-1, and sets forth the licensee's administrative limits for external whole body radiation dose control to avoid exceeding the regulatory limit of 10 CFR Parts 20.101(a) 1.25 Rem and 20.101(b)(1) 3 Rem. The licensee's whole body dose administrative limits are:

  1) Normal quarter 1000 mrem
  2) Maximum quarter 2500 mrem
  3) Maximum year 4200 mrem

  Section 3.C of RCP G-110 states in part that when a maximum administrative limit has been reached, additional exposure may be received only with written authorization of the C&RP Manager and the Plant Superintendent or their designee. Section 9 Authorization to Exceed Administrative Limits under Note: states, "This section is not applicable for raising the administrative limit above 1000 mrem/quarter after receipt of all prior radiation exposure history and completion of the NRC Form 4."

  In order to exceed the licensee's administrative limit of 2500 mrem/quarter and 4200 mrem/year this section of the procedure requires and describes the formal process for approval, and the use of form 69-11579 to document approval or disapproval. The licensee's procedures do not describe or specify a formal method to document radiation exposure specifically for workers who have been approved to exceed the licensee's administrative limit of 1000 mrem/quarter or the 1.25 Rem/quarter limit specified in 10 CFR 20.101(a). The inspectors did verify through dosimetry records review that, prior to any worker being permitted to exceed the licensee's 1000 mrem/quarter limit and/or NRC's limit specified in 10 CFR 20.101(a), the licensee performed the requirements specified in 10 CFR Parts 20.101(b) and 20.102(b).

  Requests to exceed these limits are normally verbal from the RP supervisor or designee to the supervisor of dosimetry or designee who researches the workers records to ensure regulatory requirements are met, documents the request and approval on a PIMS entry data form, makes the PIMS entry and places the form in the workers personnel file. The need to formalize requests and approvals for workers to exceed the 10 CFR 20.101(a) limits were discussed with the RP supervisor during the inspection and at the exit meeting. The licensee acknowledged and agreed to evaluate the inspectors' concern.

- On September 30, 1986, the inspector observed RP activities during the first and second fuel assembly transfers from the Unit 1 core to the Spent Fuel Pool (SFP). The licensee had preplanned and developed procedure TP TC-8501 to describe the

survey program to be performed to evaluate the shielding of the fuel transfer tube (FTT) during fuel transfers.

The licensee had previously identified two areas of major concern during fuel movements. The 85 ft. elevation level near the Auxiliary Boiler room and inside the containment at the 91 ft. elevation level at an area above the shield surrounding the transfer tube.

The inspector accompanied the RP General Foreman (RPGF) while conducting a tour of the auxiliary building, FHB, and auxiliary building roof (140 ft. elevation level) to ensure that controls had been established in accordance with TP TC-8501. The inspector noted that the licensee had roped off and set up flashing yellow lights in the areas of concern. In addition, a RP technician with a survey meter was at each location. The inspector also noted the placement of TLDs and that the licensee had established remote reading high range radiation survey instruments at the areas identified in the procedure. All instruments were observed to have current calibration tags.

During the first fuel assembly (C-36) transfer the inspector observed activities in the fuel handling building (FHB). The licensee had implemented foreign material and small item control by maintaining a housekeeping Zone 3 control barrier around the SFP, a constant air monitor was in operation between the SFP and air exhaust system, the remote area monitor (RE-58) was inservice, the FHB ventilation system was in operation (TS 3/4.9.12), a portable alarming radiation instrument was being used on the refueling bridge, and a RP technician was observed performing radiation and contamination surveys during fuel movement operations.

During the transfer of the second fuel assembly (C-56), the inspector observed RP personnel performing surveys of the unshielded portion of the FTT and outside the cage at the 85 ft. level penetration area near the Auxiliary Boiler room. The licensee and inspector observed a reading of 8,000 R/hr on the licensee's remote high range dose rate instrument. The transfer time was about 45 seconds. Readings at the locked gate into the FTT area were noted to be $\leq$2 mR/hr. The RP personnel performing surveys inside the containment reported readings up to 1,200 R/hr at the area above the FTT shield at the 91 ft. elevation area.

During the period October 1-4, 1986, the licensee performed followup surveys to complete their evaluation of shielding design and controls needed during fuel transfer. During a subsequent visit the licensee's summary report and followup surveys were examined. The licensee identified two separate areas with potential debilitating radiation levels. The 85 ft. elevation level near the Auxiliary Boiler room and the area above the shield of the FTT at the 91 ft. elevation level in the containment. The licensee also identified five areas

within the auxiliary building and FHB with dose rates of 100 mR/hr to 350 mR/hr during fuel transfers (about 30 to 45 seconds per transfer). The licensee barricaded the areas above 100 mR/hr and posted them with "Danger High Radiation Area During Fuel Transfers" signs. The areas with the very high dose rates as identified above were controlled in accordance to TS 6.12.1 (Very High Radiation Areas) and licensee procedure RCP G-130.

IE Bulletin 78-08, Radiation Levels from Fuel Transfer Tubes, addresses actions to be taken by licensees regarding exposures from fuel transfer tubes and adjacent areas. Observations during the inspection and a review of the licensee's surveys and procedures revealed that the licensee had taken the appropriate and proper actions to ensure that design and established controls prevent inadvertent radiation doses to workers. The licensee plans on a similar evaluation of the Unit 2 FTT during their upcoming refueling outage. The inspector had no questions regarding IE Bulletin 78-08.

- The inspector reviewed the licensee's Steam Generator TLD Tree Dose Measurement Summary, dated September 18, 1986, and Beta Exposure from TLD Tree UD808 Dosimeters, dated September 26, 1986. The licensee used two phantoms in this study, one facing the S/G tube sheet and one facing the divider plate. On the tube sheet phantom, TLDs were arranged to simulate the dose to the head, eyes and wrists. On the divider plate phantom, the TLDs were arranged to simulate the dose to the chest and knees.

  Based on the TLD survey, the licensee determined that for this outage the whole body gamma exposure was the limiting constituent. The dose rates obtained from the TLD study were also in close agreement with dose rate measurements obtained by the licensee's portable radiation survey instruments. No anomalies were identified by the inspectors during this review.

Exposure records for selected individuals were examined. The inspectors focused primarily on individuals involved in Unit 1 S/G work. In the samples examined, it was verified that forms NRC-4 and the forms NRC-5 or equivalents were filed, if appropriate. For terminated employees, letters documenting exposures pursuant to 10 CFR 19.13 had been prepared and sent. Problems associated with termination reports are described in paragraph 5. The inspectors verified information pertaining to RG 8.13 had been read and acknowledged where appropriate. The inspectors determined that training records, WBCs, medical qualification and respirator fit reports were maintained in the personnel files.

In review of dosimetry data sheets, the highest official quarterly whole body gamma dose noted for any one worker was 1.931 Rem during the third quarter, 1986. This individual was involved in the installation of S/G nozzle dams. Beta exposures recorded were typically less than 25% of the gamma doses to workers making S/G entries. Updated form NRC-4s were researched prior to exceeding the

10 CFR 20.101(a) limits and no one exceeded the 10 CFR 20.101(b) limits.

In review of containment entries during power operations, the inspector noted that the licensee calculates skin doses based on gaseous activity MPC values. Skin doses were also estimated for individuals involved in noble gas airborne occurrences in the power block.

Personnel contamination survey reports during the period September 1 through October 24, 1986, were examined. No personnel contaminations requiring dose evaluation had occurred. The licensee had experienced 22 personnel contaminations during this period. Contamination levels were noted to be predominantly low. The licensee maintained a graph of personnel skin and personal clothing contaminations. Personnel contaminations were promptly reviewed and evaluated by the licensee.

No violations or deviations were identified.

F. Internal Exposure Control

Review of the licensee's MPC work and log sheets for workers' MPC hours did not indicate any individual had received an intake of radioactive material which would exceed the 40-hour control measure requiring an evaluation pursuant to 10 CFR 20.103(b)(2). Whole body counts examined for several individuals indicated no positive results. The inspectors were also informed by cognizant licensee personnel that no positive WBC have been observed during the past year that indicated an intake of radioactive material.

The licensee uses an installed Helgeson "Quickie" and a bed type counter for routine and special WBCs. In addition, the licensee had rented a Helgeson "Quickie" counter to be used as a back up during the refueling outage.

The following procedures were reviewed regarding implementation of the licensee's internal exposure program:

- RCS-2 Internal Dose Control
- AP B-60E Access Control: Radiologically Controlled Area Access Requiring Use of Respirator Equipment
- RCP G-120 Personnel Internal Exposure Control
- RCP G-150 Use of Respiratory Equipment for Protection Against Airborne Radioactive Materials
- RCP D-700 Cleaning and Inspection of Filter and Airline Respirators
- RCP D-705 Cleaning and Inspection of Self-Contained Breathing Apparatus

- RCP D-710 Use of Constant Flow Air Line Respirators at Diablo Canyon Power Plant

- RCP D-760 Instructions for Use of In-Line Breathing Air Monitor Panel

In addition to the review of the above procedures, on September 30, 1986, the inspector observed a respirator training class and respirator fit testing. During facility tours the inspectors observed respiratory equipment being used, inspected breathing air monitor panels and observed air sampling equipment being used.

Based on the reviews and observations during the inspection, the inspectors determined that the licensee was effectively meeting their internal exposure control program requirements and that these were consistent with 10 CFR 20; RG 8.15, Acceptable Programs for Respiratory Protection, and NUREG-0041, Manual of Respiratory Protection Against Airborne Radioactive Materials.

No violations or deviations were identified.

G. ALARA

The effectiveness of the licensee's implementation of their ALARA program was examined. Since this was the licensee's first refueling outage, their was no historic data on which to base their 1986 exposure goals. The licensee used information taken from NUREG/CR-4254, Occupational Dose Reduction and ALARA at Nuclear Power Plants. The licensee also utilized exposures from outage jobs at other Westinghouse reactors. The licensee established a goal of 75 man-rem for routine tasks and 175 man-rem for outage related tasks, a total of 250 man-rem for 1986. Through September 30, 1986, the licensee had used a total 94 man-rem for DCPP based on TLD results. As of October 22, 1986, the licensee had used 189 man-rem based on PIC readings which were normally about 20% higher than the TLD results. Daily computer updates of all routine and refueling outage work were utilized by the licensee to evaluate their effectiveness in maintaining preestablished ALARA goals.

The inspectors noted that there were about 10 tasks that were major contributors to personnel exposures (e.g., containment inservice inspection, removal/installation of S/G manways and diaphragms, S/G eddy current inspection, remove S/G secondary manways and J-Tube replacement, containment snubbers, RP activities in the containment, replacement of reactor coolant system (RCS) wide and narrow range resistance temperature detectors (RTDs), S/G nozzle dams, and remove S/G broken manway bolts and repair bolt holes). Of these jobs the licensee had not intended to install S/G nozzle dams; however, due to delays caused by having to rerack the Unit 1 fuel pool, the licensee used nozzle dams to reduce delays in other outage tasks. In addition, snubber work exceeded expectations. It was noted that six of these major tasks exceed their goals, however, many other tasks were under their estimated goals, such as the replacement of

the RCS wide and narrow range RTDs. The licensee expected to meet their 1986 goals.

Action requests for jobs to be performed were sent to the licensee's work planning center and to a planner assigned to each department (e.g. electrical, mechanical maintenance and I&C). Through the work planning center, jobs and tasks in the RCAs were coordinated through a senior C&RP coordinator. With the aid of PIMS, work was assigned to an existing SWP or a new one was generated. From daily surveys sent to the work planning center and other available information from PIMS, the C&RP coordinator assigned an ALARA code to the request and sent them to the C&RP foreman for further review. Daily work schedules from each department were also sent to the work planning center and, through the C&RP coordinator, reviewed and discussed with the RP department at the start of each day (for work within the RCAs). The C&RP coordinator also tracked and maintained records of preestablished man-rem estimates and man-rem used for each job on a daily basis.

The following procedures were examined regarding implementation of the licensee's ALARA program.

- NPAP C-200 — General Requirements for Radiation Protection Programs
- AP C-200 S2 — Operational ALARA Personnel Exposure Implementation
- NPAP B-2 — General Training Requirements for Onsite Personnel

Based on the above observations, discussions with licensee representatives, and procedure and records review, the inspectors concluded that the licensee appeared to be effectively implementing their ALARA program. However, during the inspection one occurrence was noted in which the best judgement may not have been exercised during the initial phase of one job as described in the subsequent subparagraph.

No violations or deviations were identified.

H. Allegation Followup

(Closed) Allegation No. RV-86-A-0081: On October 15, 1986, a contract electrical worker, A, contacted a NRC resident inspector at the DCPP and made an allegation regarding poor ALARA practices. Worker A stated, in part, that on October 13, 1986, while starting work with three other contract electricians under SWP No. 1335, replacing electrical conduit in the Unit 1 containment on the 91 ft. elevation level between RCPs 3 and 4, the RP technician, B, identified a valve (later determined to be an elbow on a 1 inch vent line of the reactor coolant system (RCS) hot leg) with a 700 mR/hr hot spot. Individual B instructed the 4 electrical workers on the job to work clear of the hot spot. The electrical workers informed

individual A that their work involved close proximity and periodic contact with the hot spot. Worker A also stated, in part, that individual B then notified the RP senior on duty, C, to request shielding be placed around the valve. Individual C, without personally surveying the area, reportedly stated over the telephone, according to worker A, that it would involve too much engineering and paper work to shield the valve and suggested the electricians work until they reached their 120 mrem/entry dose limit. Worker A stated that on October 14, 1986, another RP Technician, D, raised similar concerns and requested that shielding be installed. Individual C, again, denied the request. On October 15, 1986, shielding was installed on the valve, taking approximately 20 minutes. Worker A claimed that he received 350 mrem in the three days.

On October 21, 1986, during a routine inspection, at DCPP, the inspectors were informed of the allegation by the NRC Region V office. The subsequent NRC inquiry included an examination of all records identified in regard to work to SWP No. 1335 focused on the specifics pertaining to the allegation and conducted interviews with cognizant licensee representatives and the contract electrical workers. Based on the examination of records and the interviews, the inspectors determined that:

- On September 10, 1986, the licensee completed their pre-job ALARA review (Reference Form 69-11590, Job Description/RWP/SWP Request) and assigned 14.5 man-rem total to the work to be done under SWP No. 86-1335, Replace RCS Wide Range and Narrow Range RTDs (15 locations), Including: Scaffold Work, Area Setup, Inspections, Conduit and Support Work.

  It was noted that in the licensee's dose summary, 2.0 man-rem had been estimated for the conduit portion of the job. The dose estimates were derived from 18 inch readings from each RTD and general field readings in the work areas. The form noted that the conduit portion of the job was to start in about 30 days.

- SWP No. 86-1335, dated September 12, 1986, noted that the maximum dose rate allowed to workers was 400 mR/hr. The special instructions attached to the SWP stated under Item 1.B), "Monitor your PIC frequently, exit the containment immediately upon reaching 120 mrem and contact a RP Foreman." Item 7.A, stated, "RP Technicians will survey work area to identify and document radiation sources and low dose waiting areas." It was also noted that work in areas greater than 100 mrem/hr required the worker to wear an alarming dosimeter set to alarm at 120 mrem.

- On October 21 and 22, 1986, individual B was interviewed and informed the inspectors that on October 13, 1986, he accompanied the electrical worker into the bio-shield area to perform a pre-job survey of their work area. During the survey he observed a reading of 700 to 1000 mrem/hr with a Teletector

on an elbow of a 1 inch line coming off of the RCS piping. At 18 inches from the line the field reading was about 300 mrem/hr. The readings were taken from a scaffold set up for the work in the area. The electrical workers scoped out the work for individual B and informed him that the work would take about three days and at times they would have to work near or on the hot spot to perform work in that location. The area of work was in a confined space and the electrical workers would have to crawl over the hot line and come in contact with it at times.

Individual B further informed the inspector that he stopped the job due to the hot spot and telephoned individual C. Individual B stated, in part, that he informed individual C of the dose rates involving the hot spot, and the expected duration of the job and asked the question, "Can shielding be installed in this area?" Individual B further stated that individual C's reply was that it would take a request form, in a manner that implied that it would take too much paper work, and that the job was being controlled by the 120 mrem/entry dose limit. The inspectors also learned from individual B that the electricians were wearing personnel dosimetry devices including an alarming dosimeter, in the location expected to receive the most whole body dose. He also said that the electricians were somewhat upset and that he informed them they could talk to their boss. The inspector also learned that only two of the four electricians were directly involved in work in the area of the hot spot and that the electricians at this time were entering the area only intermittently to scope out and start the removal of old conduits in a number of areas within the bio-shield.

On October 21, 1986, the inspector made a tour through the Unit 1 containment and visually checked the work area where the hot spot was located, in the company of individual D. The inspectors noted that the hot spot was unshielded at this time. The inspectors performed dose rate measurements using NRC RO-2 ion chamber, S/N 897, due for calibration January 9, 1987. The readings noted by the inspectors indicated no differences from those obtained by the licensee on October 13, 1986, the inspectors noted that the conduit work that had been performed in this area, due to the confined space, would, at times, cause a worker to come in contact with the 1 inch line and hot spot and, when not in contact, a worker would have to be in very close proximity to the hot spot.

Individual D was interviewed at this time and again on October 24, 1986. The inspectors were informed that he could not remember exact dates, however, he had made a pre-job survey, noted the hot spot in the work area and halted the job. He called individual C, informed him of the dose rates and the amount of work to be performed and stated that someone higher up than himself (C) would have to approve any further work in the area without having shielding installed around the hot

spot. Subsequently, temporary shielding was installed. The post shielding survey of the work area indicated a 100 mrem/hr general area reading, primarily from other nearby sources, and no hot spots.

- On October 22, 1986, individual C was interviewed and informed the inspectors that he remembered individual B informing him of the dose rates (October 13, 1986) and confined spaces; however, based on the time being spent in the hot spot area at that time, he did not feel that the electricians would be receiving an amount of exposure sufficient to warrant shielding.

  Individual C informed the inspector that based on individual D's request for shielding and a discussion with one of the electricians of the time it would take to install new conduit, he contacted a C&RP engineer and requested an assessment of the work area. Within a short time the C&RP engineer inspected the work area where the hot spot was located, made out a temporary shielding request form, and had the hot spot shielded. From the time of the original request on October 15, 1986 it was estimated that it took less than one hour to have the hot spot shielded.

- On October 22, 1986, at 8:30 p.m. the inspector contacted individual A, by telephone, to discuss his concerns. His concerns were reverified. He also informed the inspectors that he had not worked in the area of the hot spot; however, he did work in other hot areas behind the bio-shield on the conduit job. He named the electricians who had worked in the hot spot area when asked by the inspectors.

- On October 23, 1986, the inspectors interviewed the four contract electricians involved in the bio-shield RTD conduit job including their superintendent. All of the electricians stated that the RP technicians covering the conduit job provided good service and kept them aware of the high and low dose rate areas. They also expressed concerns with the amount of time it took to have the hot spot shielded, being that it had been suggested by individual B on October 13, 1986, and not done until October 15, 1986.

  Based on the interviews, the inspectors learned that less than 30 minutes time had been spent near the hot spot (within 18") on October 13-14, 1986, with more time spent on the 14th. On October 15, 1986, it was estimated that about 30 minutes had been spent in the area. Exact times could not be substantiated.

- In review of the temporary shielding work sheet, No. TSR-86-069, the inspector noted it took 10 milli man-rem to install the shielding with an estimated 250 milli man-rem savings for the work at the hot spot location.

- The ACAS summary reports showed that the two electricians involved in the hot spotwork area used 68 milli man-rem on October 13, 1986, and 121 milli man-rem on October 14, 1986. On October 15, 1986, with the hot spot shielded, 360 milli man-rem was used by the two workers. Based on the work times and days of work it appeared possible that 53 milli man-rem may have been saved if the hot spot had been shielded on October 13, 1986. Based on the work time on October 15, 1986, it appears reasonable to estimate that 150 to 200 milli man-rem was saved by shielding the hot spot. According to the C&RP engineer who had the shielding installed, the cost was negligible for installing the shielding and was not considered in this case.

  The ACAS data provided PIC readings and times for each entry and exit on SWP No. 1335 for the electricians. Based on this data and assuming one half of the time was actually spent doing the work (allowing for the donning of PCs, entering and exiting the containment, etc.) the average dose rate for the two electricians involved with work in the vicinity of the hot spot was 15 mrem/hr on October 13, 1986, 20 mrem/hr on October 14, 1986, and 46 mrem/hr on October 15, 1986. The alleger did receive 303 mrem during those three days and had a total of 365 mrem for the period October 1-24, 1986, but not connected with the area of the hot spot.

Based on the above observations it was determined that a small amount of exposure was incurred by not shielding the hot spot on October 13, 1986. However, the source was shielded on October 15, 1986, and provided a savings of approximately 150-200 milli man-rem. Although the allegation was substantiated no violations of NRC requirements were identified. It also appears reasonable to infer that the best judgement may not have been exercised on October 13, 1986, by individual C. This matter is considered closed.

No violations or deviations were identified.

I. Outage Meetings and Management Involvement

The inspectors attended several RP shift turnover, foreman and department meetings. These meetings were conducted twice daily to discuss outage and sitewide activities. Items such as outage status, scheduling, ALARA and problems associated with both plants were discussed.

The inspectors observed that the RP supervisor was directly involved in the initial phases of all major jobs, was heavily involved with all jobs as they occurred and was conducting routine plant walkdowns. It was also noted that the RP manager was cognizant of the plant status and associated problems.

No violations or deviations were identified.

J. Work Hours

The inspectors examined the RP staff time sheets and the licensee work hour summary data reports. The RP staff was noted to be working 10 and 12 hours per day, and six days per week for the Unit 1 outage. The inspectors verified that authorizations for overtime work hours were consistent with licensee procedures and TS 6.2.2.f.

No violations or deviations were identified.

K. Unusual Occurances

1. On October 1, 1986, the licensee noted that one of the fuel assemblies (A-06) had tilted about 10 degrees from its normal upright position in the Unit 1 core during fuel off loading operations. The actual time of this event had not been noted by the licensee. Due to the possibility that some associated stress may have resulted in loss of fuel cladding integrity, the RP department checked the status of the constant air monitor near the work area, took and compared wipe tests against previous results, and obtained an air sample. The licensee did not observe any indication of loss of fuel integrity that could have resulted in a release of activity. The constant air monitor's computer memory was also read and indicated no abnormalities that would indicate any airborne releases had occurred. In addition computer based data from the area radiation monitor (RE-02) and plant vent monitor memories were obtained, and showed no indication of increases that would identify an activity release problem.

   On October 2, 1986, the operations for uprighting and transferring the tilted fuel assembly were controlled under SWP No. 86-1498. The licensee conducted a prefuel movement meeting with all personnel involved. This was attended by the inspector. The operations department covered details of the forthcoming sequence for uprighting the tilted fuel assembly and the RP department covered all the SWP special instructions for radiological controls to be followed during the operation.

   The inspector observed activities in the control room during the uprighting and movement of the fuel assembly to the upender fuel transfer device. The inspector noted no increases in plant vent or area radiation monitor readings. The transfer occurred without incident, DCPP upper management personnel were onsite to observe activities, and the RP supervisor provided direct oversite of the special radiological controls implemented during this operation. The inspector noted no items that would indicate a weakness in radiological controls. The operation appeared to be well planned and executed.

2. Between September 27, 1986, at 11:00 p.m., and September 28, 1986, at 2:00 a.m., an incident occurred in the Unit 1 FHB that resulted in an abnormal release of noble gas activity and evacuation of the FHB. The inspector briefly discussed the occurrence with the RP manager and supervisor on September 29, 1986, and performed an in office review of the licensee's NCR,

No. DC1-86-TC-N118. The incident occurred while filling the Unit 1 SFP with water from the Unit 2 liquid waste holdup tank which contained relatively fresh RC water from Unit 2. On September 28, 1986, at 12:50 a.m., RP obtained an air sample in the Unit 1 FHB after the area air monitor alarmed. The air sample results showed that there were 124 MPC's of noble gas in the FHB at the time the sample was taken. The licensee calculated the release from the plant vent to be 0.125% of the TS 3.11.2.1 release rate limit based on current favorable atmospheric conditions. The licensee noted that had the atmospheric conditions been as encountered on average during the past 5 years, the release from the plant vent could have been as high as 22% of the TS release rate limit. The licensee determined that this event was not reportable under 10 CFR 50.72 or 10 CFR 50.73. However, the incident will be reported in the next semiannual effluent release report (10 CFR 50.36a). The licensee determined that no individual exceeded any MPC hour limits and calculated radiation doses, to personnel involved in the FHB, to be less than 11 mrem/person.

The basic cause of the incident appeared to be a lack of coordination between the operations and C&RP departments as a result of weaknesses in operating procedures. The licensee informed the inspector that they intend to make procedural changes and will coordinate activities with the C&RP department when the Unit 2 SFP is filled during their upcoming refueling outage in early 1987. The licensee's corrective actions to prevent recurrence of similar incidents will be examined in a subsequent inspection (50-275/86-38-01 Open).

No violations or deviations were identified.

4. Radiological Environmental Monitoring

The licensee's radiological environmental monitoring program prescribed in TS Section 3/4.12 was reviewed. This review included a tour of six continuous air sampling stations during the onsite inspection, discussions with licensee personnel, and a review of QA audits and the Annual Radiological Environmental Operating Report for 1985. The inspection also included a visit to the licensee's DER Environmental Radiological Monitoring facility located in San Ramon, California, on October 27, 1986. At the DER facility, the inspector toured laboratory facilities, reviewed selected procedures and records and held discussions with DER personnel.

A. Audits

Quality Assurance (QA) Audit Report No. 86022T was reviewed. The audit was conducted February 3-13, 1986, to verify that DER had implemented the Radiological Environmental Monitoring Program for DCPP. The audit included a tour of the DER facility in San Ramon and the DCPP environmental monitoring stations; interviews with cognizant management personnel; and review of sample collection records, radiological data summary sheets, equipment calibration

records, Environmental Protection Agency (EPA) and State of California intercomparison records, Inter-Laboratory analysis records, DCPP Land Use Census, and the Radiological Environmental Operating Report for 1984. The audit identified three deficiencies resulting in AFRs Nos. 86-020, 86-021, and 86-022 and required correction action. No NCRs were issued. The audit also included two recommendations. The audit concluded that with the exception of the three AFRs, DER had been effectively implementing their Radiological Environmental Monitoring Program.

The probable cause of and corrective actions associated with each AFR were also examined. The AFRs indicated a failure to perform weekly background counts on the two gamma spectrometry systems as required by Procedure D-3; a failure to perform ^{3}H analysis during 1985 of certain sea water samples in accordance with Procedure B-8a, although the TS does not require them; and a lack of timeliness in iodine-131 analyses of milk and drinking water samples. The recommendations indicated the need to update their training plan, formalize retraining of group personnel and the need to index the current listing of verified computer programs in the Records Management System along with algorithm documentation and documentation pertaining to computer program modifications. The inspector noted that the AFRs did not involve any significant safety matters and that the responses and corrective actions were taken and appeared appropriate.

No violations or deviations were identified.

B. Annual Report

The licensee's Annual Radiological Environmental Operating Report for 1985 was reviewed in-office. This timely report addressed the annual radiological monitoring results of marine samples, terrestrial samples, air particulate and iodine samples, and direct radiation measurements. The results from DER's participation in the EPA's cross-check program, State cross-check program, and the current land use census of plant environs were also included in the report. The licensee noted no trends during this report. Since this was the first full year of surveillance following criticality, a comparison with previous environmental surveillance reports was determined to be inappropriate at this time. The licensee observed no radiological impact on the environment from plant operation. The analytical data indicated that radioactive materials released from the plant to unrestricted areas were below or slightly above the levels of detectability. Program variances were also reported. No errors or anomalies were identified (86-AN-01, Closed).

C. Air Sampling Stations

On October 22, 1986, the inspectors observed particulate and radioiodine air samples being changed at samples locations MT1, OS2, 2F2, SF1, 7D1 and 8S1. Samples are changed every 6 days by DER personnel and sent to the San Ramon facility for analysis. Log books were maintained at the sample locations to record dates of air

monitor calibrations, abnormalities, sample changes and other pertinent data. No abnormalities or anomalies were noted.

D. Procedures and Documents

The following procedures, documents and records were reviewed for implementation of the licensee's radiological environmental monitoring program.

Procedures

- A-7 Environmental Radiological Monitoring Procedure - DCPP (Normal Operations)
- A-2a Air Monitoring Schedule - DCPP
- A-3 Environmental TLD Schedule - DCPP
- A-4 Equipment Calibration Schedule
- A-5a Reporting Schedule - Routine Reports
- A-5b Reporting Schedule - Special Reports (Nonroutine Reports)
- A-6 Laboratory Intercomparison Schedule
- A-11 Review of Radioanalytical Data for DCPP and HBPP
- A-12 Land Use Census

Documents and Records

- Results of Seventh International Intercomparison of Environmental Dosimeters (April-July 1984), issued March 18, 1985
- EPA Environmental Intercomparison reports
- Training records
- Laboratory counting equipment calibrations

Based on the reviews, observations made during the inspection, and discussions with licensee representatives the inspectors determined that the licensee appeared to be effectively implementing their radiological environmental monitoring program.

No violations or deviations were identified.

5. Licensee Reports

A. Semiannual Radioactive Effluent Release Report

The licensee's Semiannual Radioactive Effluent Release Report for the period of January 1, 1986, through June 30, 1986, was reviewed in-office. This timely report was issued in accordance with TS 6.9.1.6 and included a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from both Units as outlined in RG 1.21. No errors or anomalous data were identified.

No violations or deviations were identified.

B. Licensee Identified Problems - NCRs

NCR No. DC1-86-TC-N118 was discussed in paragraph 3.K.2. of this report.

NCR No. DCO-86-OP-N122 was briefly discussed with the licensee and given a partial in-office review. This NCR concerned radioactive liquid effluent discharge flowrate and volume discrepancies. The licensee had noticed, from radioactive liquid discharge permit data, that in some cases the maximum allowable flow rates specified on the discharge permits may have been exceeded based on discharge time and tank volume. Volumes of discharges are determined by tank level difference in accordance with procedure CAP A-5, Liquid Radwaste Management. Volumes of liquids discharged as indicated using the flow integrator, FM-20, have consistently been about 14% lower than the volumes indicated from tank level differences. Some of the supporting data attached to the NCR indicate that, in some cases, the volume released as indicated by FM-20 was a factor of 3 lower than the volumes indicated by tank level differences. The licensee determined that this problem was not reportable under 10 CFR 50.36 and 50.73 and 10 CFR 20 and that this did not represent a violation of TS requirements. The final resolution and licensee actions will be examined in a subsequent inspection (50-275/86-28-02 and 50-323/86-26-01, Open).

NCR No.DCO-86-TC-N102 concerned the licensee's failure to provide final termination dose reports to two workers as required by 10 CFR 20.408 and 20.409. The problem occurred during the integration of the licensee's old computer based system into the PIMS during June 1986. The delivery of one worker's termination report exceeded the 30 day reporting requirement and one worker's exceeded the 90 day reporting requirement. Based on review of the prompt corrective action taken by the licensee upon identification of this problem and of the action taken to prevent recurrence, the inspectors had no further questions regarding this matter.

Followup on Generic Letter

The licensee had incorporated the recommendations provided in Revised NRC Form 439, Report of Terminating Individuals' Occupational Exposure, dated July 1, 1986, in reference to Generic Letter No. 85-08, 10 CFR 20.408 Termination Reports - Format, dated May 23, 1985. The revised Form 439 format was being used only for PG&E employees. The licensee was evaluating the use of the form for

contract workers and visitors. The licensee was also evaluating the use of electronic media to transmit termination data to the NRC.

No violations or deviations were identified.

6. Facility Tours

Several tours of the Turbine Building and Auxiliary Building of Units 1 and 2, the Unit 1 FHB and containment, and the new laundry facility were conducted by the inspectors during this inspection period. The inspectors were accompanied by licensee personnel on several occasions. The inspectors held discussions with workers, observed work being performed and made independent radiation surveys. Radiation surveys were made using a NRC RO-2 portable ion chamber, S/N 897, due for calibration January 9, 1987. During these tours the following observations were made:

- On October 2, 1986, the inspector observed that the licensee's new laundry and old solid radioactive waste facility had been fenced off and incorporated into the main RCA. The inspector also noted that the only normal entry to the laundry facility (located on the second floor of the old waste storage facility) was by use of an elevator as the stairway was blocked by the RCA fence and a padlocked gate. The gate was installed on the stairway between the second and first floor levels. Both, the elevator and stairway are located at the southern end of the building. The fence separated the new solid waste storage facility, under final construction phases, from the controlled area. The inspector further noted a wooden ladder (about 25 ft. in length) leading from the ground level to the laundry facility, adjacent to the second floor elevator door. A sign at the elevator entrance on the second level stated, "In Case of Fire Use Stairway Do Not Use Elevator." With the stairway blocked by the locked gate and no keys available for the lock on the gate, the only exit from this end of the facility during a fire would be the installed wooden ladder. There was an emergency exit at the north end of the laundry facility that led to outside areas via a loading ramp; however, if a fire was at that end of the facility it would not be available for use.

  The inspector questioned the workers in the laundry facility as to their actions in the event of a fire at the north end of the facility. The workers stated that they would have to use the ladder since the elevator was not to be used in case of fire and the stairway was blocked off by a locked gate. The inspector was also informed that the ladder was sometimes used as the normal method to gain entrance to or exit from the laundry facility when the new elevator was not working.

  This matter was discussed with licensee management. They acknowledged the inspector's concerns. On October 21, 1986, during a subsequent tour, the inspectors noted that the gate on the stairway was unlocked and available for emergency use. The gate was properly posted as required by 10 CFR 20 and licensee procedures to prevent uncontrolled access into the RCA.

- Housekeeping was generally in good order within the RCAs and radioactive waste in the work areas was maintained at a minimum. On September 30, 1986, however, the inspector noted that a welding zone and nearby areas, between the Unit 1 main transformers and Turbine Building, appeared to be excessively cluttered with rags and paper clothing. This was brought to the licensee's attention and was noted to be in good order on October 1, 1986.

- Step off pads (SOP) were properly utilized, personnel contamination and survey instruments were working properly and the instruments displayed current calibration dates. Maps were affixed to SOPs providing direction to the nearest personnel frisking station. Workers were observed to be properly dressed in PCs, and equipped with required personnel monitoring devices. SWPs were posted near work zones providing the radiological conditions, special instructions and dress requirements. The licensee had placed signs indicating low radiation waiting zones in various areas of the containment and Auxiliary Building. These signs were considered a good ALARA practice as they were designed to keep workers cognizant of low radiation areas.

- Through discussions with workers it was found that they were aware of SWP and/or RWP requirements and special instructions.

In addition to the above observations, the inspectors observed that all radiation and high radiation areas were posted as required by 10 CFR Part 20 and that access controls were consistent with TS 6.12 and licensee procedures.

No violations or deviations were identified.

7. Exit Interview

The inspectors met with licensee representatives (denoted in paragraph 1) at the conclusion of the inspection on October 24, 1986. The scope and findings of the inspection were summarized. The licensee was informed that no violations or deviations were identified.